Climate Impact Report

Supplement to the Fana Sparebank's Green Finance report

SWECO

REPORT DETAILS

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1 SUMMARY

A customer survey carried out to Fana Sparebank's customers received 110 submitted responses and formed the data basis for this study. The purpose of the study is to address the climate gas emissions related to where the participants are living and whether living in urban areas have a positive effect on climate gas emissions as a consequence of behavioral factors, considering Fana Sparebank's definition of TEK10 Urban.

The data basis is divided into urban and non-urban groups for this purpose, with 67 participants from urban areas and 43 participants from non-urban areas. The climate gas emissions are estimated and based on data from Ducky's climate calculator and the research findings conducted. To examine the hypothesis "living in urban areas have less negative climate impact", the climate gas emissions in the urban and non-urban group related to housing, mobility, and lifestyle have been compared.

Key findings

Climate gas emissions from residential area and building size, travelling by air, and lifestyle are surprisingly equal for the urban and non-urban groups, when analyzing the data from the customer survey (Figure 1). Hence the only, and major difference in climate footprint between the urban and non-urban groups is the use of fossil fuel-based cars for commuting in the non-urban group. The CO_2 emissions from commuting are observed twice as large for the non-urban group compared to the urban group. This is in line with research findings from previous studies (Chapter 4.1)

From the customer survey conducted by Fana Sparebank, the average annual emissions per person for the emission categories included in the analysis are 7.7 tCO_2e and 8.7 tCO_2e for the urban and non-urban group, respectively. The lesser CO_2 emissions for the urban group encompasses 17 % of the CO_2 reduction that must take place for halving one person's climate footprint until 2030. Hence, it is assumed that more ambitious criteria than TEK10 Urban must take place for reaching the Agenda 2030 goal.

Climate gas emissions are saved when living in more energy efficient houses. It is estimated that buildings certified with TEK 10 save 924 kg CO_2e per person per year compared to the Norwegian average. In addition, the climate gas emissions saved by living in urban areas is 1004 kg CO_2e per person per year, mainly due to the much frequent use of fossil cars in the non-urban areas.

The total climate gas emissions saved by using the Green Finance Framework of TEK 10 Urban is 1.93 tCO_2e per person per year, which is a lot considering that the average climate footprint of one Norwegian westerner is about 11.5 tCO_2e per year (Folkets Fotavtrykk, 2021). Adding up, this means a saving of 3.7 tC02e per household. With 340 customers in the green portfolio meeting the TEK 10 Urban requirement, Fana Sparebank have a total emission reduction of 1 258 tCO_2 per year.

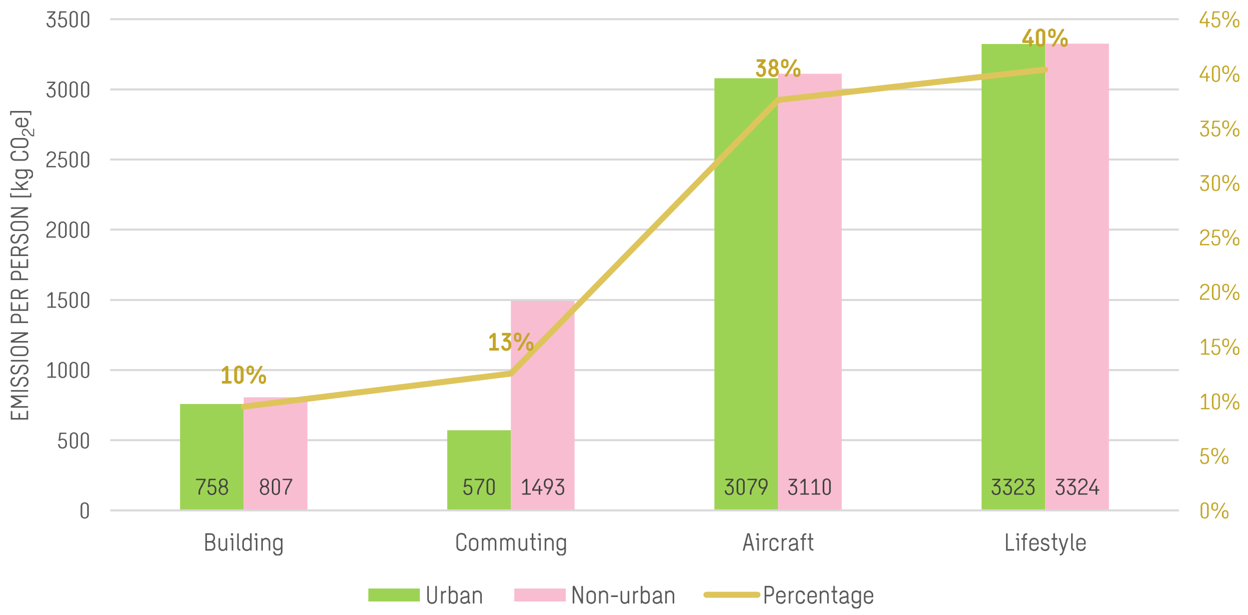

Figure 1 - the average person's annual emissions in terms of building, transportation, and lifestyle, in urban and non-urban area. Green columns represent urban area and pink columns represent non-urban area. The yellow line is the contribution of the different emission posts in total.

2 INTRODUCTION

Sweco has assessed the climate impact report of Fana Sparebank's loan portfolio eligible for green bonds, with focus on green mortgages. Fana Sparebank's green bond qualification criteria, the result of an analysis of the loan portfolio and a costumer survey are briefly described and presented in this document.

This report aims to concretize the climate impact of Fana Sparebank´s green bonds and will be a part of their Green Finance Report. Fana Sparebank wishes to promote and accelerate the transition towards a low-carbon and climate resilient society by encouraging sustainable behavior among their clients. Fana Sparebank's issuance of green bonds is regarded a natural part of their company's sustainability profile enabling the company to focus even more on positive environmental impacts within the fields of green buildings, renewable energy, and clean transportation (Table 1).

The green building category consists of several impact metrics, such as Energy Performance Certificate (EPC) A and B, TEK10 Urban, BREEAM certification of Excellent or Outstanding, and improvement works reducing energy consumption by 30 %. Due to project definition, this report only present identified climate impact related to TEK10, EPC A and B, and TEK10 Urban criteria. The TEK10 Urban criteria is defined by Fana Sparebank as buildings located within the city center zones and city densification zones in Bergen, built after 2012.

Fana Sparebank's Green Finance Framework covers public deposits, senior bonds, and covered bonds ("Green Finance Instruments") issued by Fana Sparebank and all wholly owned subsidiaries, including Fana Boligkreditt AS. Their Green Finance Framework aligns with the Green Bond Principles (GBP) published by the International Capital Markets Association (ICMA) in 2018.

3 ENVIRONMENTAL IMPACT METHODOLOGY

The assessment of climate impact is provided with the reservation that not all data can be accessed and that calculations may be on a best effort basis. The impact is reported on a portfolio basis for one of the three categories, and two of the four bullet points, in the Green Eligible Assets defined in Fana Sparebank's green framework (Table 1).

Table 1 - Fana Sparebank's Green Eligible Assets and criteria for their Green Finance Framework.

Green Eligible Asset Category	Relevant Impact Metrics
Green Buildings	Share of assets funded by Green Finance Instruments satisfying the following criteria: • **EPC A and B** • **TEK10 Urban** • BREEAM certification of Excellent or Outstanding • Improvement works reducing energy consumption by 30 % Annual energy consumption and energy savings (MWh). Estimated annual reduction of CO_2 emissions (tons of CO_2e).
Clean Transportation	Number of vehicles funded. Estimated annual reduction/ avoidance of CO_2 emissions (tons of CO_2e).
Renewable Energy	Energy generation capacity (MWh). Estimated annual avoidance of CO_2 emissions (tons of CO_2e).

The customer must be in line with TEK10 Urban, as well as having EPC A or B, to be qualified for green mortgages according to Fana Sparebank's green framework. In total, 340 customers are qualified with TEK10 Urban, where 76 are qualified for green mortgages, representing 1.3 % of the loan portfolio (Table 2).

Table 2 - lists the number of mortgages which qualifies for TEK10 Urban, EPC A or B, and the ones that are not qualified for either of them.

Dwelling type	TEK10 Urban	EPC A	EPC B	Not qualified
Condominium	0	0	0	16
Detached house	48	1	21	2338
Cabin	0	0	0	53
Apartment	259	10	26	1710
Town house	17	0	6	668
Semi-detached house	16	0	12	526
Total	**340**	**11**	**65**	**5311**

3.1 GREEN BUILDINGS

Following the GBP, the green buildings category should meet regional, national, or internationally recognized standards or certifications for environmental performance. Fana Sparebank's criteria in this category encompasses EPC A and B, TEK10 Urban, BREEAM certification of Excellent or Outstanding, and improvement works reducing energy consumption by minimum 30 %. The TEK10 Urban criterium is based on the hypothesis that it is more climate friendly to live in urban areas than non-urban areas. This hypothesis has been tested through a customer survey presented in this report.

For comparison reason, the climate impact of TEK10 and EPC A and B are first addressed. This work is based on the results from Multiconsult's report on Green Buildings portfolio. They calculated the average specific energy demand on the Norwegian residential building stock to 256 kWh/m^2. While existing buildings with code TEK10 and TEK17 have an average specific energy demand to 122 kWh/m^2 (Multiconsult, 2019).

Compared to the average residential building stock, TEK10 and TEK17 buildings give a calculated specific energy demand reduction of 52 %. A reduced energy demand also infers a reduced climate footprint. Hence, new or existing Norwegian residential buildings that comply with the Norwegian building code TEK07 and later codes for small residential buildings, and code TEK10 and later codes for apartments, are eligible for green bonds, as all these buildings have significantly better energy standards and account for less than 15 % of the residential building stock (CBI, 2018; Multiconsult, 2019).

Some TEK10 and TEK17 buildings are labeled with poorer EPC than B (Figure 2). This is due to the conservative method of calculation in the simplified registration system, unfavorable location of an apartment in apartment buildings, a geometrically unconventional building form with higher energy losses than the representative model, and/ or the revised and tightened grading scale. Hence, the building itself is not necessarily less energy efficient (Multiconsult, 2019).

All buildings with an energy grade of A and B are eligible as green residential buildings according to this criterion. Data from 2018 shows that approximately 7 % of the residential buildings in Bergen municipality has an EPC B or better, with building code TEK10 and TEK17 (Energimerking.no, 2018). It is, however, reasonable to assume that this number has increased the last three years.

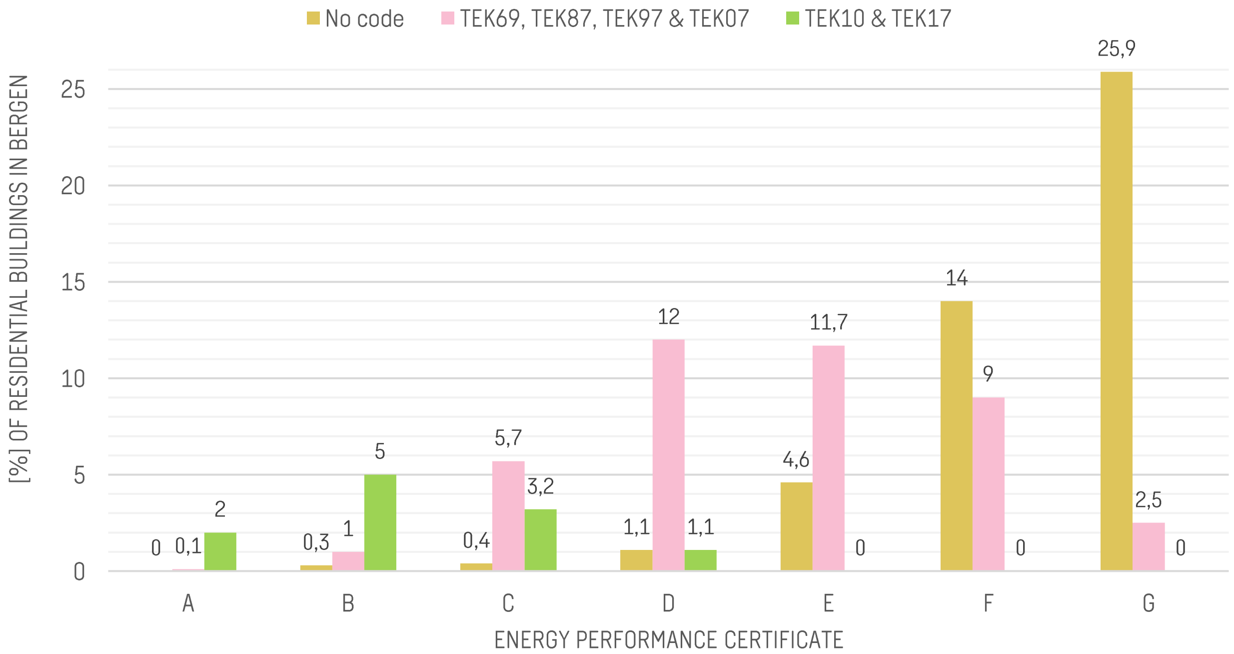

Figure 2 – shows the energy grades and building codes in the already granted certificates to residential buildings in Bergen municipality. Data from energimerking.no, updated in 2018.

A grid factor for electricity consumption is used to estimate the associated CO_2 emissions. The factor is averaged over the building's lifetime, estimated to 60 years. According to Norwegian Standard NS 3720: 2018, the grid factor must be estimated for two scenarios. One for the European mix (EU28 + Norway) and another for only Norwegian mix (Table 3; Multiconsult, 2019).

Table 3 - Electricity production greenhouse gas factors for two scenarios. The energy consumption mix also includes bio energy and district heating, which gives a total specific factor as well (Multiconsult report, 2019; NS 3020: 2018, Table A1).

Scenarios GHG emissions	CO_2-factor for electricity demand [kg CO_2e/ kWh]	Total specific CO_2-factor for energy consumption [kg CO_2e/ kWh]
European (EU28 + Norway) consumption mix	0.136	0.123
Norwegian consumption mix	0.018	0.032

The European mix grid factor is used for estimations and presented in this report, as the energy system is getting even more interconnected. This is in line with the grid factor used by the environmental certification system for buildings, BREEAM-NOR, as well as the Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Report (Multiconsult, 2020).

4 CLIMATE IMPACT OF TEK10 URBAN

Fana Sparebank's Green Finance Framework is based on known and well used principals. To enhance their work on green finance they defined TEK10 Urban, with the hypothesis that living in urban areas have less negative climate impact. Sweco has conducted a study to identify the most significant climate gas sources in building types, mobility and lifestyle, by studying known research on the field, and by analyzing data from a survey sent to Fana Sparebank's customers that both qualify and don't qualify as TEK10 Urban.

For the literature review, leading research institutions in the field have been contacted, and results from the most relevant studies are presented in this chapter. Results from the survey is presented in Chapter 5.

4.1 RESEARCH REVIEW

The climate impact of people's lifestyle, dwelling type and mobility is poorly understood, due to little research on the field and sparse data. For comparison reasons, the research presented is limited to Norwegian cities, as income and culture highly depend on geographic location. In addition to public articles, researchers at NMBU, NTNU, UiB, Bergen municipality and Vestlandsforskning have also been contacted directly.

4.1.1 Dwelling type, size, and materials

A high population density means that relatively little of the previously undeveloped areas has been reallocated to make room for buildings and infrastructure. High population density helps to reduce material consumption for transport infrastructure and infrastructure for water and sewage (Næss, 2000). When only looking at this aspect, living in a high-density zone is more climate friendly than living in a non-urban area, due to lower material use per person.

More building materials are usually used for detached houses than for blocks and terraced houses, as detached houses usually have larger floor area and more exterior wall and roof area per square meter of floor area (Næss, 2000). A survey among households in Oslo and Førde shows that detached house residents bought several larger objects for the home and had higher consumption of both resource-consuming facilities outdoors and in the home as well as energy-intensive garden tools equipment (Aall, C. et al., 2004).

Blocks and terraced houses demand less energy, and they also require less land per dwelling. Thus, living in blocks and terraced houses contribute to a higher population density for the city, than if the city were dominated by detached houses. This contributes to lower reallocation of undeveloped areas, lower energy consumption and less emissions from transport. With a given population density within the district or residential area, area-saved housing types also increase the opportunities to preserve local natural qualities and ecosystems, or to take advantage of local climate conditions (Næss, 2000).

4.1.2 Energy

The heat loss of a building is proportional to the size of the outer surfaces under otherwise equal conditions. This means that blocks and terraced houses require less energy for heating than detached houses, as part of the areas that delimit homes in multi-family houses are common partitions or floor dividers, with little or no heat loss (Næss, 2000).

An early study from 2004 shows that the energy consumption for detached houses, in non-urban areas, is more than twice as large as for blocks in urban areas (Aall, C. et al., 2004). Later, a study from 2015 shows that detached houses require on average 82 kWh per square meter annually for space heating, compared to 59 kWh for apartments and 60 kWh for terraced houses (Borg, A., 2015).

4.1.3 Mobility and lifestyle

It has been found that residents in the most peripheral resident areas in Oslo (8 km from the city center) use more than twice as much energy for local transport than residents in the areas closest to the city center (1.2 km from the city center). Similar findings have been seen in Bergen as well (Aall, C. et al., 2004). This statement is also supported by other researchers, such as Nweman and Kenworthy (1989), Holtzclaw et al. (2002), Næss (2006), and Rickwood et al. (2008), who found that per capita fuel consumption is lower in urban areas than outside. It is however found, from the research project in Oslo and Førde, that the energy savings from less car use in urban areas are almost compensated with more frequent flights (Aall, C. et al., 2004).

Also, when it comes to jobs, a central location in the urban area usually contributes to lower energy consumption and emissions from commuting, since accessibility of public transport is usually best in the city center, while scarcity of parking spaces and narrow streets makes it less attractive to use a car. When looking at the climate gas emission sources from households, the transport category really stands out, followed by energy and food consumption (Figure 3).

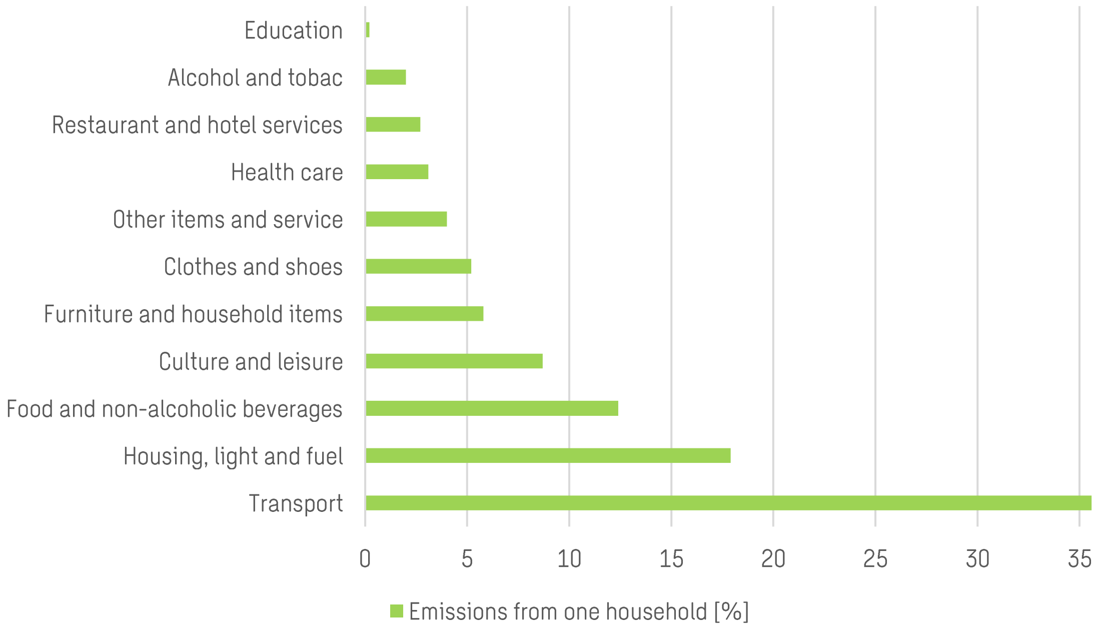

Figure 3 – Illustrates emissions from an average Norwegian household in 2012. There are twelve main categories, and in total 22.3-ton CO_2e (Steen-Olsen et al., 2016). https://gemini.no/2015/04/tegner-opp-livet-ditt-i-co2-utslipp/

5 THE CUSTOMER SURVEY

5.1 BACKGROUND

A customer survey was made and sent to Fana Sparebank's customers to address climate gas emissions related to house type, lifestyle and transport. The data basis from the survey contains in total 110 participants, 67 from urban areas and 43 from non-urban areas (Table 4). The analysis on the climate gas emission is based on data from Ducky's climate calculator and the research review in section 4.1. For clarification, the emission data is precented per person, per submitter and per household. This is specified for every estimation presented in this report and depends on the emission category.

Data from the survey is used to compare the climate gas emissions and lifestyle related to an urban and a non-urban group, to examine the hypothesis that "living in urban areas have less negative climate impact". The categorization of the urban and non-urban groups is based on the customers postal codes, given from Fana Sparebank's qualification list *"Postnummerliste_Bergen_Urban.csv"*. The ones that are inside Bergen centrum or density zones in Bergen qualify for urban areas, while those outsides are not qualified and are referred to as non-urban further in the analysis.

Table 4 - Number of urban or non-urban households in the dataset. The table also takes into consideration every person in the household for each group.

	Urban	Non-urban
Number of persons that submitted the survey (i.e. the number of households)	67	43*
Total persons in the respective groups	130	111*
The average number of persons in a household	1.9	2.6

* incl. households with the 30 undefined postal codes

The average trend for the urban and non-urban groups is reproduced in the next sub-chapters. The climate footprint is estimated at each relevant question, related to emissions from work and private traveling, lifestyle, dwelling type, and size.

5.2 THE PARTICIPATING CUSTOMERS

5.2.1 Gender distribution

The share of women and men responding to the customer survey is well distributed, as well as the observed distribution of the urban and non-urban groups (Table 5). However, the relatively low number of submitters in total does cause an uncertainty of the results presented in the next chapters, as the data base is too sparse to represent the majority of Fana Sparebank's customers.

Table 5 - Lists the number of women and men who submitted the survey.

	Urban	Non-urban	Total
Women	39	18	**57**
Men	28	25	**53**
Total	**67**	**43**	**110**

5.2.2 The age span

The age span 55 to 64 years covers one quarter of all submitters (Figure 4). However, the sparse data set gives few submitters per age span, which cause uncertainty for the representation of people per age span.

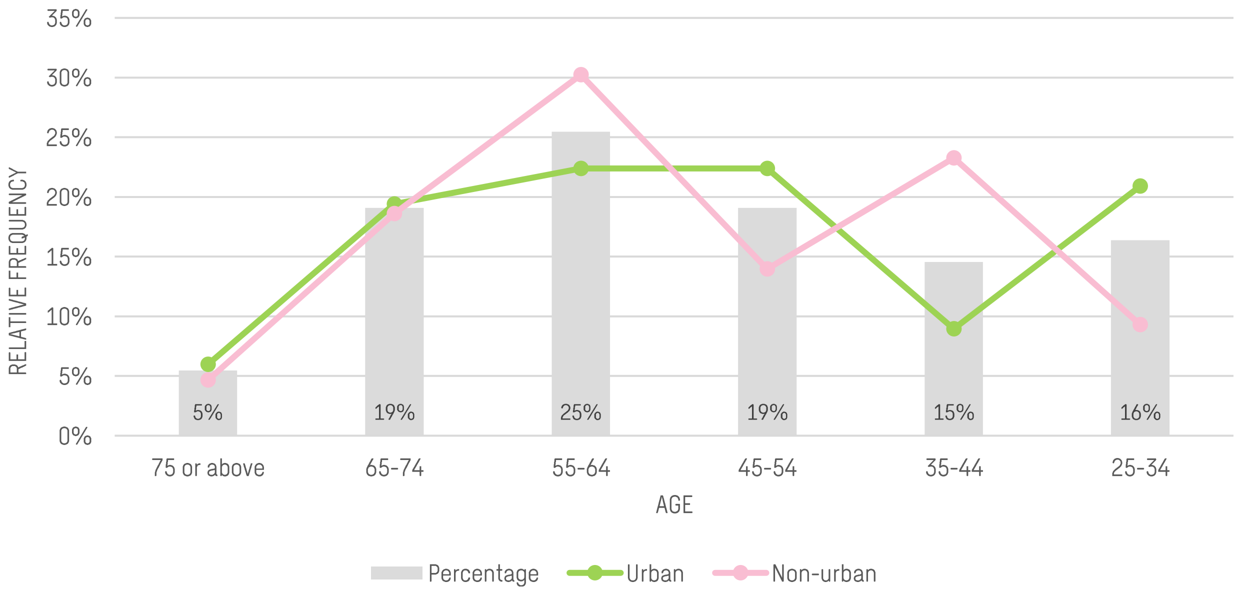

Figure 4 - Illustration of the age of the submitters in urban and non-urban group. Numbers in percent of the respective groups.

5.2.3 The annual income before taxes

The income range from 661 to 790 thousand NOK was the most represented in the customer survey (Figure 5). This is a somewhat higher income than the average yearly income in Norway, which in 2020 was estimated to 585 thousand NOK (SSB, 2022). In 54 % of the cases the urban group has a higher income than the non-urban group. This is assumed not being a significant deviation.

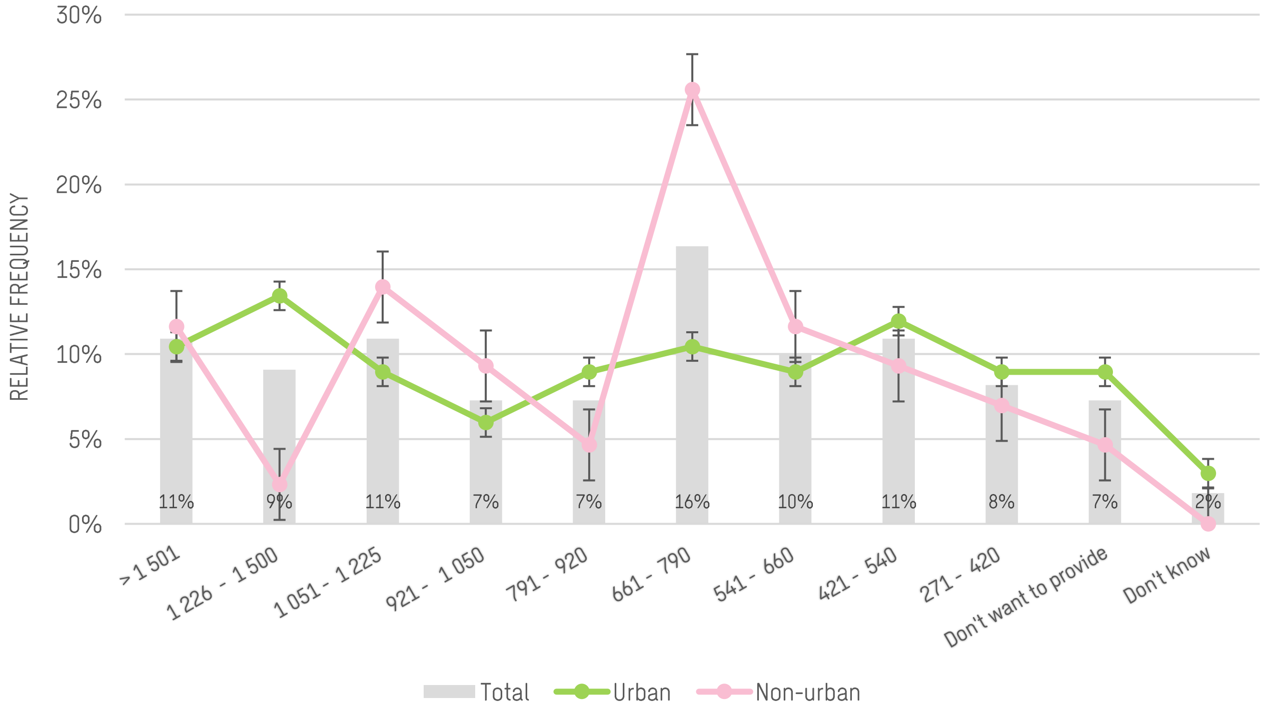

Figure 5 - Illustrates the annual income for the survey participants in thousands NOK horizontally. The vertical axis shows percent of the total income from all submitters, relative to the respective groups. Income of the urban group is presented as the green line, while the non-urban group is presented as the pink line. Standard error bars are added to both green and pink line. The grey columns present the relative percentage for all the submitters.

5.3 DWELLING TYPE, SIZE AND MATERIALS

Dwelling type, size, and materials encompasses a significant impact on the customers' emissions according to previous research presented earlier in the report and have been asked for in the survey. The dwelling type alternatives in the survey were apartment, terraced house, semi-detached house, and detached house. Most people were living in apartments, especially evident for the urban group (Figure 6). As presumed, more people living in non-urban areas were living in detached houses.

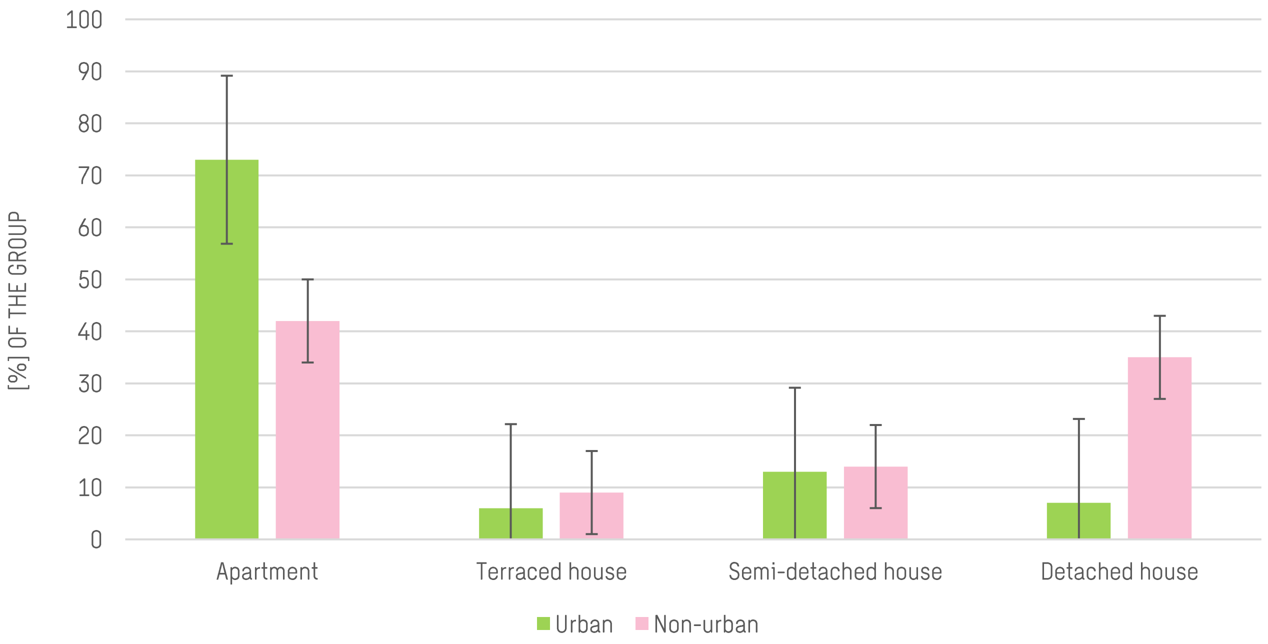

Figure 6 - Illustrates the representation for the different dwelling types. The green columns represent the urban group and the pink columns represent the non-urban group, in percent of total submitters in the respective groups.

It becomes evident that the average size of each dwelling type is approximately equal for urban and non-urban areas (Figure 7). It is, however, more people living together in the non-urban areas (in average 2.6 persons per household) compared to the urban areas (in average 1.9 persons per household).

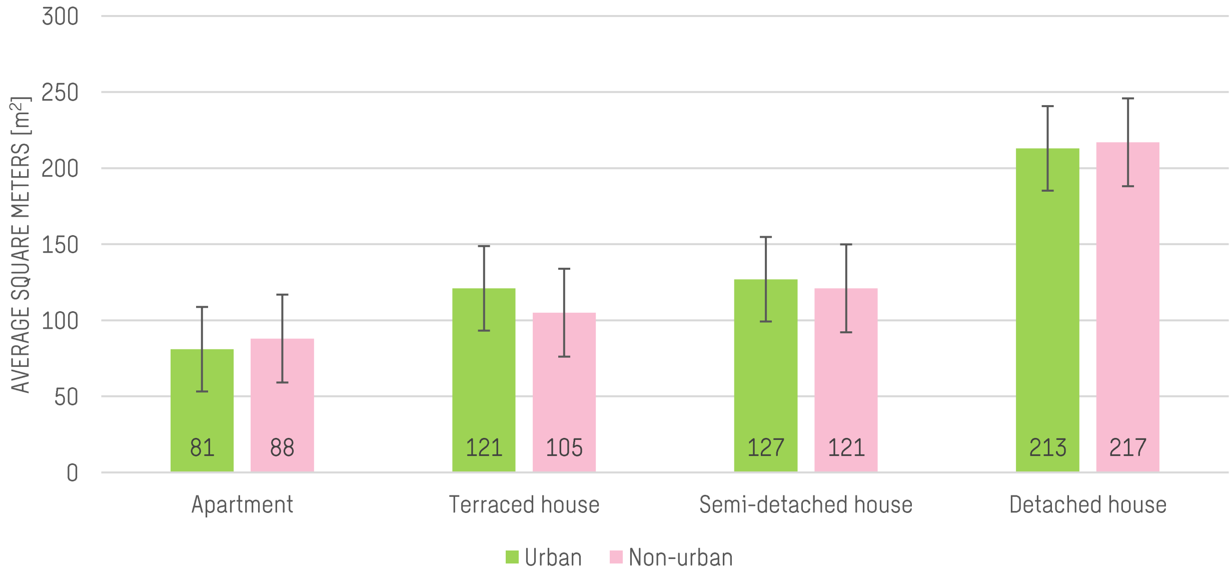

Figure 7 - The average square meter for each housing type for the two groups. Green columns represent urban area and pink columns represent non-urban area. The grey lines are standard error bars.

The square meter per person in urban and non-urban areas is used to estimate reduction of climate gas emissions per person in the respective groups (Table 6). As the submitters of the customer survey live in houses qualified for TEK10, the associated CO_2 reduction potential is 874 kg CO_2e and 890 kg CO_2e for the urban and non-urban group, respectively, compared to average specific energy demand on the Norwegian residential building stock.

Table 6 - lists the CO_2 reduction potential, using data from the customer survey and factors presented in environmental impact methodology. The total amount of people in the urban and non-urban group includes every person in the households.

	Total amount of people	**Total square meters [m²]**	**Square meter per person [m²]**	**CO_2 reduction in total [kg CO_2e]**	**CO_2 reduction per person [kg CO_2e]**
Urban	130	6 944	53	114 451	874
Non-urban	111	5 984	54	98 628	890
Total	**241**	**12 928**		**213 079**	2 143

5.4 ENERGY

It is over all seen that the non-urban group has a higher percentage of EPC A and B, which can be explained by the significant amount of people in the urban group who are not aware of the energy label on their dwelling (Figure 8). In total, 44 % and 68 % of the people in the urban and non-urban group have EPC A or B, respectively.

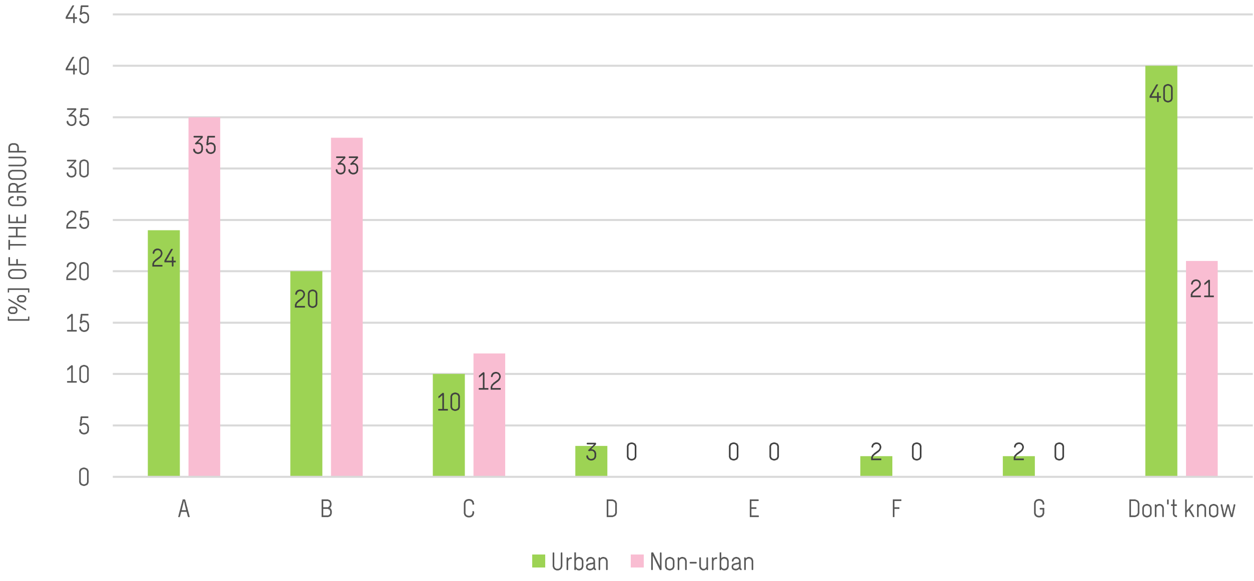

Figure 8 – illustrate the energy label of the dwellings in the urban (green columns) and non-urban (pink columns) groups.

When considering the weighting of the different dwelling types for estimating CO_2 emissions, the high number of apartments in the urban group gives a lower climate footprint for the urban group (Table 7).

Table 7 - Climate gas emissions per person in the urban and non-urban group. Specific energy demand (sed.) factors are given in Multiconsult's report on green finance (2019). The total climate gas emissions in each group are divided by the total amount of people living in the households in the respective groups, as reported in the customer survey.

	Urban	Non-urban	Unit
Square meters, apartments	4588	1585	m^2
Square meters, other	2356	4399	m^2
TEK10 sed. apartments	110	110	kWh/m^2
TEK10 sed. other	126	126	kWh/m^2
CO_2 factor	0.123	0.123	kg CO_2e/kWh
Total emissions	98588	89621	kg CO_2e
Emissions per person	**758**	**807**	kg CO_2e/person

Further, answers from the survey shows that district heating is the main heat source in most buildings in the urban area (Figure 9), which is as expected as the urban areas are within the licensing area of BKK Varme (NVE, 2018). The heat pump is more used in the non-urban area (Figure 9), and the temperature in the dwellings in the urban and non-urban group are approximately equal, 21.8 ˚C in urban area and 21.6 ˚C in the non-urban area.

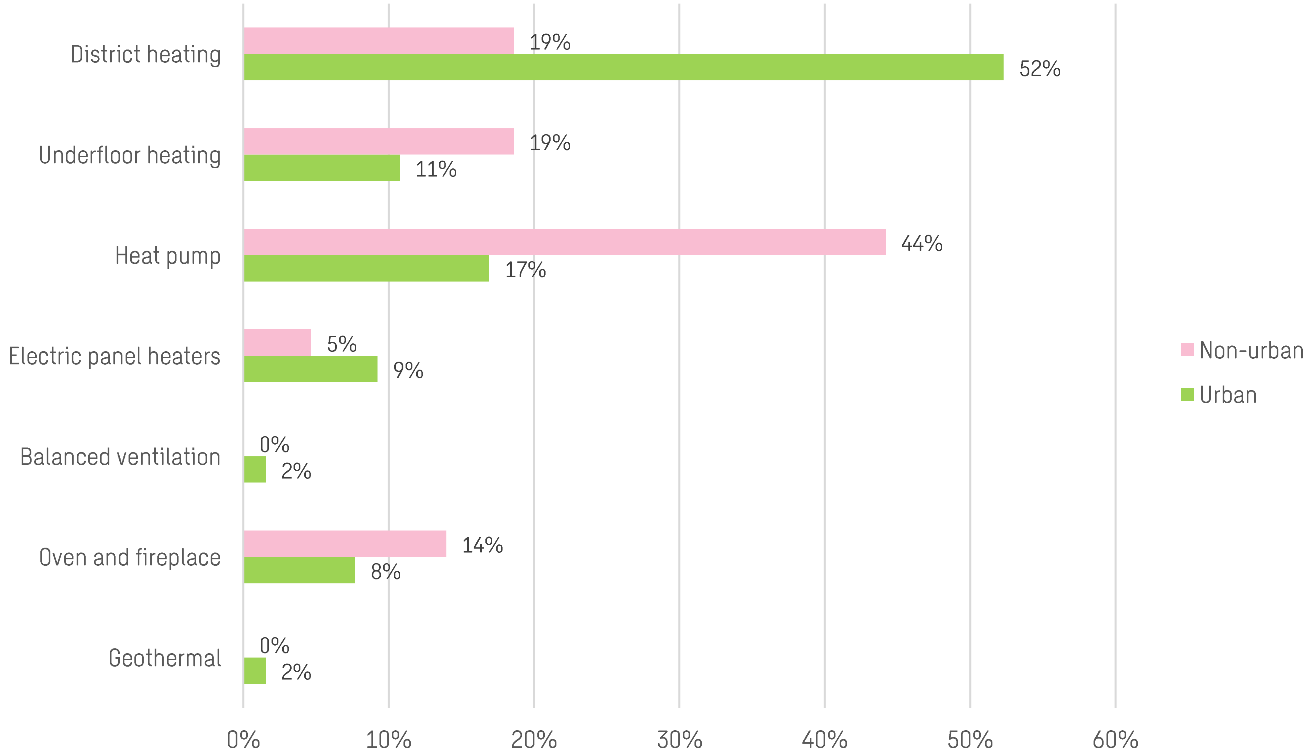

Figure 9 - The main heat source in the urban and non-urban group. Green columns represent the urban group, while pink columns represent the non-urban group. Percentage as the relative frequency for the respective groups.

5.5 MOBILITY

The customers were asked to list up whether their household owns a car(s). If so, they were asked about how many, and what type of cars. The distribution of cars in the different groups shows that the urban group owns on average 1 car per household, while the non-urban group owns 1.2 cars per household. 55 % of the urban group and 45 % of the non-urban group owns an electric or hybrid car. As expected, the non-urban group has a higher portion of petrol or diesel cars (Figure 10).

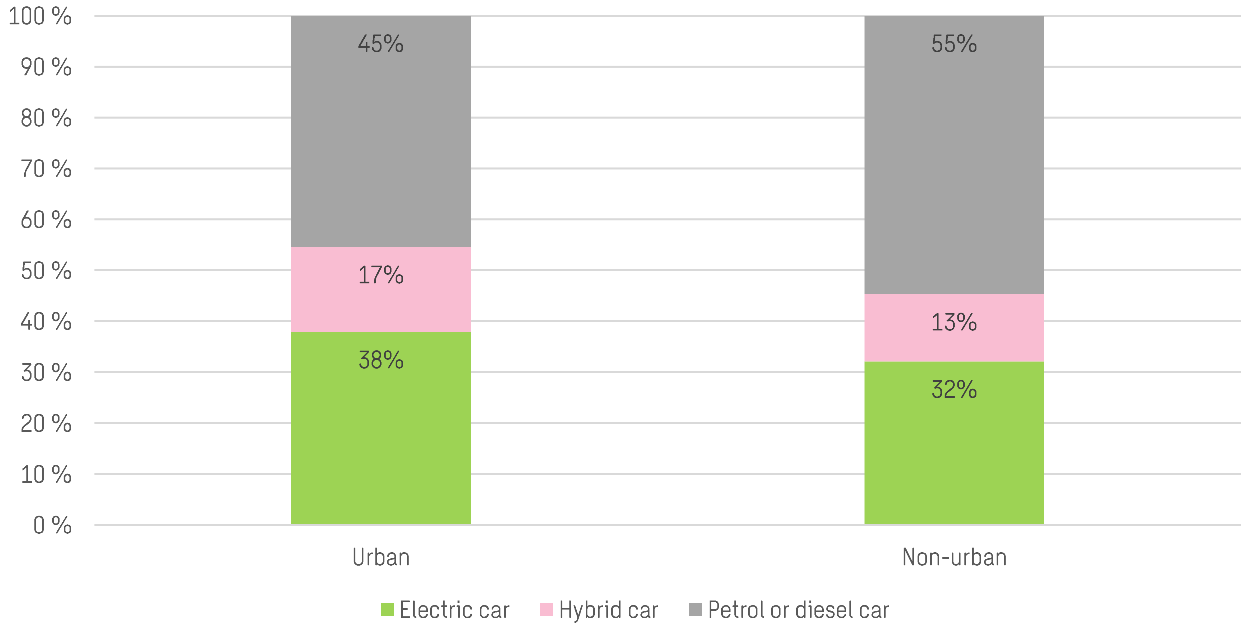

Figure 10 – Shows the distribution of car types in the urban and non-urban groups. Green columns represent electric cars, pink columns represent hybrid cars, and grey columns represent petrol or diesel cars.

To estimate the climate gas emissions from transport data collected from the survey, emission factors from the Ducky calculator are used (Table 8 and 9). The emissions per kilometer associated with the different vehicles in the household include the use of the car, production, and maintenance. For the flight data, the number of trips has been collected to estimate the emissions associated with round-trip flights. The commuting data covers travel to and from work or school, while flight data are not specified for work or holiday.

Table 8 - Emission factors related to transport alternatives to and from work or study place (Ducky, 2021)

Emission factor	[kg CO_2e / km]
Public transport	0.078
Car sharing	0.2
Carpooling	0.108*
Electric car	0.081
Petrol & diesel car	0.27

* when assuming on average 2.5 people in a car, driving in a petrol or diesel car.

Table 9 - Emission factors related to aircraft used in estimations (Ducky, 2021).

Emission factor	[kg CO_2e / km]
Domestic/in Scandinavia	0.34
Within Europe	0.28
Globally	0.24

When combining the commuting dataset and the emission factors, the estimated emission per person who submitted the survey for the urban and non-urban group are 570 kg CO_2e and 1 493 kg CO_2e, respectively (Figure 11). The largest contributor to the difference is the vast use of petrol and diesel cars in the non-urban group, as this alternative accounts for more than half of the total emissions in the different groups.

This result is in line with the findings in the research section, where it is stated that non-urban areas use twice as much energy for local transport, and thereby emits twice as much CO_2 through driving more fossil fuel cars. However, although the customer survey and research findings suggest the same, it is important to emphasize that the emissions in the former are only related to job commuting and do not include leisure travels.

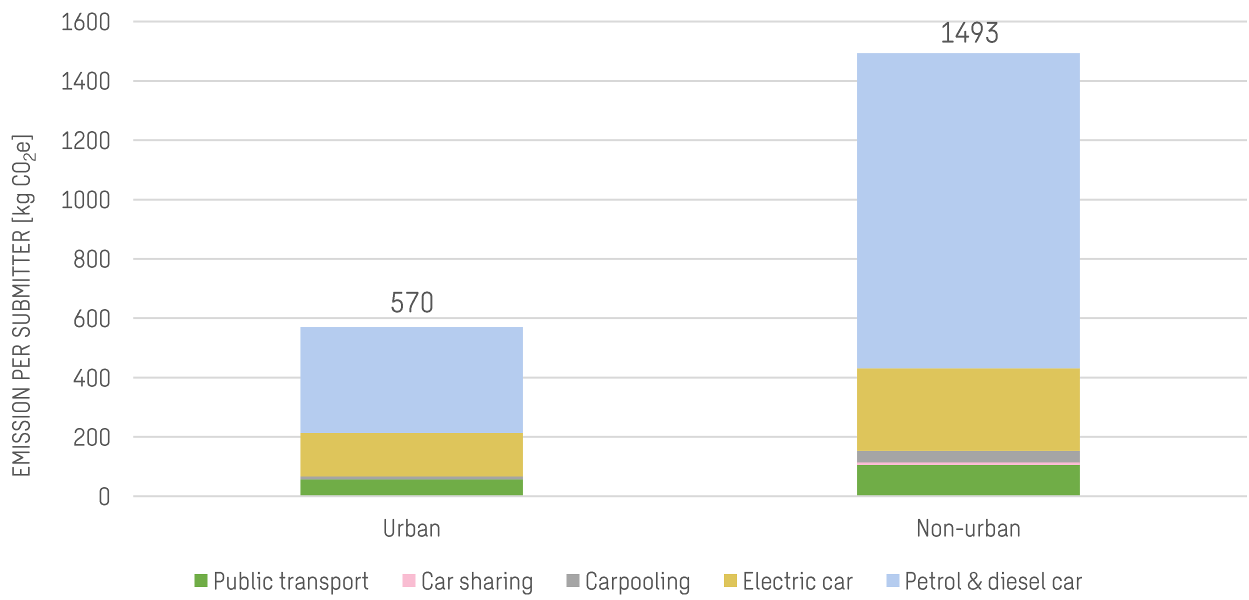

Figure 11 – The average climate gas emissions from commuting per submitter in the urban and non-urban groups. Green columns are public transport, pink columns are car sharing, grey columns are carpooling, yellow columns are electric car, and blue columns are petrol and diesel car.

Based on previous studies, it was assumed that the urban group would have a larger climate footprint related to flight travels. Results from the survey show that the urban and non-urban group have approximately the same climate gas emissions related to flight travels (Figure 12). The urban group's higher emissions from Europe-flights, is balanced by the non-urban group's higher emissions related to global flights. The total, average climate footprint for the urban and non-urban group is 3 079 kg CO_2e and 3 110 kg CO_2e, respectively, for flight travels.

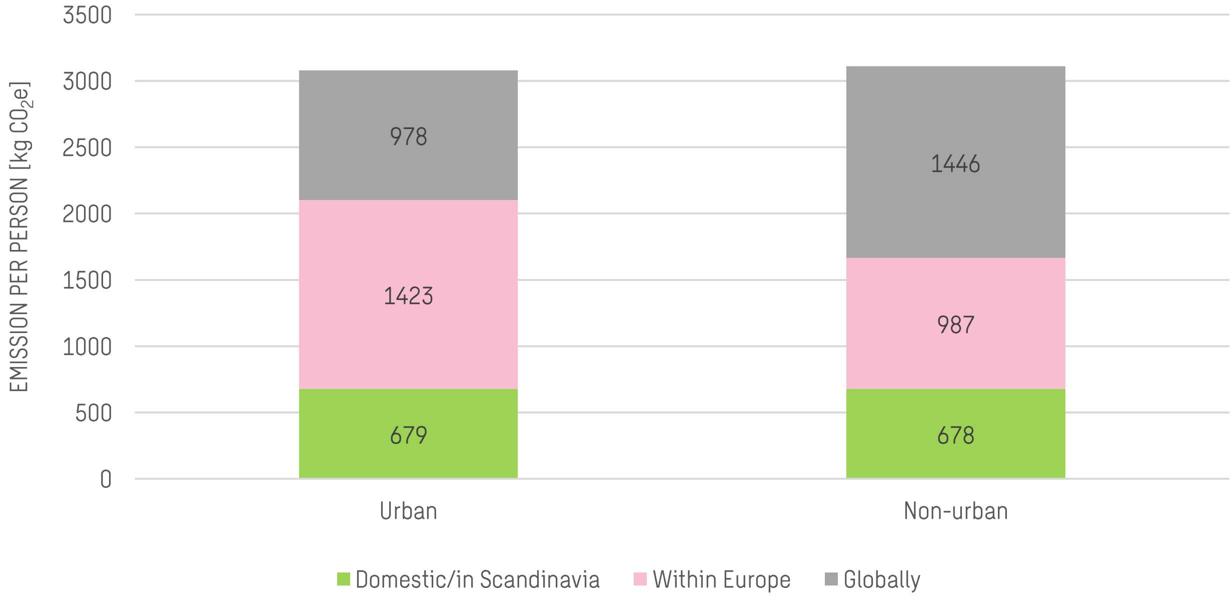

Figure 12 – The average climate footprint per submitter in the urban and non-urban groups from transport with aircraft. For transport using aircraft, the contributing elements is the domestic flights in green columns, the flights within Europe in pink columns, and global flights in grey columns.

5.6 LIFESTYLE

By always repairing worn or damaged things it is estimated that the products will last 20 % longer than average (Ducky, 2021). And by making products lasting save both nature resources and CO_2 emissions. Climate gas emissions are therefore estimated from the customers' habit regarding repairing and reuse of products, as well as waste sorting and food consumption. The data distribution from the urban and non-urban groups are close to equal when looking at repairing worn or damaged things (Figure 13).

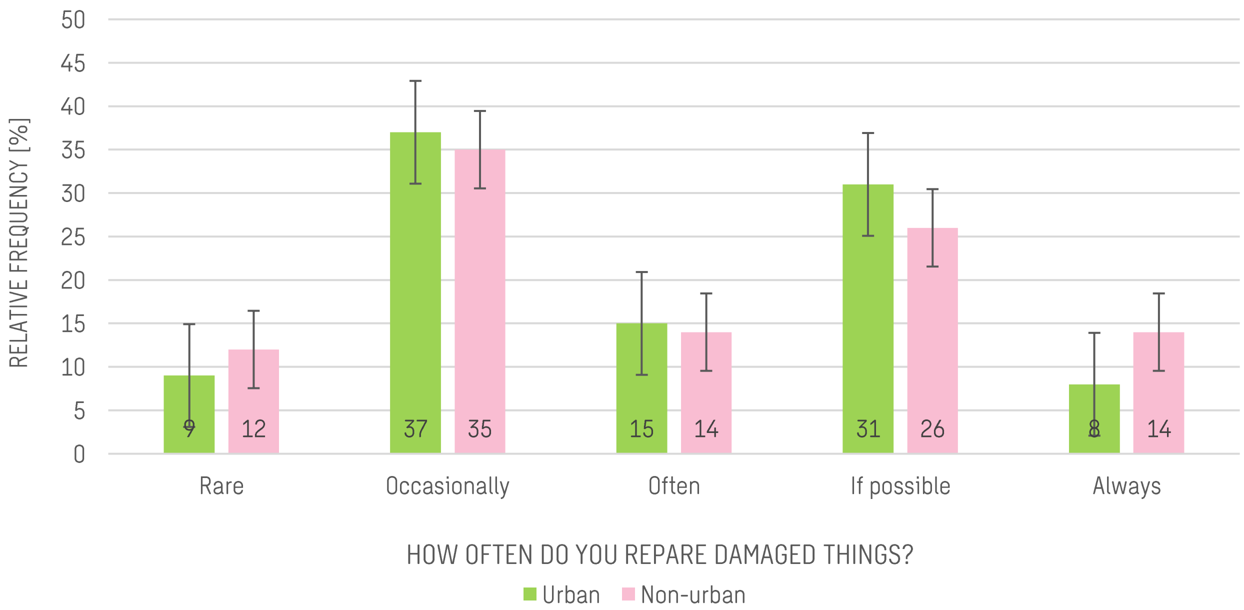

Figure 13 - Answers regarding repairing worn or damaged things, divided in the urban and non-urban group. The number of participants that answered is illustrated in relative frequency for that respective group. The green columns express the answer from the urban group, while the pink columns are for the non-urban group.

As for the customers' habit regarding reuse of clothes, equipment or things, most people stated they would reuse their things if possible (Figure 14). While 52 % of the urban group answered that they "Often", "If possible" or "Always" would reuse their clothes, equipment or things, the same share for the non-urban group is 63 %. The observed difference in the urban and non-urban group is in this case not significant (Figure 14).

Figure 14 - How the participants have answered the question regarding reusing clothes, equipment or things, divided in the urban and non-urban group. The number of participants that answered is illustrated in relative frequency for that respective group. The green bars express the answer from the urban group, while the pink bars are for the non-urban group.

When it comes to the customers willingness to recycle their waste, it is observed that both groups have the same distribution trend – the trend is exponential towards more frequent recycling (Figure 15). The non-urban group does, however, has a more exponential trend, meaning the group has a higher frequency of always recycling their waste.

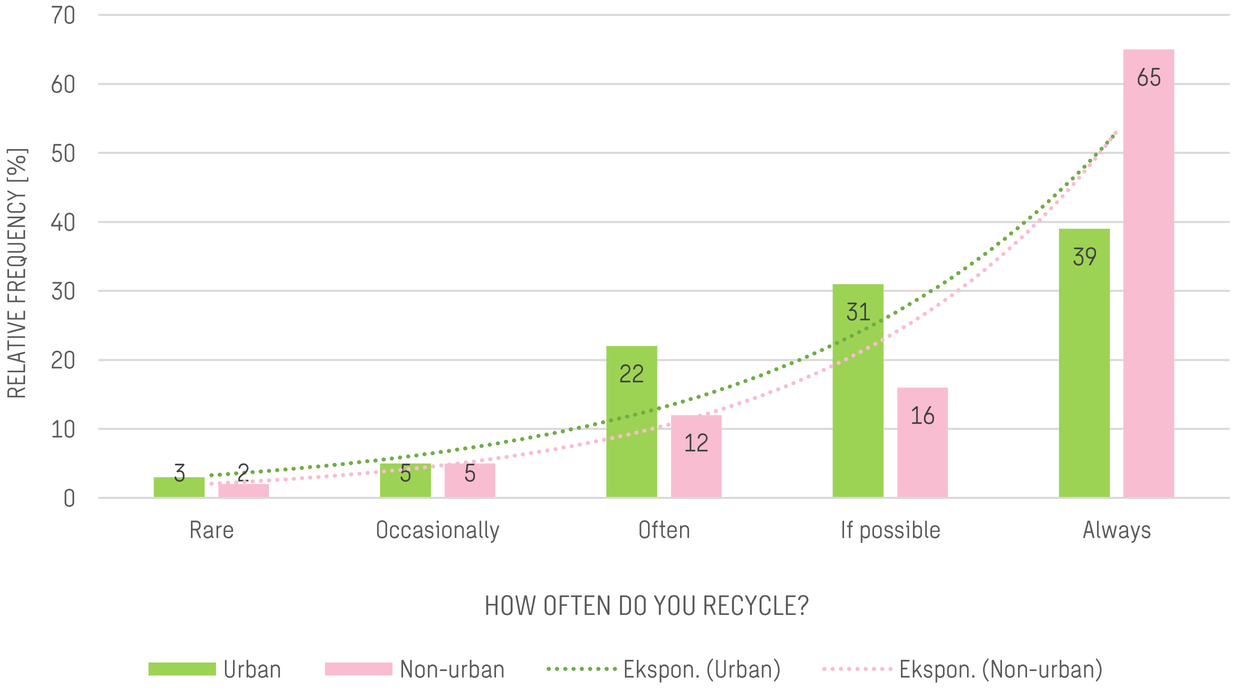

Figure 15 - How the participants have answered the question regarding recycling their waste, divided in the urban and non-urban group. The number of participants that answered is illustrated in relative frequency for that respective group. The green bars express the answer from the urban group, while the pink bars are for the non-urban group.

Some assumptions have been made when estimating the annual climate footprint of the urban and non-urban households. The estimations are based on average consumption behavior among Norwegians: from how often quality products, ethical and environmentally friendly products are chosen, and how often service is chosen over product. Due to little variation in distribution between the urban and non-urban groups, it is assumed that the participants' habit on repairing worn and damaged things is average (Figure 13).

The annual climate footprint related to consumption for an average Norwegian with varying waste sorting habits contribute with 1 851 kg CO_2e to 1 937 kg CO_2e (Ducky, 2021). The average, annual emissions per submitter in the urban and non-urban group are estimated to 1 873 kg CO_2e and 1 865 kg CO_2e, respectively. Adding up, the annual emissions per household are estimated to 3 558 kg CO_2e and 4 848 kg CO_2e, respectively.

5.6.1 Food consumption and waste

The annual climate footprint related to food is approximately 10 % of the total annual footprint for a person (Ducky, 2021). It is therefore of interest to look at the customers' climate gas emissions from food consumption and food waste. While about half of the urban group eat vegetarian one day or more during a week, only 39 % of the non-urban group eat vegetarian one day or more (Figure 16). The trend for both the urban and non-urban groups is relatively similar. The largest portion of the two groups does not eat plant-based food, and the portion decreases exponentially as the number of days increase.

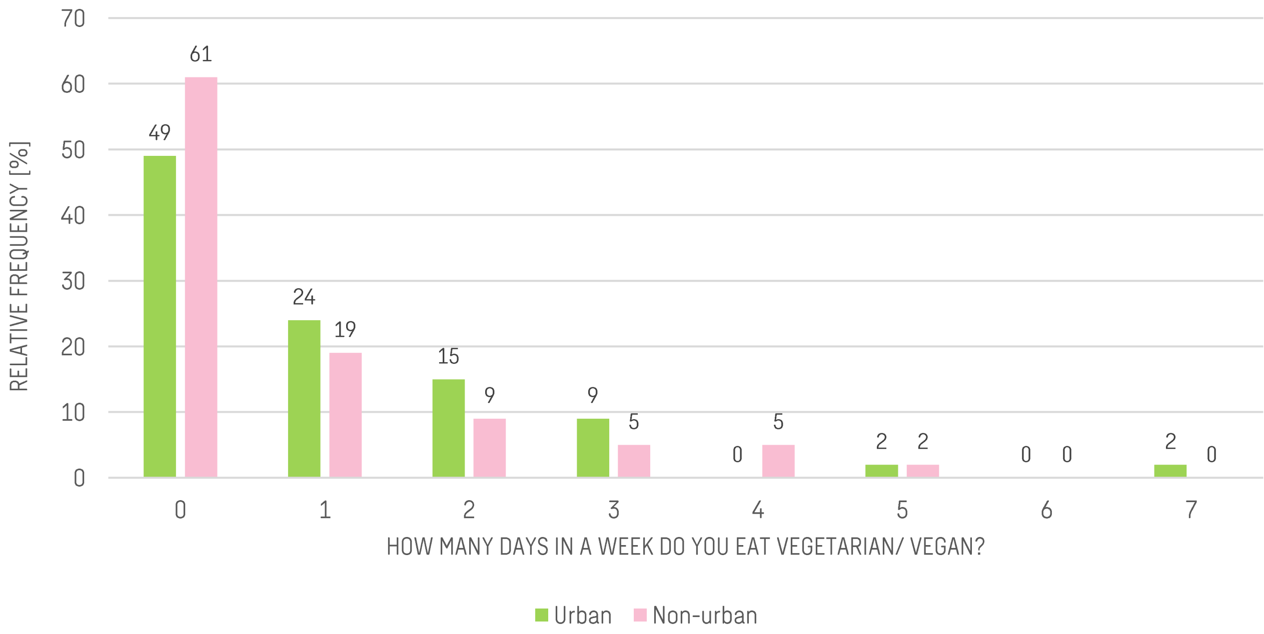

Figure 16 - How many days the participants in the urban and non-urban groups eat vegetarian or vegan, for one week. The green columns represent the urban group, while the pink columns represent the non-urban group.

Most of the customers throw away leftovers between 0 to 2 days a week (Figure 17). The share of customers in the urban and non-urban groups that throw away food less than 2 days a week are 73 % and 72 %, respectively.

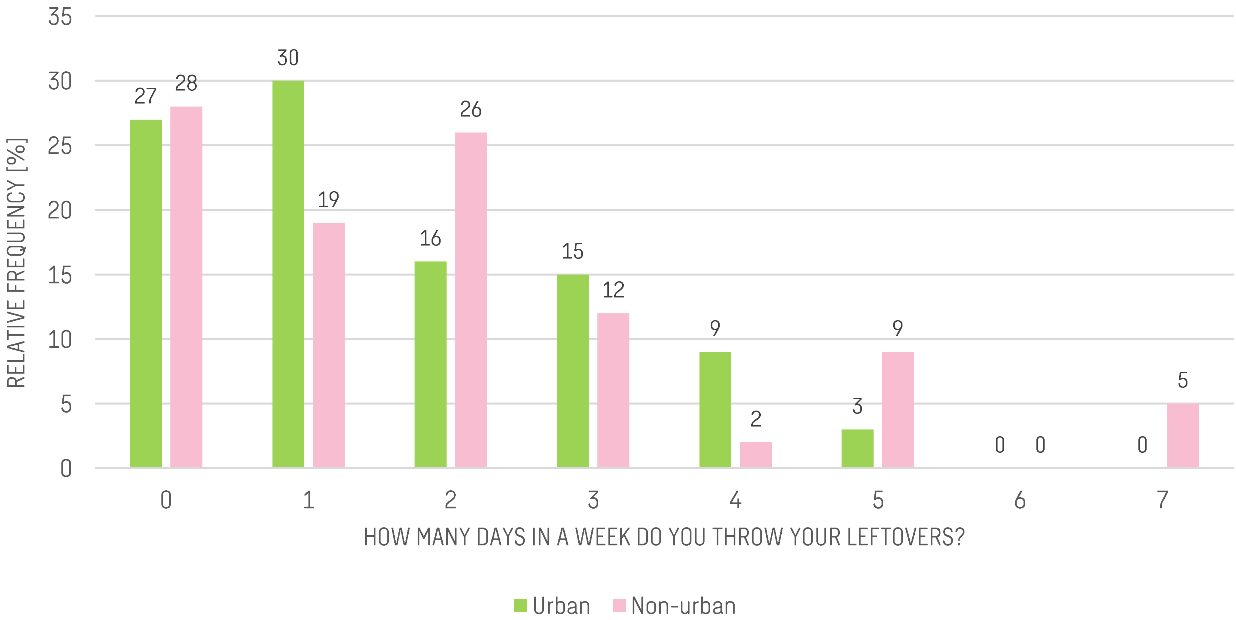

Figure 17 - How many days the participants in the urban and non-urban group throw away leftovers, for one week. How the participants that answered, is illustrated in relative frequency for that respective group. The green columns represent the urban group, while the pink columns represent the non-urban group.

The estimations are based on numbers from an average Norwegian eating 2700 kcal per day (Ducky, 2021). It is assumed that the intake of meat during a week is almost every day. The annual footprint for those who, weekly, eat meat almost every day and throw leftovers a few days to almost every day is between 1 398 to 1622 kg CO_2e (Ducky, 2021). The average, annual emissions per submitter in the urban and non-urban group is then estimated to be 1 450 kg CO_2e and 1 460 kg CO_2e, respectively. Adding up, the annual emissions per household is estimated to 2 755 kg CO_2e and 3 796 kg CO_2e, respectively.

5.6.2 Sustainable alternatives

The customers were asked about their willingness to pay for several sustainable alternatives such as food, household products, degradable plastic/plastic-free products, and environmentally certified products. By looking at the four questions in total, most of the people in the urban group would choose sustainable products "occasionally". It is, however, observed that while 44 % of the urban group are willing to choose sustainable products "Often", "If possible" and "Always", over half of the non-urban group would have done the same (Figure 18).

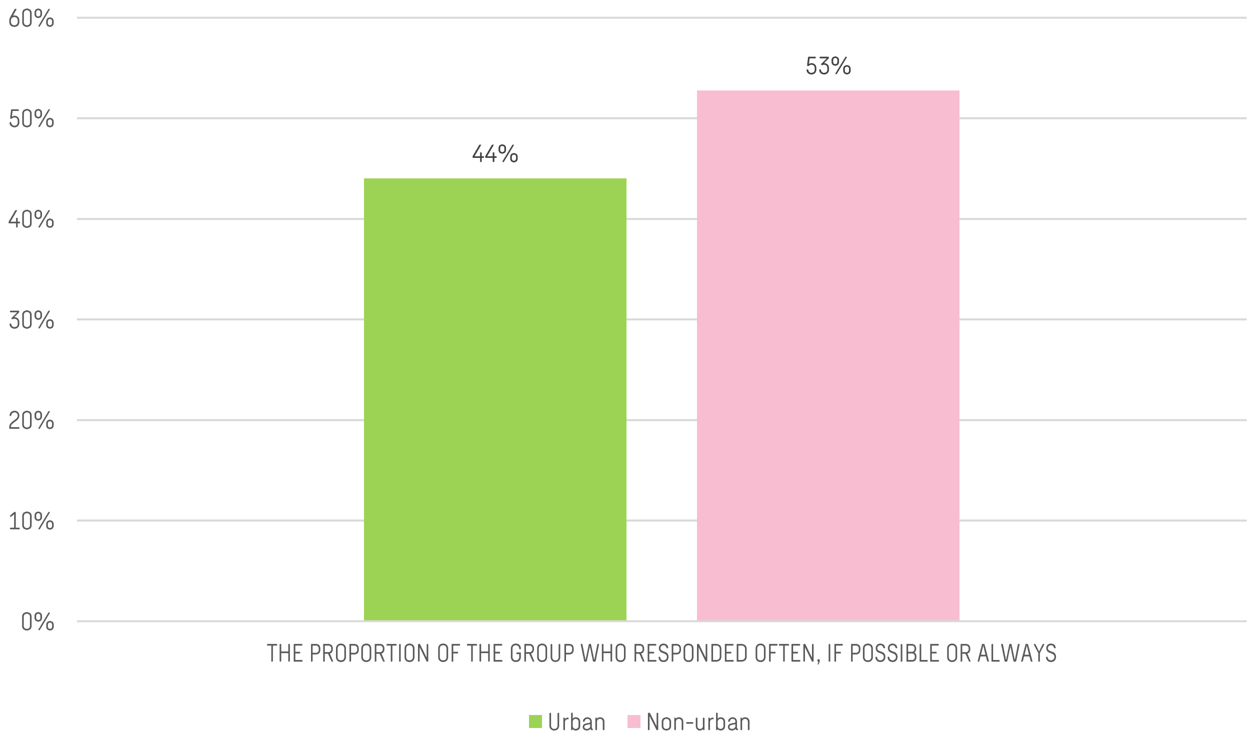

Figure 18 - Accumulated answers from the four questions. (1) The customers' willingness to pay for more sustainable food, (2) more sustainable alternatives for household products, (3) more sustainable alternatives for products with degradable plastic or that is plastic-free, and (4) environmentally certified products. The green and pink columns illustrate the proportion of the groups that have responded Often, If possible or Always for these four questions.

6 EMISSION REDUCTION

When comparing the average specific energy demand on the Norwegian residential building stock with the existing buildings with code TEK10 and later, the associated emission reduction with TEK 10 certification is approximately 925 kg CO_2e per person per year. This is mainly due to the higher energy efficiency in the buildings with the TEK 10 code and later. (Multiconsult, 2019).

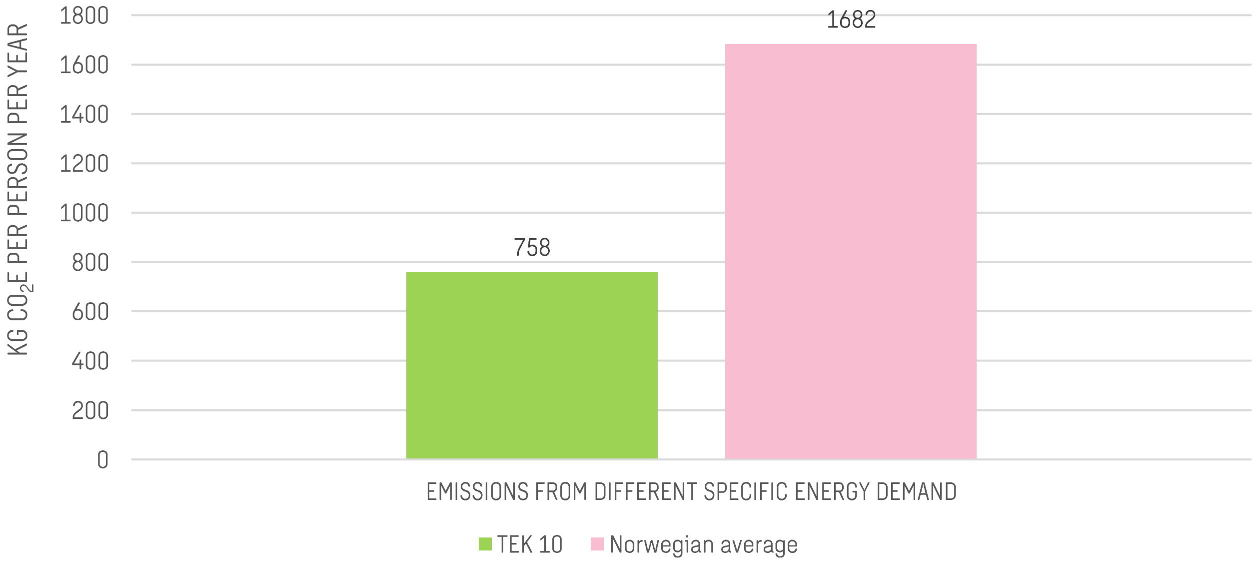

Figure 19 - illustrates the difference of CO2 emissions between TEK 10 buildings (green column) and the Norwegian average (pink column).

In addition, the climate gas emissions saved by living in urban areas is 1004 kg CO_2e per person per year, mainly due to the much frequent use of fossil cars in the non-urban areas. The total climate gas emissions saved by using the Green Finance Framework of TEK 10 Urban is 1.93 tCO_2e per person per year, which is a lot considering that the average climate footprint of one Norwegian westerner is about 11.5 tCO_2e per year (Folkets Fotavtrykk, 2021). Adding up, this means a saving of 3.7 tCO2e per household. With 340 customers in the green portfolio meeting the TEK 10 Urban requirement, Fana Sparebank have a total emission reduction of 1 258 tCO_2 per year.

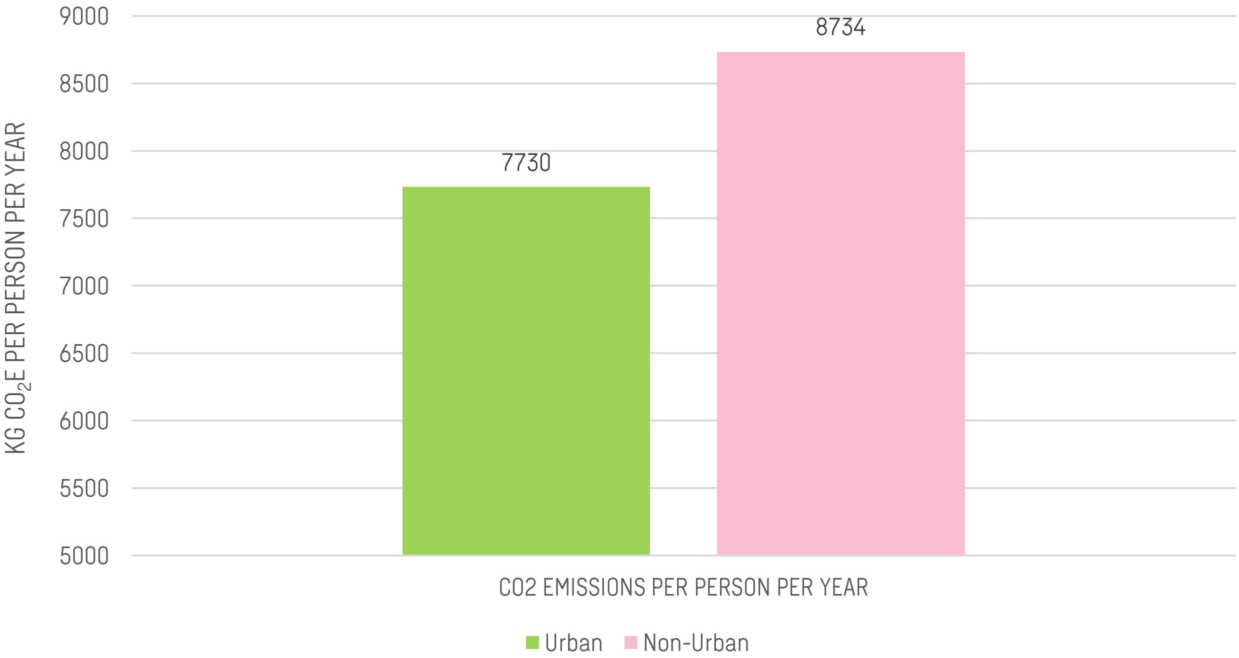

Figure 20 - show the difference in climate gas emissions between the urban group (green column) and the non-urban group (pink column). Data is collected from the customer survey conducted for this report.

7 REFERENCES

Aall, C. et al. (2004) *Bustad, forbruk og økologisk fotavtrykk. Ein rapport til Husbanken om korleis utforming og lokalisering av bustader påverkar forbruket.* ISBN nr 82-428-0244-0

Aamaas, B. (2019) Personlige klimatiltak for å kutte de globale utslippene. Rapport skrevet av CICERO Senter for klimaforskning på oppdrag fra KLP. Rapport_Klimatips_KLP_CICERO.pdf

Borg, A. (2015) Relationship Between Measured and Calculated Energy Demand in the Norwegian Dwelling Stock. URL: https://www.ntnu.no/documents/1201072460/1201115133/Prosjektoppgave_Borg_2015.pdf/4f4ab527-ce90-46d7-8c3e-4c063bf77762

Ducky (2021) Calculator documentation, URL: https://static.ducky.eco/calculator_documentation.pdf

Energimerking (2019) Energimerking.no, URL: https://www.energimerking.no/no/energimerking-bygg/energimerkestatistikk/

Engebretsen, Ø., Næss, P. and Strand, A. (2018) Residential location, workplace location and car driving in four Norwegian cities, DOI: https://doi.org/10.1080/09654313.2018.1505830

Folkets Fotavtrykk (2021) *Folkets Fotavtrykk.* URL: https://app.folketsfotavtrykk.eco/

Holden, E. & Linnerud, K. (2011). Troublesome Leisure Travel: The Contradictions of Three Sustainable Transport Policies. Urban Studies. 48. 3087-3106. 10.1177/0042098010396234.

Multiconsult (2019). Norwegian Energy Efficient Buildings- Green residential and commercial buildings. Doc. code: 10209489-TVF-RAP-002

Nordic Public Sector Issuers (2020). *Position Paper on Green Bonds Impact Reporting*. URL: https://www.kuntarahoitus.fi/app/uploads/sites/2/2020/02/NPSI_Position_paper_2020_final.pdf

Noregs vassdrags- og energidirektorat, NVE (2018), URL: https://www.nve.no/konsesjonssaker/konsesjonssak?id=405&type=A-7. Accessed: June 25th, 2021.

Næss, P. (2000) *Bærekraftig utvikling – hva kan arealplanleggerne gjøre?* I Fiskaa, Helge og Skjeggedal, Terje (red.). Planlegging og bærekraftig utvikling, 1-31. Tapir Akademisk Forlag, Trondheim. (31 s.).

Statistisk sentralbyrå, SSB (2022) *Lønn*. URL: https://www.ssb.no/arbeid-og-lonn/lonn-og-arbeidskraftkostnader/statistikk/lonn. Accessed: February 25th, 2022.

Other relevant papers:

Næss, P. (2012). Urban form and travel behavior: experience from a Nordic context. *Journal of Transport and Land Use*, *5*(2). https://doi.org/10.5198/jtlu.v5i2.314.

Næss, P., Saglie, I.L. and Richardson, T. (2020) Urban sustainability: is densification sufficient? European Planning Studies, 28:1, 146-165, DOI: 10.1080/09654313.2019.1604633.