Kommuninvest Green Bonds Impact Report

December 2022

KOMMUNINVEST

This report in brief

Report on 541 Swedish local government investment projects financed by Kommuninvest Green Bonds as of year-end 2022.

At 31 December 2022, Kommuninvest had disbursed a total of SEK 65.3 (58.1) billion, equivalent to USD 6.3/EUR 5.9 billion, in Green Loans to investment projects aligned with our Green Bond Framework.

This report presents the expected annual impacts of these projects, the governance process to verify and select them and the impact reporting methodology we apply. Unless otherwise indicated, 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 2022, representing Kommuninvest's financed impact.

65.3 SEK bn

GREEN LOANS

Green Loan Ratio[1]:

13.5 %

63.3 SEK bn

GREEN BONDS

Green Bond Ratio[2]:

11.6 %

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.

Annual greenhouse gas (GHG) emissions savings

702,221 tCO_2

674,987 tCO_2
avoided annual emissions[3]

27,234 tCO_2
reduced annual emissions[4]

13.0 tCO_2 per SEK mn

Impact in tonnes CO_2 per SEK million in Green Loan disbursements

206,776

Number of person equivalents supplied by water and wastewater facilities, p.e.

163 tonnes per year

Reduced nitrogen emissions from water and wastewater facilities

2.5 TWh

Annual renewable energy generation, incl. rooftop solar cells on buildings

26.0 GWh

Energy savings from energy efficiency projects

Energy savings in green buildings

55.7 GWh

Whereof avoided energy use[3]
45.0 GWh

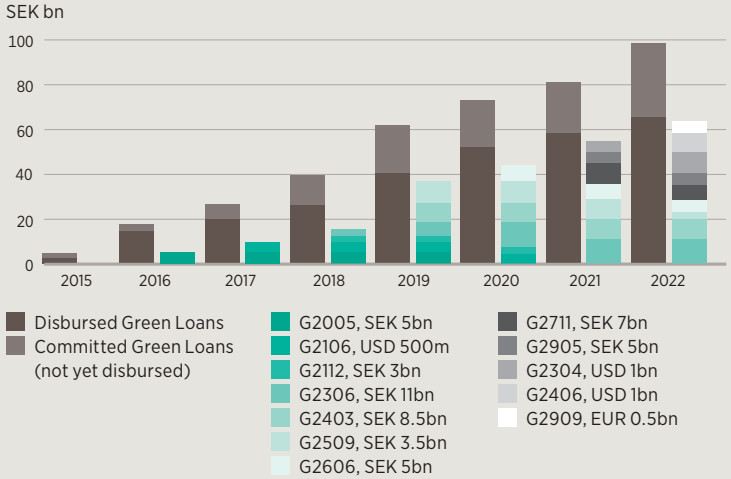
Whereof reduced energy use[4]
10.7 GWh

3) Refers to a baseline/alternative reference scenario.
4) Refers to a direct or absolute reduction in operation.

Executive Summary

as of 31 Dec 2022

Green Loans and Green Bonds

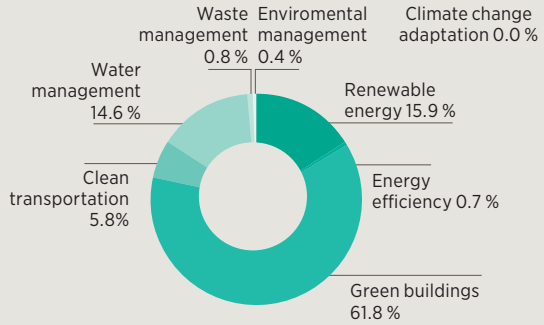


Basic information

Green Bond Frameworks applied	Report comprises projects financed under frameworks dated May 2021, March 2018, January 2016 and May 2015
Related Green Bond ISIN(s)	XS1897258098; XS2081157401; XS1968465572; XS2311395169; XS2530407340; XS2351401109; XS2259127269; XS2402061530; XS2462606489
External verifier of allocation report	KPMG
Reporting period	Reporting for calendar year 2022. Comprises all eligible projects financed from GB programme start in 2015 until year-end 2022.
Report publication date	April 28, 2023
Frequency of reporting	Annual
Next reporting planned for	March 2024
Reporting approach	Portfolio-based and project-by-project reporting

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	614,491	10,367	59
Green buildings	10,299	40,351	0.3
Energy efficiency	29,675	470	63
Clean transportation	26,771	3,761	7
Waste management	5,595	520	11
Water management	15,390	9,551	2
Climate change adaptation	n/a	0	n/a
Enviromental manegement	n/a	276	n/a
Total	**702,221**	**65,296**	
Disbursed amounts with CO_2 impact		**54,198**	
Impact, tonnes CO_2e per SEK mn			**13.0**
Annual renewable energy generation, MWh			**2,544,714**
Annual energy reduced/avoided, MWh			**81,701**

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 41–49. 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]	**97 %**
Whereof impact attributable to each Green Bond outstanding as of 31 Dec, 2022	
G2304: USD 1bn, maturing 24 April, 2023	15 %
G2306: SEK 11bn, maturing 1 June, 2023	17 %
G2403: SEK 8.5bn, maturing 27 March, 2024	13 %
G2406: USD 1bn, maturing 19 June, 2024	13 %
G2509: SEK 3.5bn, maturing 1 September, 2025	5 %
G2606: SEK 5bn, maturing 10 June, 2026	8 %
G2711: SEK 7bn, maturing 26 November, 2027	11 %
G2905: SEK 5bn, maturing 16 May, 2029	8 %
G2909: EUR 0.5bn, maturing 1 Sep, 2029	8 %

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

Key facts

- This report outlines the allocation of Green Bond proceeds to Green Loans that finance eligible green investment projects in Swedish municipalities and regions. Each investment project has been selected, reviewed and approved according to the process outlined on page 17. The complete framework is available online.
- As part of the annual impact reporting process, we may identify investment projects which no longer comply with framework requirements. Such projects are excluded from the reporting. We also consolidate those Green Loans that correspond to the same physical investment project. The above affects the number of reported projects, the disbursed Green Loan volume and the Green Loan Ratio, and means that values in this report differ from those in our Annual Accounts, including the annual report. This report totals 541 projects at year-end 2022, compared with 563 in the Annual Accounts.
- Kommuninvest reports on a portfolio basis in Swedish kronor (SEK) based on nominal amounts. Green Bonds issued in EUR and USD are converted to SEK using the F/X rate as per the date of issuance.
- Kommuninvest reports impact based on the share of the project's total investment cost financed with Green Loans. Impacts are based on outstanding disbursed amounts to projects (net of redemptions).
- Reporting is undertaken in accordance with recommendations outlined in the Nordic Public Sector Issuers: *Position Paper on Green Bonds Impact Reporting.*

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KOMMUNINVEST
kommuninvest.se
Cover page: Shutterstock

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 294 out of Sweden's 310 local governments, of which 280 municipalities and 14 regions. Kommuninvest is the largest lender to the Swedish local government sector and the sixth largest credit institution in Sweden. At year-end 2022, total assets were SEK 553 billion (USD 53 billion[1]). The head office is located in Örebro.

1) USD/SEK= 10.4031 as of 31 Dec, 2022

About this report

This report was written and compiled by: **Björn Bergstrand,** Head of Sustainability, **Hanna Leife,** Sustainability Strategist, and **Edvin Gepertz,** Sustainability Accounting

Any errors, omissions or otherwise are our responsibility.Project impact reporting is based on data collected from financed projects during Q1-2023. 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 9.

Green Bonds

Green Bonds outstanding

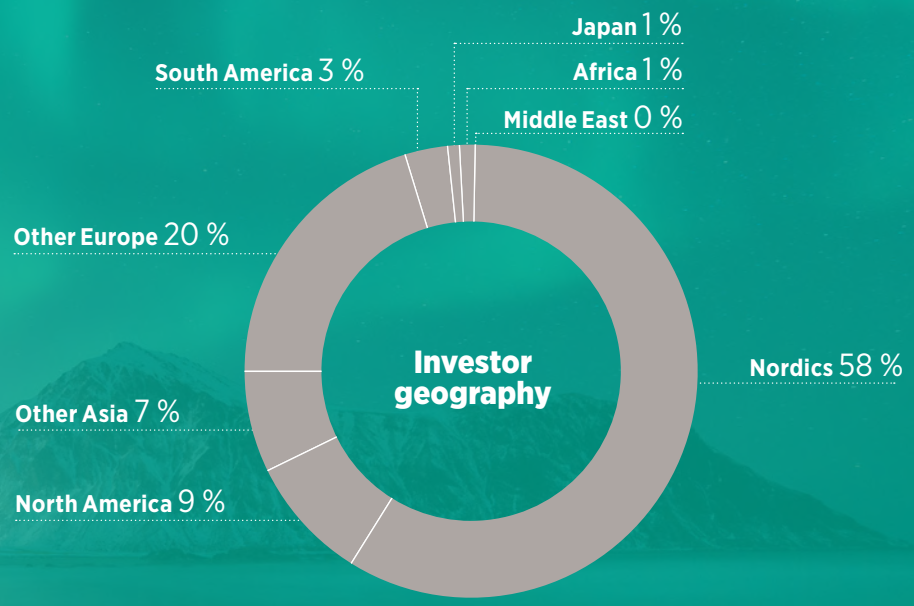
63.3

Billion SEK

Green Bond Ratio

11.6 %

(share of funding)



Kommuninvest issued its first green bond in 2016 and has since evolved to become one of the largest Nordic green bond issuers, and the largest in Sweden. Demand for our issuances is broad-based, encompassing dedicated green investors across the globe.

At year-end 2022, the equivalent of SEK 63.3 billion was outstanding in nine green bonds denominated in SEK, USD and EUR. The green bond framework allows financing in eight project categories. In the second opinion from CICERO, four of these are characterized as “dark green”, signaling investment projects aligned with the 2050 climate targets. Overall, the framework has a “medium green” shading.

Outstanding Green Bonds

Issue date	Amount issued	Maturity	Coupon	ISIN
20 Nov, 2019	USD 1 billion	24 Apr, 2023	1.625% (semi-annually)	XS2081157401
23 Oct, 2018; 17 Sep, 2019; 27 May, 2020*	SEK 11 billion	1 Jun, 2023	0.625% (annually)	XS1897258098
27 May, 2019; 18 June, 2019**	SEK 8.5 billion	27 May, 2024	0.375 (annually)	XS1968465572
10 Mar, 2021	USD 1 billion	19 Jun, 2024	0.375 % (semi-annually)	XS2311395169
8 Sep, 2022	SEK 3,5 billion	1 Sep, 2025	3.000 (annualy)	XS2530407340
10 Jun, 2021	SEK 5 billion	10 Jun, 2026	0.375 (annually)	XS2351401109
19 Nov, 2020	SEK 7 billion	26 Nov, 2027	0.250% (annually)	XS2259127269
28 Oct, 2021	SEK 5 billion	16 May, 2029	0.875 (annually)	XS2402061530
30 Mar, 2022	EUR 0,5 billion	1 Sep, 2029	0,875 (annualy)	XS2462606489

* SEK 3 billion was issued on 23 October, 2018 and the bond and the bond was subsequently tapped for SEK 3 billion and SEK 5 billion, respectively.

** SEK 3.5 billion was issued in 2019 and the bond was tapped for SEK 5 billion.

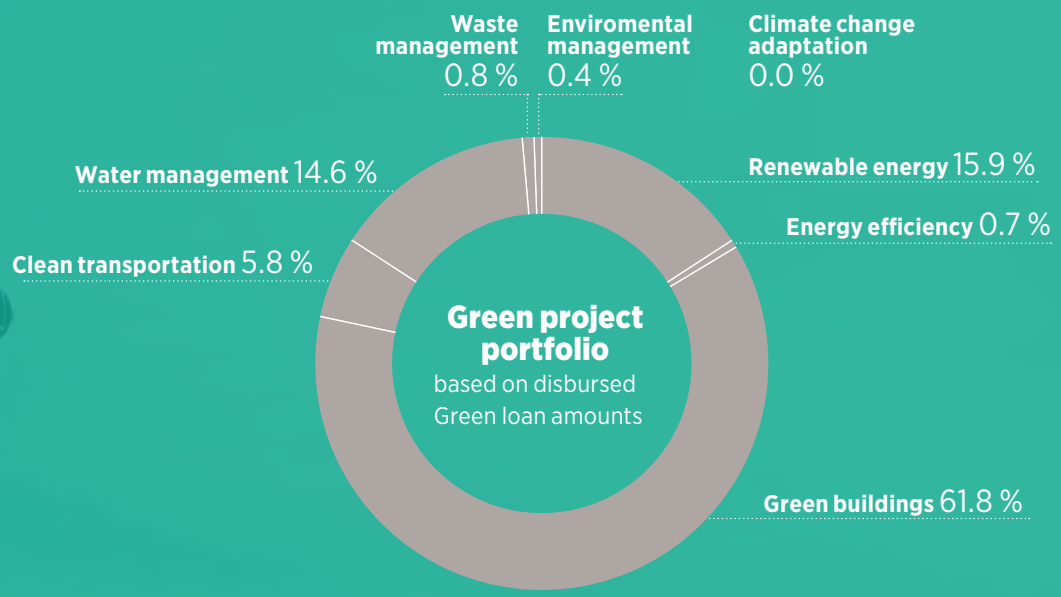
Green Loans

Green Loans
(disbursed and outstanding)

65.3
Billion SEK

Green Loan Ratio
(share of lending)

13.6 %

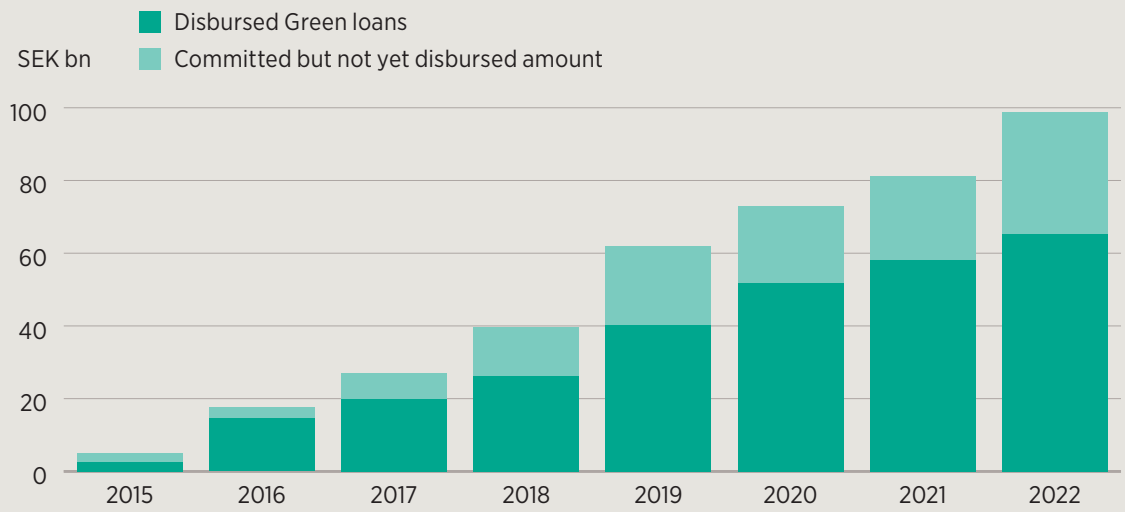


In 2015, Kommuninvest began offering reduced-rate Green Loans for investments that contribute to addressing local and regional climate and environmental objectives. The Green Loans are financed by green bonds.

The demand for Green Loans has increased substantially since launch, outpacing the general borrowing trend amongst Swedish municipalities and regions. In 2022, Kommuninvest's Green Loan portfolio increased by SEK 7.2 billion to a total of SEK 65.3 billion (based on disbursed amounts).

Growth of the Green Loan portfolio accounted for the lion's share of the growth in Kommuninvest's total loan portfolio, contributing to increasing the Green Loan Ratio to 13.6 (12.6) percent.

Green loans 2015–2022



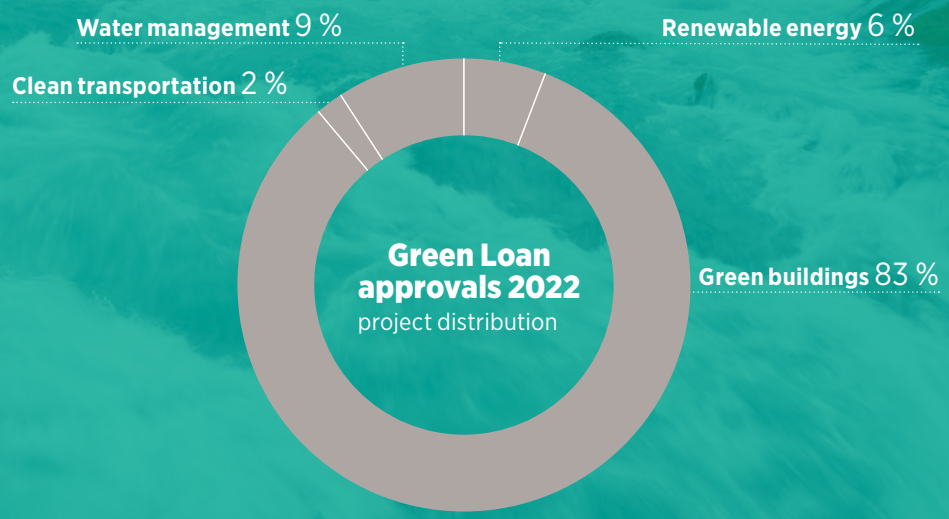
2022 in review

New Green Loan approvals

52

Green Bonds issued

2



Kommuninvest's green financing framework has grown every year since inception. In 2022, 52 (88) investment projects were awarded Green Loan status and total Green Loan disbursements increased by 12 percent to SEK 65.3 (58.1) billion.

Two green bonds for a total of SEK 8.7 billion were issued, including a SEK 3.5 billion bond and an inaugural euro-denominated green bond, for EUR 500 million.

The process of gradually sharpening green building eligibility criteria continued. The purpose is to address the climate-impact from the construction phase in addition to existing requirements for low energy use. From 2021, all new building projects must demonstrate that concrete measures are undertaken for the construction, for example by using a wooden frame (see case example on page 29). In early 2022, these requirements were complemented by a requirement to calculate the embedded impact in CO_2 terms.

Taxonomy alignment of framework underway

During 2022, Kommuninvest, based on recommendations from its Green Bonds Environmental Committee, resolved to initiate a gradual/partial EU Taxonomy adaptation of the framework. The objective for the first update is for all project categories, where the Committee has deemed it feasible and reasonable, to align with taxonomy eligibility criteria for "significant contribution" to at least one of the EU's six environmental objectives. During 2023, Kommuninvest expects to engage in consultation with members and clients regarding proposed framework amendments.

Promoting green transition

Kommuninvest's green financing programme was launched in 2015 with a Green Loan for a wind farm development in northern Sweden. It is now one of the largest programmes in the Nordic countries.

In 2022, 52 green investment projects in Swedish cities and regions were approved for inclusion in the programme, bringing the total number financed to 563, of which 541 are included in this reporting. At year-end, total loan disbursements exceeded SEK 65 billion; as a share of Kommuninvest's total lending the Green Loan ratio was 14 percent.

Green financing is today well established inside Swedish municipalities and regions. 186 out of Kommuninvest's 294 member municipalities and regions had at least one green project approved for financing, either for its own funding or for that of a subsidiary municipal company, foundation or other; 28 of them have had five projects or more approved, with some ranging from 15 to 30 projects. In a further sign of the attractiveness of green financing, demand for Kommuninvest's Green Loans grew at a more rapid pace than for its traditional loan products.

This is likely a reflection of the progressive and ambitious climate and environmental work undertaken at the local and regional level. Many cities today aim to be fossil-free and/or climate neutral by 2030; Sweden as a nation has the goal of becoming a fossil-free welfare society with net-zero emissions by 2045.

Kommuninvest wants its green financing programme to serve as a supporting tool in the implementation of long-term climate investment plans by local and regional authorities. Our role, as members of the Kommuninvest Green Bonds Environmental Committee, includes ensuring that the green bonds framework is fit for purpose.

Therefore we have gradually tightened eligibility criteria, particularly with regards to life cycle perspectives in green buildings, the largest framework project category. Now, a partial taxonomy alignment is underway. In this work, we are keen to strike a good balance, so that any changes are also well aligned with good practice at the local government level. We strongly support Kommuninvest's objective that all its clients should be able to use green financing.

As usual in these letters, we place a strong emphasis on the climate work undertaken on the ground. However, we also want to extend our thanks to the green bond investor community, which continues to solidly support Kommuninvest's issuances in green format. We, who work inside the local governments, know that this type of financing is highly conducive to promoting a green transition.

The Kommuninvest Green Bonds Environmental Committee:
Hanna Ryman, Municipality of Örebro; Andreas Hagnell, Swedish Association of Local Authorities and Regions; Susanne Arneborg, City of Borås (chairperson); Lisa Järner, City of Mölndal; Charlotte Billgren, Tekniska verken i Linköping AB.

Supporting sustainable local governments

Kommuninvest's sustainable finance solutions foster efficient use of tax revenues, financial stability and the local government sector's work with Agenda 2030.

Sweden has a decentralised societal model in which municipalities and regions are responsible for much of society's services. The basic tasks of municipalities and regions include, for example, healthcare, education, social care, urban planning and regional development responsibilities, which are directly or indirectly related to the implementation of the 2030 Agenda. They therefore manage much of the basic social infrastructure, in the form of housing, energy supply, public transport, water management, waste management, etc.

How we generate sustainable values

At year-end 2022, Kommuninvest had 294 out of Sweden's 310 local governments as members/owners and accounted for 59 percent of their external financing. As the largest lender to the sector by far, we generate both direct and indirect values.

Crucially, the financing solutions, knowledge and debt management tools we provide benefit financial stability in Swedish municipalities and regions and help develop members' debt management expertise. Accordingly, essential investments in welfare and sustainability can be made more efficiently and at a lower cost to taxpayers.

Specifically, we support our members' sustainability work with financing products clearly focused on environmental and social sustainability. Green Loans were launched in 2015 and accounted for 14 percent of Kommuninvest's lending at year-end 2022. Social Sustainability Loans were introduced in 2021; by year-end 2022 16 loans and SEK 1.7 billion in committed funding had been approved.

The 2030 Agenda in municipalities and regions

The 2030 Agenda has had a major impact in many municipalities and regions, including by integrating the Agenda into their regular targets and budget processes, monitoring systems, surveys and strategic plans. The Agenda is also incorporated in their strategic communication work and in regional development strategies. All in all, work performed at the local and regional level is an important contribution to the Agenda's impact at the national and international level.

Net zero by 2045:

Kommuninvest as a tool for the Swedish municipal sector

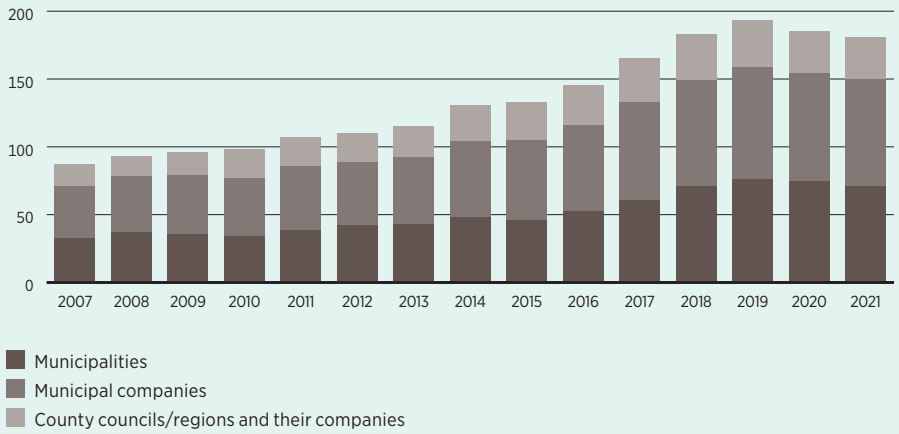
Kommuninvest's stated climate objective is to be a tool and support to enable the municipal and regional sector to reach Sweden's goal of climate neutrality by 2045. The core of our climate work is to, with relevant support and through active dialogue with municipal borrowers, contribute to reduced greenhouse gas emissions in Swedish municipalities and regions.

The goal means that the municipal and regional operations financed by Kommuninvest shall have no net emissions of greenhouse gases into the atmosphere in 2045. We aim to have established a present value of financed greenhouse gas emissions for the lending portfolio by 2024, using these to establish transition pathways including intermediate targets.

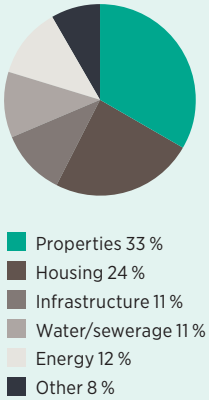
Find out more:
klimatkommunerna.se
viablecities.se
fossilfrittsverige.se

Local government investment volumes, total

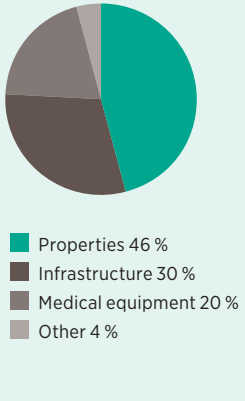
SEK bn



Municipal investments, distribution (2021)



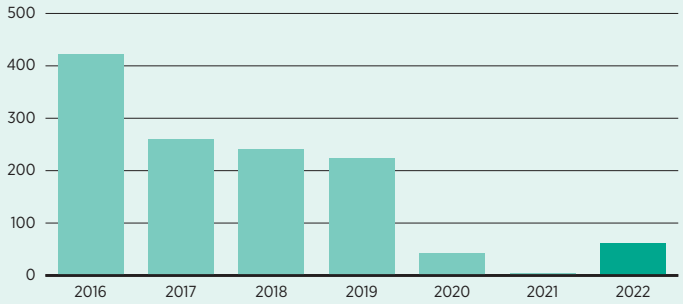
Regional investments, distribution (2021)



ESG Ratings: Ranked among the top public credit institutions

	Rating	Rating Category	Peer Group Comparison
Corporate ESG Performance Prime ISS ESG	B–	Prime	Top 5 out of 78 issuers rated
MSCI	AA	n/a	Maintained 2nd highest rating since 2017
SUSTAINALYTICS	12.4	Low ESG risk	

CO_2 emissions from business travel, tonnes



Source: Big Travel, with processing by Kommuninvest (emission values have been multiplied by a so-called RFI factor of 1.9 for the aviation industry's high altitude effects). Reductions in 2020 and 2021 strongly influenced by the Covid pandemic.

ENVIRONMENTAL INDICATORS – KOMMUNINVEST GROUP

	Unit	2022	2021	2020
Energy consumption				
Total energy consumption (in buildings)[1]	kWh	536,811	561,117	518,793
– of which, electricity	kWh	248,268	325,657	334,963
– of which, heating	kWh	216,381	235,460	183,830
– of which, cooling	kWh	72,244	–	–
– of which, solar power	kWh	–5,586	–	–
Total CO_2 impact of energy consumption (in buildings)	Tonnes	95	119	119
– of which, electricity consumption[2]	Tonnes	78	103	106
– of which, from heating[3]	Tonnes	19	16	13
– of which, solar power	Tonnes	–2	–	–
Proportion of renewable energy in energy consumption of electricity	%	100	100	100
Change in electricity consumption compared to the preceding year	%	-24	-3	–13
Proportion of renewable energy in energy consumption for heating	%	100	100	100
Proportion of renewable energy in energy consumption for cooling	%	100	–	–
Total office space	m^2	2,217	2,217	2,217
Total energy consumption per square metre	kWh/m^2	242	253	234
Total energy consumption per employee	kWh	5,478	5,611	5,037
Resource usage				
Purchased office paper	Tonnes	0.3	0.1	0.4
– of which sustainability labelled paper (PEFC)	Tonnes	0.1	0.1	0.3
Proportion of sustainability labelled office paper, of total purchases	%	33	100	84
Total paper consumption per employee	Kg	2.7	1.1	3.8
Paper recycling, incl. purchased and delivered paper	Tonnes	2.1	2.0	1.6
CO_2 emissions avoided through recycling[4]	Tonnes	3.7	2.3	2.3
Business travel				
Total business travel[5]	Km	494,654	77,515	228,922
Total business travel per employee	Km	5,047	775	2,223
Total air travel	Km	275,250	14,899	90,363
Rail travel in Sweden	Km	203,382	44,504	120,241
Total CO_2 emissions from business travel	Tonnes	61	5	43
CO_2 emissions from business travel, per employee[6]	Tonnes	0.62	0.05	0.42
Total climate footprint				
Total climate footprint of the operations[7]	Tonnes	156	124	162
Total climate footprint per employee, CO_2e	Tonnes	1.6	1.2	1.6

1) Gross solar production: 5,668 kWh (reading 13 Jan 2023) of which 5,586 kWh was used for the building's own energy consumption, while 81.6 kWh was delivered to the grid.

2) The climate impact from electricity consumption, calculated applying an emissions factor for electricity of 315g CO_2e/kWh, in accordance with the principles for impact reporting applied by Kommuninvest for Green Bonds (Nordic Position Paper on Green Bonds Impact Reporting). The reported values are within Scope 2, in accordance with the Greenhouse Gas Protocol.

3) Climate impact from heating calculated with the latest available emission factor for district heating in the Municipality of Örebro in 2022, 131 g CO_2e/kWh, in accordance with the principles for effect reporting.

4) The emissions avoided through recycling over the year break down between 679 kg of plastics, 2,147 kg of paper, 174 kg of iron, 6 kg of hazardous waste and 473 kg of alternative raw materials. Source: Stena Recycling. Kommuninvest does not include emissions avoided by recycling resources, as the climate impact of the purchases in question has not been calculated.

5) Figure from 2021 is corrected from 76,865 to 77,515 due to an incorrect reading in 2021.

6) Values are adjusted for high altitude factor.

7) Including CO_2

Find out more in our Sustainability Report 2022, see Annual Report 2022 page 16–26.

KOMMUNINVEST GREEN TEAM

Björn Bergstrand,
Head of Sustainability

Daniel Nykvist,
Deputy Head of Lending

David Ljung,
Head of Lending

Edvin Gepertz,
Financial Analyst

Erik Törnblom,
Analyst

Hanna Leife,
Sustainability Strategist

Patrik Stenman,
Financial Advisor

Tobias Landström,
Deputy Head of Debt Management

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 more deeply involved in the Programme. The Programme is co-led by David Ljung, Head of Lending and Björn Bergstrand, Head of Sustainability.

Share of financing and refinancing

Kommuninvest Green Bond proceeds are used for financing of Green Loans, which in turn are used for new financing and refinancing of eligible investment projects. New financing is defined as the committed volume of Green Loans during the reporting year. Refinancing is defined as the committed volume of Green Loans before the reporting year.

Bottoms-up model, starting with the projects

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

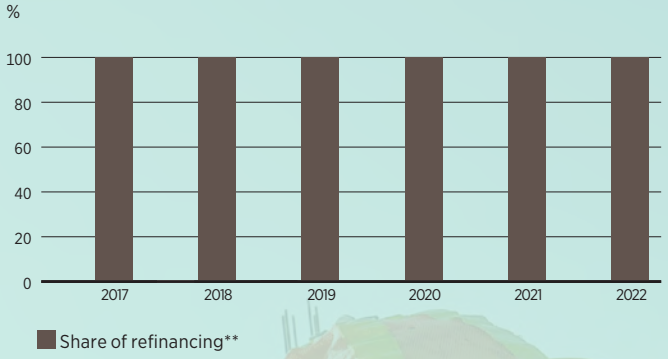
i) It enables Kommuninvest to manage its green framework in a conservative manner, with the size of the portfolio of approved Eligible Projects guiding the volume of Green Bonds issuance. As a rule, Kommuninvest aims for aggregated Green Bond Proceeds not to exceed total disbursements to Green Loans.

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.

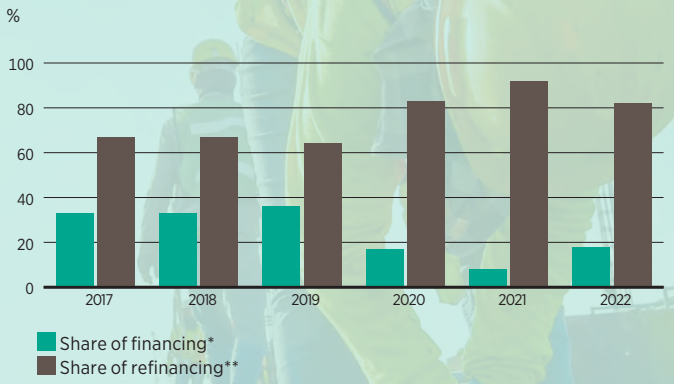
Reporting according to alternative approach

We report the share of financing and refinancing according to the alternative approach proposed in the Nordic Position Paper on Green Bonds Impact Reporting. We use this alternative approach because we find that the proposed reporting approach according to the EU Green Bond Standard, which is based on allocated amounts, is not directly applicable to our issuance model.

Share according to EU Green Bond Standard approach



Share according to alternative Nordic Position Paper approach



* Share of financing will always be 0%, given Kommuninvest's Green Bonds issuance model, whereby green bonds are issued in relation to the total volume of outstanding disbursed Green Loans.

** Committed amount is chosen over allocated/disbursed amount, as the committed amount captures disbursements that will be made in the future.

Share of financing and refinancing: EU GBS approach & Nordic Position Paper approach

Status per end of reporting year	2017	2018	2019	2020	2021	2022
Kommuninvest Green Bonds Framework						
Committed amount in Green Loans, SEK billion	26.6	39.7	61.8	74.7	81.2	98.6
Disbursed amount in Green Loans, SEK billion	19.9	25.8	40.3	52.5	58.1	65.3
Reporting according to EU GBS approach						
Share of financing (allocated amount to projects financed after bond issuance)*	0%	0%	0%	0%	0%	0%
Share of refinancing (allocated amount to projects financed before bond issuance)	100%	100%	100%	100%	100%	100%
Reporting according to alternative Nordic Position Paper approach						
Share of financing (committed amount** to projects during the year of reporting)	33%	33%	36%	17%	8%	18%
Share of refinancing (committed amount** to projects before the year of reporting)	67%	67%	64%	83%	92%	82%

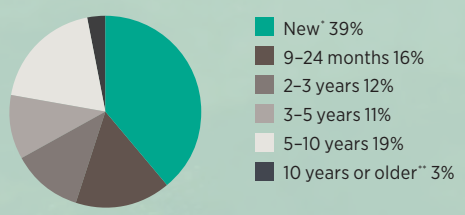
* Share of financing will always be 0%, given Kommuninvest's Green Bonds issuance model, whereby green bonds are issued in relation to the total volume of outstanding disbursed Green Loans

** Committed amount is chosen over allocated/disbursed amount, as the committed amount captures disbursements that will be made in the future

Age distribution of Eligible Projects

as of 31 Dec 2022

based on project completion and committed amounts

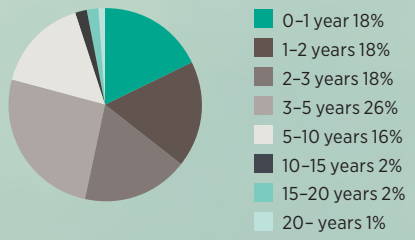


* Planned, on-going or a maximum of nine months has passed since completion

** 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 2022



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 most recently updated in February 2020. 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.
- Projects which no longer comply with the requirements of the Green Bonds framework are excluded from the reporting.
- 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.
- Greenhouse gas emissions savings from electrical energy production and electrical energy savings are calculated using an emission factor for electricity production in mainland EU and Norway of 315 CO_2/kWh.
- We report impact from activities financed by green bonds on a yearly basis.
- Please see pages 46–55 for further information about reporting methodology and baseline choices.

Project evaluation and selection

Green Loan applications are reviewed and finally approved by the Kommuninvest Green Bonds Environmental Committee, an advisory 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 at least a quarterly basis, reviewed and finally approved by consensus vote in the Committee.

The Committee, which is elected by Board of Kommuninvest, consists of expert officials from at least three member municipalities and regions as well as experts from other relevant public sector organisations or academia/non-governmental organizations.

COMMITTEE MEMBERS

1. **Chair: Susanne Arneborg**, Strategic Urban Planner, City of Borås
2. **Hanna Ryman**, Sustainability Manager, Municipality of Örebro
3. **Andreas Hagnell**, Senior Advisor Environment and Energy, Swedish Association of Local Authorities and Regions (SALAR)
4. **Lisa Järner,** Environmental Coordinator, City of Mölndal
5. **Charlotte Billgren**, Head of Sustainability, Tekniska Verken

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 categories

Kommuninvest Green Bonds finance investment projects in Sweden undertaken by our member municipalities and regions. We finance projects within eight areas of investment and subject to meeting pre-determined sustainability criteria.

The following pages present an overview of the green project categories and their impact, as well as lists of the approved projects which were approved during 2022. The complete project-by-project reporting, covering all investment projects in the Green Loan portfolio as of year-end 2022, is available at the Green Bonds section of Kommuninvests website, kommuninvest.se

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

Project portfolio summary

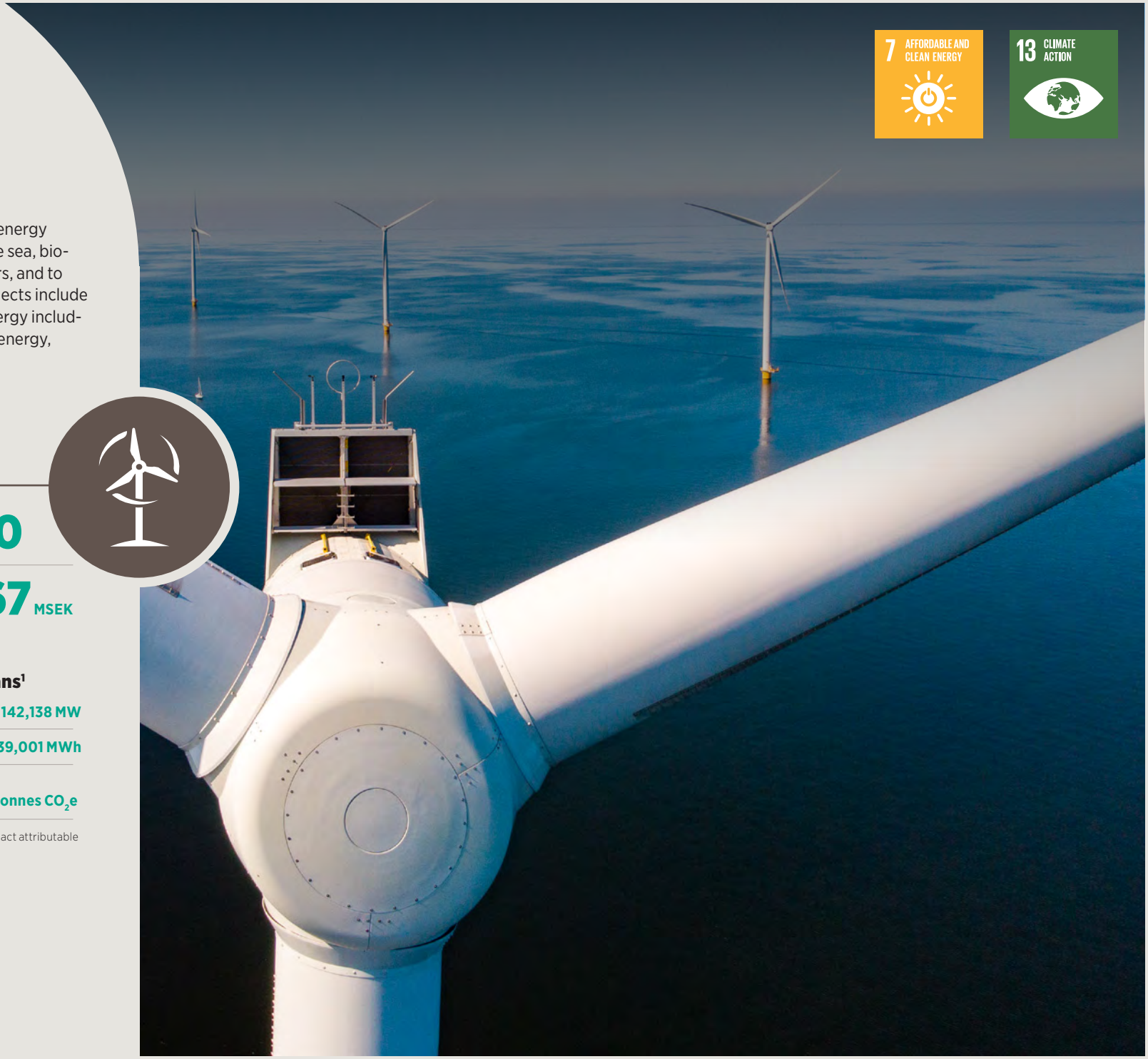
Project category	Sustainable Development Goals	EU Environmental Objectives	Total # projects	New projects in 2022	Disbursed Green Loans, SEK mn	Renewable energy production (MWh/year)	Energy reduced and avoided (MWh/year)*	GHG emissions reduced/ avoided, tonnes CO_2e/year	Committed Green Loans, SEK million	Disbursed Green Loans, SEK million
Renewable energy	7, 9, 11, 13	Climate change mitigation	70	3	10,367	2,539,001	n/a	614,491	14,020	10,367
Energy efficiency	7, 11, 12, 13	Climate change mitigation	8	0	470	n/a	26,001	29,675	644	470
Green buildings	9, 11, 13	Climate change mitigation	327	34	40,351	5,713	55,700	10,299	56,515	40,351
Clean transportation	11, 12	Climate change mitigation	20	3	3 761	n/a	n/a	26,771	8,958	3,761
Waste management	6, 14	Transition to a circular economy, waste prevention, and recycling	20	4	520	n/a	n/a	5,595	766	520
Water management	3, 11, 13	Sustainable use and protection of water and marine resources	86	6	9,551	58,490*	n/a	15,390**	17,057	9,551
Climate change adaptation	11, 14, 15	Climate change adaptation	1	0	0	n/a	n/a	n/a	16	0
Environmental management		Protection of healthy ecosystems	9	1	276	n/a	n/a	n/a	599	276
Total			**541**	**51**	**65,296**	**2,603,204**	**81,701**	**702,221**	**98,574**	**65,296**

* Refers to the production of energy and biogas after investment, regardless of previous production

** Refers to that energy production in these projects replaces the production of district heating and that biogas production in th projects replaces diesel fuels

Renewable energy

Investments in this category aim to reap the energy potential of the wind, the sun, the ground, the sea, bio-materials 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.



Green loans to Renewable energy

Total number of projects:	**70**
Total amounts disbursed and outstanding:	**10,367** MSEK

Estimated annual impact of Green Loans[1]

Estimated installed effect (total):	142,138 MW
Estimated annual energy production:	2 539,001 MWh
Greenhouse gas emissions avoided, per year:	614,491 tonnes CO_2e

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

Renewable energy: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated impact, Kommuninvest share	
								Renewable energy generation	GHG-emissions reduced/ avoided
Filipstad Municipality	1206	Bio energy	Construction of a new digester plant at the municipality's largest wastewater treatment plant, including the connection of that plant with the district heating network in Filipstad. When sludge digestion is introduced, significant energy and environmental gains are expected. In addition to contributing to the district heating production in the municipality, the amount of digestate to be extracted is deemed sufficient for both heating the sludge in the digestion process as well as heating new and existing premises. Digestion also means a significant reduction in sludge transportation.	2024	0 %	25	0	n/a	n/a
Vaggeryds Energi AB	1223	District Heating	Modernization of the district heating production and connection of the district heating networks in Vaggeryd and Skillingaryd. Old boilers with lower energy efficiency and boilers powered by fossil fuels are being phased out. The change brings better conditions for efficient and environmentally friendly district heating production, e.g. by enabling future utilization of waste heat from local industry.	2024	0 %	190	0	n/a	n/a
Mölndal Energi AB	1242	District Heating	Investment project to meet future expected district cooling demand in a new "medtech" area linked to AstraZeneca. District cooling demand expected to increase from currently approx. 2,500 MWh annually to approx. 14,500 MWh annually within 10 years, and increasing thereafter.	2025	75 %	250	250	0	494

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

CASE: GREEN BUILDINGS

District cooling production to meet the needs of the future

Due to a number of large sites for construction of new offices, service operations and medical technology development at the GoCo Health Innovation City in Mölndal municipality, the future need for district cooling is expected to multiply from ~2,500 MWh annually today to ~14,500 MWh/year within 10 years. Therefore, Mölndal Energy is investing in a 3 MW waste heat-driven absorption chiller, a 3 MW compressor cooling and a 5,500 m^3 cold water accumulator.

In combination with the expanded distribution network, the cooling plant is estimated to reduce CO_2e emissions by 4,200 tonnes during its technical lifespan*, compared to conventional district cooling production fully reliant on electric cooling production. Another benefit is reduced efficiency demand from the grid, facilitating other expansion in the city. Moreover, less demand for individual cooling solutions and associated electricity use is expected. Such cooling production also risks potentially more extensive refrigerant leakage.

* Client calculation based on Swedish EPA recommended emission factors. Kommuninvest reported annual emissions savings are 493 tonnes CO_2e (ie. financed share).

Client: Mölndal Energi AB (Mölndal Municipal Energy Company)

Project category:	**Renewable energy**
Objectives: Investment in district cooling production to meet future needs. Lower climate impact than conventional district cooling.	
Total investment:	**SEK 335 million**
Green loans from Kommuninvest (committed):	**SEK 250 million**
Green loans from Kommuninvest (disbursed):	**SEK 250 million**
In operation/Completed (year):	**2024/2025**
Expected annual supply of district cooling	**14,500 MWh**

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.

Green loans to energy efficiency

Total number of projects:	**8**
Total amounts disbursed and outstanding:	**470** MSEK

Estimated annual impact of Green Loans[1]

Total energy savings:	**26,001 MWh**
- whereof Avoided energy use[2]	0 MWh
- whereof Reduced energy use[3]	26,001 MWh
Greenhouse gas emissions reduced, per year :	**29,675 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.

Green buildings

New or existing residential and non-residential buildings with an energy performance per sq.m. that is at least 20 percent better than the Swedish building code. Also major renovations of buildings that reduce energy use by at least 30 percent or to compliance with the Swedish building code, and energy efficiency measures in partial systems that reduce energy use by at least 30 percent.

Green loans to buildings

Total number of projects:	**327**
Total amounts disbursed and outstanding:	**40,351** MSEK

Estimated annual impact of Green Loans[1]

Total energy savings:[2]	55,700 MWh
– whereof avoided energy use[3]	45,033 MWh
– whereof reduced energy use[4]	10,668 MWh
Greenhouse gas emissions savings, per year:	10,299 tonnes CO_2e
– whereof Avoided energy use	9,066 tonnes
– whereof Reduced energy use	1,233 tonnes
Solar energy production in buildings	5,713 MWh

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

2) Calculated total savings related to reduced energy consumption and solar energy production

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

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

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Kristianstad Municipality	1072	New buildings	Expansion and renovation of existing school. New construction built according to Environmental Building Silver, with chemical considerations when choosing materials. Installation of solar cells.	2021	100 %	160	160	101	16	18
Oskarshamn Municipality	1181	New buildings	Construction of new preschool built according to Environmental Building Silver. The building's climate impact during construction has been calculated with a 100 percent coverage rate.	2023	0 %	50	0	n/a	n/a	n/a
Skara Municipality	1188	New buildings	Construction of 48 new multi-family housing units, built according to Environmental Building Silver. Installation of solar cells and green roofs on low-rise buildings.	2023	18 %	81	15	29	4	5
Fastighetsaktiebolaget Hushagen	1189	Greater renovations	Connection of the first property to the new district cooling network built in Borlänge. Means that the indoor climate can meet the temperature increases that climate change entails in the best way possible.	2021	78 %	35	35	350	0	105
Växjö Kommunföretag AB	1191	New buildings	Construction of Växjö railway station and town hall, built according to Environmental Building Gold. The project has also focused on a good indoor environment with regard to ventilation, acoustics and daylight.	2021	57 %	600	357	406	116	118
Växjö Kommunföretag AB	1192	New buildings	New construction of a preschool with a wooden frame. Designed to meet passive house requirements corresponding to Feby 18, certified according to Environmental Building Silver.	2022	0 %	70	0	n/a	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Osby Municipality	1193	New buildings	New construction of a preschool with building frame and facades in climate-improved concrete. Rooftop solar cells on entirety of building. Adaptation of outdoor environment to enable local infiltration of stormwater.	2020	92 %	85	78	116	19	21
Växjö Kommunföretag AB	1194	New buildings	Expansion of existing school with a new school building, incorporating kitchen and lunch room and educational facilities. Green roof, certified according to Environmental Building Silver.	2019	0 %	54	0	n/a	n/a	n/a
Växjö Kommunföretag AB	1196	New buildings	Renovation and extension of existing school, wooden frame and green roofs.	2024	0 %	262	0	n/a	n/a	n/a
Eskilstuna Municipality	1198	New buildings	New construction of preschool using materials specified and registered in SundaHus. Sedum roof on parts of the building and solar cells to cover the building's energy consumption.	2020	100 %	116	116	108	0	27
Eskilstuna Municipality	1200	New buildings	New construction of preschool using materials specified and registered in SundaHus. Sedum roof on parts of the building and solar cells to cover the building's energy consumption.	2023	100 %	164	164	119	0	23
Fastighets AB Glysis	1202	New buildings	Construction of offices and parking garages. The frame in the office part is mainly built in wood, while the parking garage and ground floor are constructed using climate-improved concrete. Sedum plants are planted on the roof as a delay measure in case of large amounts of rainfall. Solar rooftop cells.	2023	29 %	275	80	21	10	7

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Green buildings: Projects approved in 2022

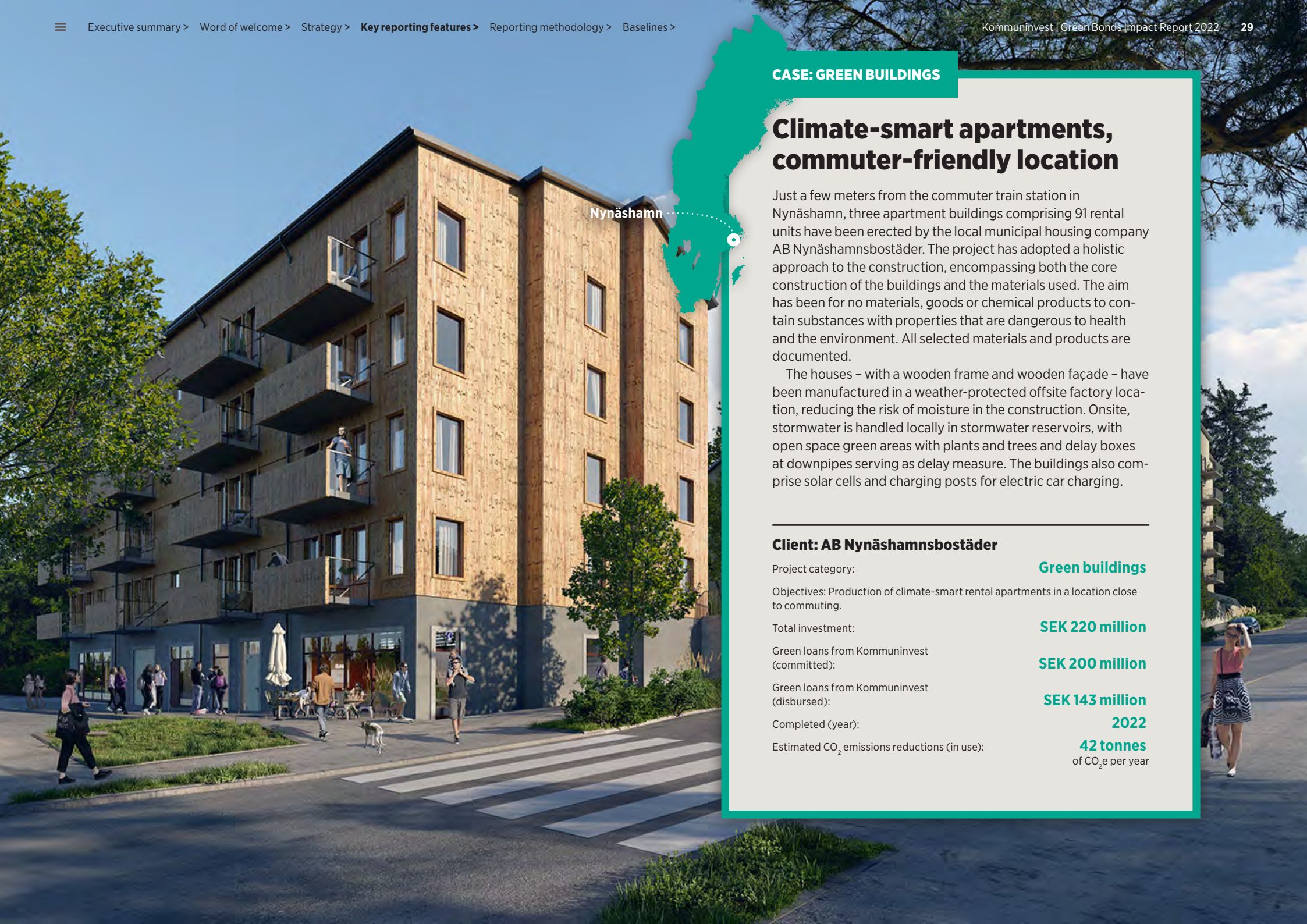
Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Säter Municipality	1203	New buildings	New multi-family housing for care and nursing homes. Built according to Environment Building Silver.	2023	9 %	230	20	13	0	2
Hammarö Municipality	1204	New buildings	New building of school designed according to Environmental Building Silver. All built-in materials have been documented and no potentially hazardous chemicals have been used.	2022	19 %	225	52	48	0	8
Gävle Municipality	1207	New buildings	New school to be certified according to Environmental Building Silver. The building uses materials with a lower environmental impact from a life cycle perspective and based on chemical content.	2022	0 %	72	0	n/a	n/a	n/a
Filipstad Municipality	1209	New buildings	Construction of new more energy-efficient bathhouse/ indoor swimming facility. Among measures to reduce the building's energy needs are a more energy-efficient core construction, heat recovery in the ventilation system to reduce energy losses, heat exchangers in the building's showers to reduce the need for heating and heat pumps for the building's flushing water tanks. Heat extracted from the flushing water is returned to the building's energy system. The building is also equipped with solar cells.	2023	40 %	206	83	67	26	16
AB Nynäshamnsbostäder	1212	New buildings	Construction of 91 new apartments in three buildings, located close to the commuter train station. Frame and facade in wood. Rooftop solar cells and charging posts for electric car charging.	2022	65 %	200	143	153	103	42

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Filipstad Municipality	1215	New buildings	Construction of new school and sports facility, with a focus on reducing building heat losses, i.a. through a climate screen with good insulating properties. To reduce the sports hall's need for heating, a recirculation ventilation system with carbon dioxide measurement enables the use of outside air intake only taken when the indoor climate requires it. In the school, geothermal heating and free cooling are used, which creates a better indoor climate and reduces the need for heat during the cold season.	2022	0 %	191	0	n/a	n/a	n/a
AB Nynäshamnsbostäder	1216	New buildings	Construction of new multi-family housing in three buildings, located close to the commuter train station. Factory-manufactured wooden frame, resulting in weather-protected production and reducing risk of moisture in the construction. The project strives for material goods and chemical products not to contain substances that are dangerous to health and the environment. Rooftop solar cells and charging posts for electric car charging.	2024	0 %	247	0	n/a	n/a	n/a
AB Ronnebyhus	1219	New buildings	New construction of 84 units in multi-family housing, based on a quality program that defines principles for cradle-to-cradle development in planning and construction. Built according to Environmental Building Silver. All materials are documented in Sundahus. Outdoor environment designed to promote biological diversity.	2021	0 %	182	0	n/a	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se



CASE: GREEN BUILDINGS

Climate-smart apartments, commuter-friendly location

Just a few meters from the commuter train station in Nynäshamn, three apartment buildings comprising 91 rental units have been erected by the local municipal housing company AB Nynäshamnsbostäder. The project has adopted a holistic approach to the construction, encompassing both the core construction of the buildings and the materials used. The aim has been for no materials, goods or chemical products to contain substances with properties that are dangerous to health and the environment. All selected materials and products are documented.

The houses – with a wooden frame and wooden façade – have been manufactured in a weather-protected offsite factory location, reducing the risk of moisture in the construction. Onsite, stormwater is handled locally in stormwater reservoirs, with open space green areas with plants and trees and delay boxes at downpipes serving as delay measure. The buildings also comprise solar cells and charging posts for electric car charging.

Client: AB Nynäshamnsbostäder

Project category:	**Green buildings**
Objectives: Production of climate-smart rental apartments in a location close to commuting.	
Total investment:	**SEK 220 million**
Green loans from Kommuninvest (committed):	**SEK 200 million**
Green loans from Kommuninvest (disbursed):	**SEK 143 million**
Completed (year):	**2022**
Estimated CO_2 emissions reductions (in use):	**42 tonnes** of CO_2e per year

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Falköping Municipality	1224	Greater renovations	Energy efficiency project including changing windows to energy glass, recycling ventilation through heat recovery ventilation, additional insulation of attic joists and installing solar cells.	2022	91 %	72	72	41	22	0
Gävle Municipality	1225	New buildings	New construction of multi-family building, built according to Environmental Building Silver. Building frames in cross-laminated timber, rooftop solar cells will provide electricity for the property's operations. Rainwater is collected in underground tanks and used to irrigate green areas. Roofs on complementary buildings covered with sedum plants.	2023	75 %	395	295	206	103	49
Hammarö Municipality	1227	New buildings	New construction of a preschool with roof elements in prefabricated wood. Solar cells on parts of the roof.	2021	89 %	98	98	105	21	22
Tibro Municipality	1229	New buildings	New school construction, replacing former school on the same site and reusing existing geothermal heating and commercial kitchen equipment and furniture. Sedum roof on most of the building. Built according to Environmental Building Silver.	2024	0 %	85	0	n/a	n/a	n/a
Tibro Municipality	1230	Greater renovations	Reconstruction of the former high school into a 7–9 school, leisure center and cultural school. Improved energy use through replacement of windows and new technical systems.	2023	0 %	160	0	n/a	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Eskilstuna Municipality	1232	New buildings	New construction of multi-family housing using materials specified and registered in SundaHus. Roof top solar cells.	2020	95 %	134	134	144	23	31
Eskilstuna Municipality	1233	New buildings	New construction of multi-family housing using materials specified and registered in SundaHus.	2018	100 %	109	109	185	0	32
Eskilstuna Municipality	1234	New buildings	New construction of multi-family housing using materials specified and registered in SundaHus. Roof top solar cells.	2021	99 %	218	218	321	35	66
Eskilstuna Municipality	1235	New buildings	New construction of multi-family housing using materials specified and registered in SundaHus. Roof top solar cells.	2021	93 %	120	120	156	23	30
Oxelösund Municipality	1236	New buildings	New multi-family housing with retail and services on the ground floor. Residential section built according to the Nordic Swan Ecolabel. Rooftop solar cells.	2024	10 %	170	20	15	3	3
Eksta Bostadsaktiebolag	1238	New buildings	New multi-family housing for care and nursing homes. According to customer's policy, built as passive houses according to Feby 18 Gold.	2022	88 %	350	350	569	234	143

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

Green buildings: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
								Total energy savings, MWh	Of which solar energy production, MWh	GHG-emissions reduced/ avoided, tCO_2e
Gävle Municipality	1243	New buildings	Hemlingborg in Gävle is one of the country's largest wooden construction projects, including a nursing home, a school, a preschool and a sports hall under the same roof. The house is built with a wooden frame according to Environmental Building Silver. The construction also acts as a test bed for new technology and new solutions, including moisture sensors mounted at exposed positions in the construction so that the moisture content can be monitored in real time.	2023	100 %	570	570	876	450	225
Boden Municipality	1244	New buildings	Renovation and extension of F-6 school, built according to Environmental Building Bronze and with solar cells.	2023	0 %	110	0	n/a	n/a	n/a
Region Västmanland	1246	New buildings	Construction of a new emergency hospital in Västerås, built according to Environmental Building Silver.	2028	0 %	5,150	0	n/a	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

CASE: GREEN BUILDINGS

A holistic approach to welfare services provision

The city of Gävle is home to one of Sweden's largest wooden buildings – Hemlingborg, a property complex that integrates several welfare services under the same roof: a nursing home with 80 apartments, a school for 570 students, a preschool for 120 children and a sports facility.

The building, certified as Environmental Building Silver by Sweden Green Building Council, has a high environmental profile with sustainable materials all the way, energy-efficient solutions backed up by solar cells, shared use of business areas and outdoor environments. The building also integrates built-in sun protection and management of stormwater to prevent flooding of a nearby stream which serves as natural water runoff. Among other things, an underground reservoir has been installed to reduce the load on the stream. The building is also designed with large open areas and long spans in the joists to increase flexibility in its future use.

Client: Gävle municipality (for Gavlefastigheter)

Project category:	**Green buildings**
Objectives: Building that houses a nursing home, a school, a preschool and a sports hall. Constructed with a holistic approach, taking into account both green and social factors.	
Total investment:	**SEK 570 million**
Green loans from Kommuninvest (committed):	**SEK 570 million**
Green loans from Kommuninvest (disbursed):	**SEK 570 million**
Completed (year):	**2023**
Total estimated energy use/year:	**48 kWh/m²**
Total energy requirement (BBR25, Atemp):	**84 kWh/m²**
Estimated annual CO_2 emissions savings (in use):	**225 tonnes CO_2e**

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.

Green loans to clean transportation

Total number of projects:	**20**
Total amounts disbursed and outstanding:	**3,761** MSEK

Estimated annual impact of Green Loans[1]

Greenhouse gas emissions avoided, per year:	**26,771 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.

Clean transportation: Projects approved in 2022

Borrower	Project ID	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share	
							Renewable energy generation, MWh	GHG-emissions reduced/ avoided, tCO_2e
Gamla Uppsala Buss Aktiebolag	1208	Replacement of twelve diesel buses with electric ones, three older biogas buses with new light hybrid biogas buses and two older ambulance buses with new Euro6 vehicles.	2022	95 %	93	89	n/a	79
Svealandstrafiken AB	1228	Electrification and expansion of Svealandstrafiken's public transport fleet. Procurement of approximately 150 electric buses for city and regional traffic and construction of charging infrastructure at 5 bus depots. The buses replace existing buses powered by biogas and HVO.	2026	0 %	1,450	0	n/a	n/a
Trollhättan Energi Aktiebolag	1240	Replacement of biogas-powered garbage truck from 2015 with newer, greener version. Emissions reductions approx. 100 mg CO, 140 mg NOx and 1 mg particles per kWh.	2022	0 %	3	0	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

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.

Green loans to Renewable energy

Total number of projects:	**20**
Total amounts disbursed and outstanding:	**520** MSEK

Estimated annual impact of Green Loans[1]

Increase in capacity:	n/a
Greenhouse gas emissions reduced and avoided, per year:	5,595 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.

Waste management: Projects approved in 2022

Borrower	Project ID	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share	
							Renewable energy generation, MWh	GHG-emissions reduced/ avoided, tCO_2e
Stiftelsen Östhammarshem	1180	Introduction of near-property collection of source-sorted waste at municipal public housing properties. 480 tonnes of waste expected to be source-sorted annually into multiple fractions: corrugated cardboard, newspapers, plastic, paper, metal packaging, colored glass, uncoloured glass, batteries and light sources. Before the project, only the fractions combustible, food waste and newspapers were collected.	2021	100 %	2	2	n/a	n/a
Sydnärkes Kommunal-förbund	1210	Construction of a new reloading station for household waste from garbage trucks to tight containers for further transport to final treatment. Currently, transshipment takes place at only one facility, by dividing the waste flow into two locations, the associated transport needs are estimated to be halved. The new facility also facilitates testing/introduction of on-site collection of packaging.	2022	36 %	5	2	n/a	13
Trollhättan Energi Aktiebolag	1239	New waste recycling center with better capability for sorting and recyling, capacity for processing 25,000 tons of waste yearly. Its more central location in the city is expected to reduce traffic to the site by some 30,000 km per year.	2024	0 %	74	0	n/a	n/a
Trollhättan Energi Aktiebolag	1241	Investment in new waste containers to enable sorting of more fractions, including books and plastic from today's combustible fraction for energy recovery. Also exchange of older rusty containers which risk leaking material during transport.	2022	0 %	0	0	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

CASE: WATER MANAGEMENT

Ensuring freshwater supply and redundancy for a growing population

Kalmar, a coastal municipality in south-eastern Sweden, is gearing up to be able to supply a growing population with drinking water while ensuring redundancy in the drinking water supply, which was previously lacking. The project includes the upgrading of waterworks, reconstruction and modernization of other water management facilities, sectioning of the water mains network, new raw water lines and the establishment of a new raw water source.

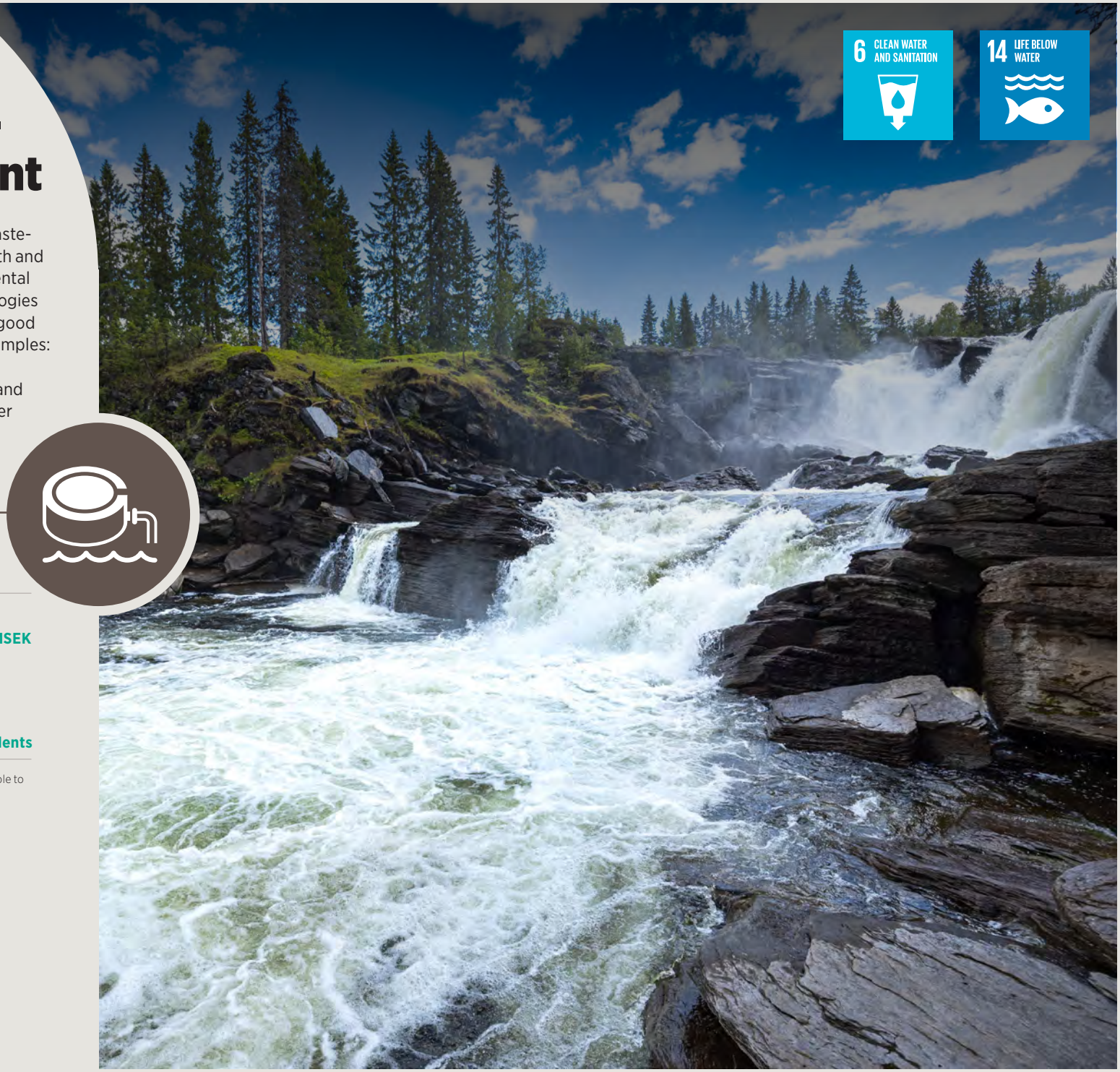
With an average energy consumption of 0.4 kWh per cubic meter for the freshwater supply, the project also meets the significant contribution criteria of the EU taxonomy, for the EU environmental objective of climate change mitigation.

Client: Kalmar Vatten AB

Project category:	**Water management**
Objectives: Investment in capacity increase for freshwater production and redundancy in freshwater supply for Kalmar municipality.	
Total investment:	**SEK 273 million**
Green loans from Kommuninvest (committed):	**SEK 273 million**
Green loans from Kommuninvest (disbursed amounts):	**SEK 273 million**
Completed (year):	**2024**
Increase in capacity:	**3,000 p.e.**
Annual volume of freshwater treated:	**655,600 m^3**
Energy consumption:	**0.4 kWh/m^3**

Water and waste-water management

Construction and upgrading of freshwater and waste-water 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.



Green loans to water and wastewater management

Total number of projects: **86**

Total amounts disbursed and outstanding: **9,551** MSEK

Estimated impact of Green Loans[1]

Increase in capacity: **206,776 population equivalents**

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

Water and wastewater management: Projects approved in 2022

Borrower	Project ID	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share		
							Renewable energy gener. MWh	GHG-emissions reduced/ avoided, tCO_2e	Population equivalents change
Ånge Municipality	1190	Expansion of a sewage treatment plant, resulting in several smaller facilities being replaced with transmission lines to a larger, more energy-efficient sewage treatment plant. The project ensures a long-term good sewage supply to the towns Ljungaverk och Fränsta, more stable operation, reduced emissions of phosphorus and oxygen-consuming substances and reduced energy use.	2023	63 %	75	48	n/a	12	–917
Borgholm Energi AB	1214	Renewal of freshwater network, connecting production units and investing in two new waterworks. By connecting production units, groundwater is saved and more residents can be supplied with municipal drinking water services. The use of chemicals as well as drinking water leakage has decreased as a result of the investment.	2022	21 %	143	30	n/a	–76	1,215
Aneby Miljö och Vatten AB	1231	Expansion of the municipal water and waste water network, replacing individual water and wastewater facilities and thereby securing supply while improving water treatment efficiency. The investment mainly consists of transmission lines for distribution of drinking water and diversion of wastewater to and from existing water and sewage works in Aneby, as well as pumping stations.	2020	77 %	23	19	n/a	–11	35
Kalmar Vatten AB	1237	Expansion of drinking water supply to meet the needs of a growing population while ensuring redundancy in supply. The project includes upgrading of waterworks, reconstruction and modernization of other water facilities, sectioning of the water mains network and new raw water mains.	2024	100 %	273	273	n/a	–25,196	3,000
Sydvästra Stockholms-regionens VA-verksaktie-bolag	1245	Additional wastewater treatment capacity for a growing population while meeting new treatment requirements for reduced emissions of nitrogen, phosphorus and oxygen consuming substances as well as reduced use of chemicals.	2026	0 %	2,400	0	n/a	n/a	n/a
Vätternvatten AB	1249	Joint venture to ensure future drinking water supply for Örebro, Kumla, Hallsberg and Lekeberg municipalities. The application relates to Phase 1, which includes planning, investigation, design and permit application in the Land and Environment Court.	2031	0.5 %	311	20	n/a	n/a	872

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

In-depth analysis into the green benefits of water projects

Better access to quantitative data regarding the climate and environmental benefits associated with freshwater and wastewater projects is a priority for Kommuninvest. As of 2021, we have revised Green Loan application forms to include a range of relevant quantative information before/after the investment project and seek to include such information in our reporting. The data presented here are the result of an in-depth analysis conducted in 2019, to which has since been added information. Reporting is confined to those projects which have been capable of demonstrating quantitative data before and after the investment.

Project objective (multiple responses possible)	# of projects
Add capacity	31
Comply with new purification requirements	29
Replace individual drains	17

	BEFORE investment	AFTER investment	INCREASE (+) DECREASE (–)	%	Reported share of impact
Number of person equivalents supplied by the facility, PE	1,372,699	1,947,008	574,309	42 %	206,776
Number of projects included in this reporting					*45*
Freshwater production					
Annual volume of freshwater treated, m^3	57,729,982	79,973,379	22,243,397	39 %	5,742,772
Number of projects included in this reporting (per PE)					*18*
Energy consumption per m^3 of freshwater supplied, kWh*	0	1	0.33	71 %	0
Number of projects included in this reporting					*18.00*
Electricity production on-site, kWh per year	777,250	943,467	166,217	21 %	135,183
Number of projects included in this reporting					*6*
Sewage treatment and measures to reduce bridges/leaks					
Nitrogen, emissions of, kg per year	1,489,984	1,187,313	–302,671	–20 %	–163,451
Number of projects included in this reporting					*24*
Phosphorus, emissions of, kg per year	46,790	31,465	–15,325	–33 %	–4,247
Number of projects included in this reporting					*23*
Oxygen-consuming substances, BOD, kg per year	1,005,374	776,840	–228,534	–23 %	–86,445
Number of projects included in this reporting					*27*
Annual volume of wastewater treated, m^3	146,617,801	204,907,819	58,290,018	40 %	15,675,313
Number of projects included in this reporting (per PE)					*28*
Energy consumption per m^3 of wastewater treated, kWh*	1	1	0.25	32 %	0.05
Number of projects included in this reporting					*18*
Electricity production on-site, kWh per year	0	111,967	111,967	0 %	21,967
Number of projects included in this reporting					*3*
Production of biogas, m^3 per year	14,110,879	15,371,804	1,260,925	9 %	344,461
(of which upgraded to vehicle fuel, m^3 per year)	4,719,056	4,740,273	21,217	0 %	–54,648
Number of projects included in this reporting					*11 (7)*

* Gross, excluding electricity production on-site

CASE: WATER MANAGEMENT

Securing long-term wastewater management in mid-Sweden

The village of Fränsta, with ~1,100 inhabitants, is located west of Sundsvall city, near Sweden's geographic center. Currently, wastewater treatment in the area is handled by several smaller facilities, including treatment plants and bio-ponds. According to the the Swedish Environmental Protection Agency the purification capacity in bioponds is relatively low, both for nutrients and infectious substances, and the treatment capacity varies depending on season, dam design and maintenance.

To ensure long-term sewage supply, reduce emissions to water, and ensuring stable operations, a new sewage treatment plant in Fränsta will replace four smaller facilities. Green benefits include reduced emissions of nitrogen, phosphorus and oxygen-consuming substances as well as reducing energy use. Better working environment for the operating staff due to more rational operation and maintenance is also expected. The project, designed for 3,000 PE in Fränsta and three neighboring villages, also includes two transmission lines, and the closure of two biodams and one sewage treatment plant.

Client: Ånge municipality

Project category:	**Water and waste water management**
Objectives: Qualitative long-term sewage supply.	
Total investment:	**SEK 85 million**
Green loans from Kommuninvest (committed):	**SEK 75 million**
Green loans from Kommuninvest (disbursed):	**SEK 47.5 million**
Completed (year):	**2024**
Discharge phosphorus (kg/ year)/ BOD (kg/year) Before	**140/5,600**
Discharge phosphorus (kg/ year)/ BOD (kg/year) After	**100/4,600**
Power consumption Before, per m^3 of treated wastewater	**0.8 kWh**
Power consumption After, per m^3 of treated wastewater	**0.65 kWh**

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.

Green loans to climate change adaptation

Total number of projects:	**1**
Total amounts disbursed and outstanding:	**0** MSEK

Estimated impact of Green Loans[1]

Increase in capacity:	n/a

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

Environmental management

This category covers a range of projects that intend to ensure sustainable land use. 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.

Green loans to environmental management

Total number of projects:	**9**
Total amounts disbursed and outstanding:	**276** MSEK

Estimated impact of Green Loans[1]

Area, hectares	**50.4**

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

Environmental management: Projects approved in 2022

Borrower	Project ID	Sub-category	Project description	Construction period ending	Kommuninvest share of financing, %	Committed amount, SEK million	Disbursed amount, SEK million	Estimated annual impact, Kommuninvest share	
								Renewable energy generation, MWh	GHG-emissions reduced/ avoided, tCO_2e
Botkyrka Municipality	1201		Project to dispose of 48,000 tons of unsorted and untreated mixed construction waste, which was dumped by a private contractor in Kassmyra, Botkyrka municipality. Large parts of the waste deemed environmentally dangerous and fire prone. Within the project, the waste will be disposed of, sorted and, as far as possible, recycled.	2022	0 %	200	0	n/a	n/a

Complete project-by-project-reporting in spreadsheet format is available in the impact reporting section for Green Bonds at kommuninvest.se

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 2022, Kommuninvest had financed Eligible Projects in all eight Framework project categories: Renewable energy; Energy efficiency in energy systems; Green buildings and energy efficiency; Clean transportation; Waste management; Water and wastewater management; Climate change adaptation and Environmental management.

Investments in the first five of these categories typically lead to direct reductions in greenhouse gas emissions, primarily through provision of added renewable energy capacity, through establishment of more energy efficient housing or other property construction or through direct energy efficiency measures. In the case of water and waste water management, investments typically result in reducing emissions of nutrients and oxygen-consuming substances. Remaining categories target climate change adaptation and other environmental objectives including reducing leakage of toxic substances.

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 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 16).

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 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 2022, 62 (62) percent of the disbursements were for Green building projects and 16 (16) 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 50–55.

1) Nordic Public Sector Issuers: Position Paper on Green Bonds impact reporting, February 2020

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

3) See "Handbook – Harmonized Framework for Impact Reporting, April 2020" at the Resource Centre for Green & Social Bonds at icmagroup.com

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.

It is not uncommon that the list of financed projects included in our reporting are projects to which no Green Loans have been disbursed. This may be because clients have applied for funding for projects yet to be started, or where the client has yet to draw down on the committed funding. Alternatively, the client may intend to use the Green Loan to refinance an existing traditional loan and is awaiting maturity of the latter. In some cases, the project forms part of a portfolio for the same customer, where the total committed amount is not fully utilized and the disbursed financing is allocated to other project(s) in the portfolio. No environmental impact is reported for Green Loans where no amounts are disbursed and outstanding.

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 specifically 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. As stated above and for conservative purposes, we report impact based on amounts disbursed to a project. 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 46 kg CO_2 per MWh, instead of the 315 kg CO_2 per MWh used for electricity savings.

About 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 calculating 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 53.

For electricity, Kommuninvest uses an EU Mainland grid factor including the UK and Norway as the 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[4].

4) 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.

However, Kommuninvest applies the same combination of the OM and BM for all projects, as recommended by the Nordic Position Paper.

For district heating[5] 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[6].

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).

Methodology for Green Buildings

As mentionned, the impact for green buildings is calculated by comparing the building's expected or actual energy consumption to a reference scenario, where the building is constructed in accordance with legal requirements. The calculation applies emission factors for electricity and district heating to the reported energy consumption for each energy carrier in the building.

For buildings approved in relation to building regulation BBR 21, the data reported to Kommuninvest refers to energy consumption in kWh. This straightforward type of reporting has changed with later updates to the regulation, BBR 25 and BBR 29. According to BBR 25 and BBR 29, the actual consumption is converted to so-called energy performance, with consideration for instance as to whether the building is heated by district heating or electricity.

Therefore, for BBR 25- and BBR 29-buildings in the portfolio, the reported values for energy performance that Kommuninvest has received does not correspond to actual energy consumption. In order to recalculate reported energy performance values to actual energy consumption, a conversion methodology has been developed in dialogue with the Kommuninvest Environmental Committee. The first step of this method is to convert reported values for energy performance to actual energy consumption and then calculating the the CO_2e benefit of the lower energy consumption.

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.

5) District heating is a system for 1distributing 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.

6) Profu memorandum (in Swedish only): "Stöd till klimatutvärdering av gröna investeringar inom fjärrvärmeområdet - Uppdatering och utveckling 2020", March 2020. Interested parties can obtain this report by sending a request to: ir@kommuninvest.se

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 an EU Mainland grid factor including the UK and Norway as the baseline as the relevant baseline for electricity. The rationale is that the Nordic electricity market is already characterised by a high level of interconnection, also with neighboring countries in the Northern European region. Furthermore, the integration of European electricity markets is planned to increase in the coming years and decades, which is the relevant time perspective for most investments. 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[7], 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. The CM used in this report is 315 kg CO_2e per MWh.

District heating

In the Nordic countries, district heating (the term is explained in footnote 5 on page 48) 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.

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

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 96 kg/MWh, representing an avoided alternative heating mix of 4 percent biofuel boilers, 55 percent geothermal heat pumps, 17 percent air/water heat pumps, 21 percent exhaust air heat pumps and 2 percent gas boilers.

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 52 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, we calculate project emissions based on local emissions. No additional benefit for avoided alternative waste treatment is applied.

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	315 kg CO_2e/MWh	EU25+UK&Norway: Combined Margin (50% Operating Margin (OM) 476 kg CO_2e/ MWh + 50% Build Margin (BM) 154 kg CO_2e/ MWh)[1]
Firm electricity generation e.g. hydropower projects	315 kg CO_2e/MWh	See above
Electricity consumption from the grid, e.g. green buildings and energy efficiency projects	315 kg CO_2e/MWh	See above
Electricity generation in district heating projects	315 kg CO_2e/MWh	See above
Heat consumption from the grid, e.g. green building and energy efficiency projects	46 kg CO_2e/MWh	Swedish average for heating production from district heating, 2018[2]
Heat generation in district heating projects	96 kg CO_2e/MWh	Estimated national Swedish average for avoided alternative heating[3]
Waste incineration in district heating projects	52 kg CO_2e/MWh	Estimated national Swedish average for avoided alternative waste treatment[4]
Diesel (vehicle fuel)	2.6 kg CO_2e per liter	[5]
Passenger cars	190 gram CO_2e /km	Weighted forecast for average Swedish car fleet in 2021, WTW[6]
City buses	450 gram CO_2e / km	Weighted forecast for average Swedish bus fleet in 2021, WTW[6]

1) Calculation by Kommuninvest in November 2019, based on IFI Interim Dataset of Harmonized Grid Factors 11.05.2019, as provided by Nordic Investment Bank.
2) Swedenergy.
3) Profu, 2020.
4) Swedenergy (calculations by Profu).
5) Swedish Energy Agency & The Swedish Construction Federation.
6) The Swedish Transport Administration, 2023.

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	64 kg CO_2e/MWh	Swedish average for electricity production from district heating, 2021[1]
Heating generation in district heating projects	46 kg CO_2e/MWh	Swedish average for heating production from district heating, 2021[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

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 relevant building regulation that has been in force for since the launch of the Kommuninvest Green Bonds Framework (Boverket's Building Regulations BBR 21, BBR 25 and BBR 29).

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) = Energy savings in consumption in MWh * (share of energy used as electricity in the building * baseline factor for electricity + share of energy used as district heating in the building * baseline factor for district heating) + Production of solar energy in MWh * baseline factor for electricity Note: The reference building is assumed not to produce any solar power, and to have a proportion between heat and electricity consumption which is equivalent to 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 GHG emissions.

Collected data

- Number of kilometres per year with clean transport solutions.
- Number of people the project will affect each year.
- 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.

Climate impact calculation

Calculation is performed by comparing the investment to an alternative scenario, typically provided by the customer. Here, Kommuninvest applies emissions factors as outlined in the table on page 53. When the client has not provided an alternative scenario, averages and templates are applied in order to reach conclusions.

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 and wastewater 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 person equivalents (PE) of water or wastewater the plant processes, identifying any increase that can be attributed to the investment.
- Volume of freshwater and wastewater treated.
- Reductions in emissions of nitrogen, phosphorus and oxygen-consuming substances (BOD).
- 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.

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

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 294 out of Sweden's 310 local governments, of which 280 municipalities and 14 regions. Kommuninvest is the largest lender to the Swedish local government sector and one of the largest credit institutions in Sweden. At year-end 2022, total assets were SEK 553 billion (USD 53 billion). The head office is located in Örebro.

KOMMUNINVEST

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