Framtiden i våre hender
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Towards a fair consumption space for all:

Options for reducing lifestyle emissions in Norway

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Framtiden i våre hender / Future in our hands is a Norwegian civil society organization promoting ethical and sustainable consumption. Our goal is a socially just world, within the planetary boundaries. We were founded in 1974 and are a growing organization with more than 47 000 members.

Framtiden i våre hender
Oslo

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The Hot or Cool Institute is a public interest think tank that explores the intersection between society and sustainability. Our mission is to equip organisations, policymakers, and communities with the science to inform their decisions towards a sustainable and prosperous future, putting people and science at the centre of the sustainability transition.

Hot or Cool Institute
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The report is written by The Hot or Cool Institute on behalf of Future in Our Hands.

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About

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Annexes are not included in this document, but are available on:
www.framtiden.no/fair-consumption-space-norway-annexes

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Abbreviations

°C	Degrees Celsius
CBDR-RC	Common but differentiated responsibilities and respective capabilities
CO_2e	Carbon dioxide equivalent, based on GWP100
€	Euro
g	Gram
Gt	Gigatonne
GWP100	The relative heating effect of different greenhouse gases over a 100-year period
IPCC	Intergovernmental Panel on Climate Change
kg	Kilogram
km	Kilometre
LCF	Lifestyle carbon footprint
m^2	Square metre
p-km	Person-kilometre
SAF	Sustainable aviation fuels
t	Tonne

Foreword

By Anja Bakken Riise,
Leader of Future in our hands

"If we who already live in abundance aim for further growth in wealth, we will not only deprive the world's poorest of their livelihoods, but we will also destroy the planet that sustains us all. And ultimately, we will also destroy ourselves, our joy of life, and our humanity."

— *Erik Dammann*

These words, spoken by Erik Dammann at the founding meeting of Future in Our Hands 50 years ago, send shivers down my spine, for today the connection between overconsumption, economic inequality, and environmental destruction is more obvious than ever before. When this report is launched, it will be exactly fifty years since those words were spoken. The link between overconsumption, economic inequality, and environmental destruction is probably clearer today than ever before.

When the Intergovernmental Panel on Climate Change (IPCC) presented its sixth main report, they showed that the wealthiest ten percent in the world account for *half* of the global greenhouse gas emissions. It's easy to think, "These people need to shape up," but it's worth remembering that the majority of us living in Norway belong to these ten percent. Rather than shaming you and me individually, we as a society should recognize the problem and address the drivers that have led Norway to become a country that exceeds its share of the planet's resources.

It's simple math, really. In Norway, we have around three million cars, meaning we have about one ton of car per person. On average, the car remains idle over ninety percent of the time. This is overconsumption. It's wasteful use of resources. It's not your fault or mine, but the sum of political decisions and factors that have brought us here.

Similarly, we have a transport system in which it's cheap to choose the most emissions-intensive mode of travel; flying, while it's expensive and often challenging to choose to travel by train. The fact that Norway is among the countries in Europe, and the world, with the highest domestic air travel is not because Norwegians don't want to make environmentally friendly choices, but because we have designed our society in a way that encourages us to travel, reside, and live in an emissions-intensive manner. Going forward, we need to plan our society smarter.

The Hot or Cool Institute is a global leader in climate transition from a consumption and lifestyle perspective. Here, they analyse Norwegians' emissions and present concrete alternatives for what the authorities must do for us to live in line with climate goals and contribute to limiting global climate change.

There are two aspects of Hot or Cool's analysis that surprised us: the first is the potential. We *can* achieve significant climate cuts if politicians address Norwegian overconsumption. The second is how extensive the transition will need to be for a high-consumption society like ours. According to Hot or Cool's analysis, politicians must ensure that we more than halve the number of international flights, eat significantly more plant-based food and much less meat, shop much less, and think differently about how we build, live in, and use our homes and our cabins.

The analysis is crystal clear: we will not come close to reaching the climate goals if we rely solely on efficiency improvements and technological measures. We are also dependent on measures that effectively reduce overconsumption by changing the way we live today.

Despite the magnitude of the task, I choose to be optimistic. As we enter our fifty-first year, my impression is that we are approaching an increased acceptance of limiting overconsumption in Norway. Nine out of ten Norwegians say they can reduce their consumption without compromising their quality of life. In fact, nearly six out of ten say they can more than halve their consumption!

Decision-makers should take note. When it comes to living in balance with the planet's ecological limits, it's primarily about how our society is organized rather than individual actions. While you and I can and should do our part, the main responsibility lies with political decision-makers. Hence, we extend an invitation to politicians to join the dance. Armed with the insights from this report, we have confidently stepped onto the dance floor. Now, we await eagerly to see if they will take the lead.

Even though we have analysed Norwegian emissions through a consumption lens, it does not mean that the responsibility solely lies with those of us who live, move, shop, and eat every day. We can and must make good choices in our daily lives, but these choices do not happen in a vacuum. I can choose to take the bus instead of driving a car. But I can only make this choice if there's actually a bus when I need it. This illustrates the political responsibility. We need someone to facilitate making the right choices easy.

Norwegians also desire clearer political leadership. More than six of ten Norwegians believe politicians must take the lead and introduce stricter regulations to compel individuals and businesses to live more sustainably.

Many of the sustainable solutions of the future already exist. We see it in the local political efforts to transition transportation systems in our urban areas. We see it in the entrepreneurs developing new sharing- and reuse solutions for clothing, building materials, cars, electronics, and furniture. We see it in the many volunteer- and non-profit organisations redistributing surplus goods and creating social meeting places in communities through repair workshops and fix-it events. We see it in the many farmers who want to switch to green production or adopt more environmentally friendly methods. But what all these pioneers need is a better political framework. Only then can solutions be scaled up and eventually take over from the systems that currently worsen global climate and environmental issues by allowing Norway to consume more than our fair share.

Foreword

By Lewis Akenji, PhD
Executive Director,
Hot or Cool Institute

When we first developed the 1.5-degree lifestyles approach, the aim was to give a clear understanding of how lifestyles impact the environment, and to provide science-based estimations of how specific changes in lifestyles could contribute to keeping global warming within the 1.5-degree Celsius limit, as specified in the Paris Agreement on climate change.

At the time, popular misconceptions would consider it a sacrilege to question consumption and lifestyles in democratic societies. The privilege of having and being able to afford multiple consumer choices, even when not necessary, was confused with freedom of choice. The need to shift our economies away from consumerism, to make them fairer, and to operate within ecological capacity was conflated with freedom restrictions and reduced wellbeing.

But inequality, as it is now widespread and getting worse, is the antithesis of democracy.

So, I am pleased that in the years between that first global edition of the 1.5-degree lifestyles report and this edition, a slew of other authoritative scientific publications have reinforced our message on the centrality of addressing lifestyles. The Intergovernmental Panel on Climate Change (IPCC), typically more conservative in its estimates, only recently acknowledged that **changes in behaviours and lifestyles hold significant untapped potential to reduce greenhouse gas emissions 40-70% by 2050**.

In fact, for mandates such as the Paris Agreement and the UN Sustainable Development Goals – which affect everyone and all facets of society – their legitimacy depends on public acceptance and support, more than they depend on technological innovation or skewed economic profits. Realising the untapped potential of sustainable lifestyles requires going beyond the narrow interpretations of the past. **We need to change the values and the socio-technical context that predetermines available options, creates access and shapes choices for people.** This requires brave and bold policies, large investments in infrastructure, and a rethink of the role an economy should play in a healthy society.

One other key to viewing sustainable lifestyles as a solution is to not play the chicken-and-egg game of which should go first: systems change or individual change. This question is a false dichotomy, and it is being effectively used to cause internal rifts and to slow progress towards an urgently needed transformation. In an ecological emergency, we no longer have the luxury to choose: we need systems change, individual change, infrastructure change, and every other lever of change that impacts the urgency and scale of the challenge at hand.

Sustainable lifestyles are drivers, as well as entry points for citizens. They are a central objective of a sustainable society – one that ensures equitable wellbeing for all within ecological capacity.

This report on Norway is the first national report on 1.5-degree lifestyles, and is predicated on three points:

→ As the analysis shows, Norway is one of the countries that consumes above its fair share of global resources. Accepting responsibility and addressing this impact will contribute to mitigating the environmental crises.

→ This is a time for leadership. Norway is among the world's wealthiest countries, with significant resources that can contribute towards solutions. It also has a high share of citizens showing awareness of the problem and willingness to see change.

→ Finally, understanding the impact and rethinking lifestyles in Norway is an opportunity for the country to decide what type of future society it wants. **Climate change is already happening, and major changes in society are inevitable. A planned transition will be more manageable than one left to the whims of a planetary system being pushed beyond tipping points and a global society torn apart by social tensions.**

It is my wish that this report provides not only scientific evidence, but also serves as a backdrop for discussions and options for change towards a better tomorrow – for the people of Norway and the world.

Summary

The lifestyle carbon footprint in Norway

The study estimates how an average Norwegian lifestyle affects the global climate. It identifies options for reducing these lifestyle emissions, assesses their respective effectiveness, and creates scenarios for how targets for emissions reduction could be met.

The analysis covers greenhouse gas emissions related to both domestic production and imports, excluding emissions from products that are made in Norway and exported to other countries. It covers only the emissions associated with private consumption and lifestyles, not those related to public consumption or investments by companies and governments.

Norway's average lifestyle carbon footprint (LCF) is estimated at 7.8 tonnes of CO_2 equivalent (tCO_2e) per capita per year (Figure 1.1). Nearly two-thirds of this footprint is related to just two lifestyle domains: personal transport (36%, or 2.8 tCO_2e/capita/year) and nutrition (27%, or 2.1 tCO_2e/capita/year). Smaller contributions are from consumer goods (18%, or 1.4 tCO_2e/capita/year) and housing (13%, or 1.0 tCO_2e/capita/year). Leisure and services account for only a small part of the footprint (3% each, or 0.3 and 0.2 tCO_2e/capita/year, respectively).

An assessment of a fictive high-consumption lifestyle, assumed to be common among well-off Norwegians, shows that the footprint of such lifestyles could easily be twice as high as for the average person.

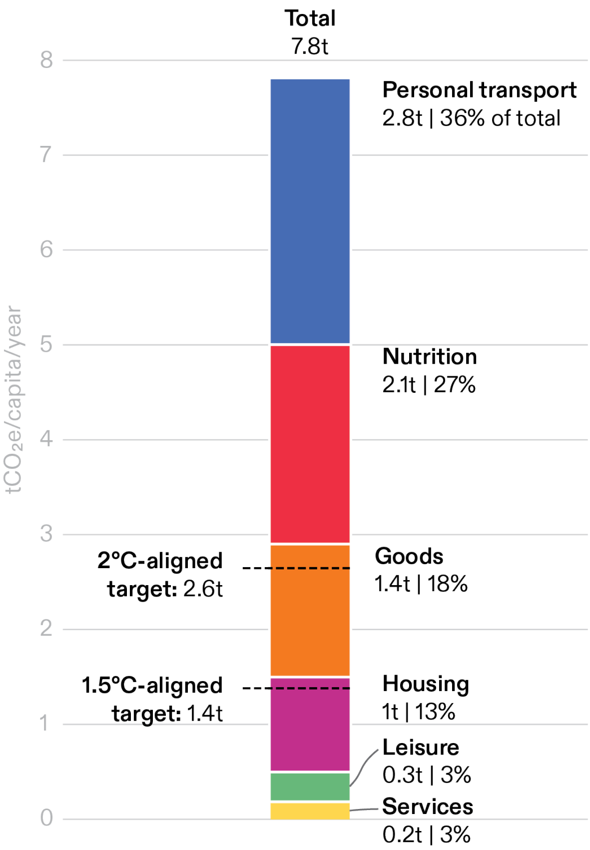


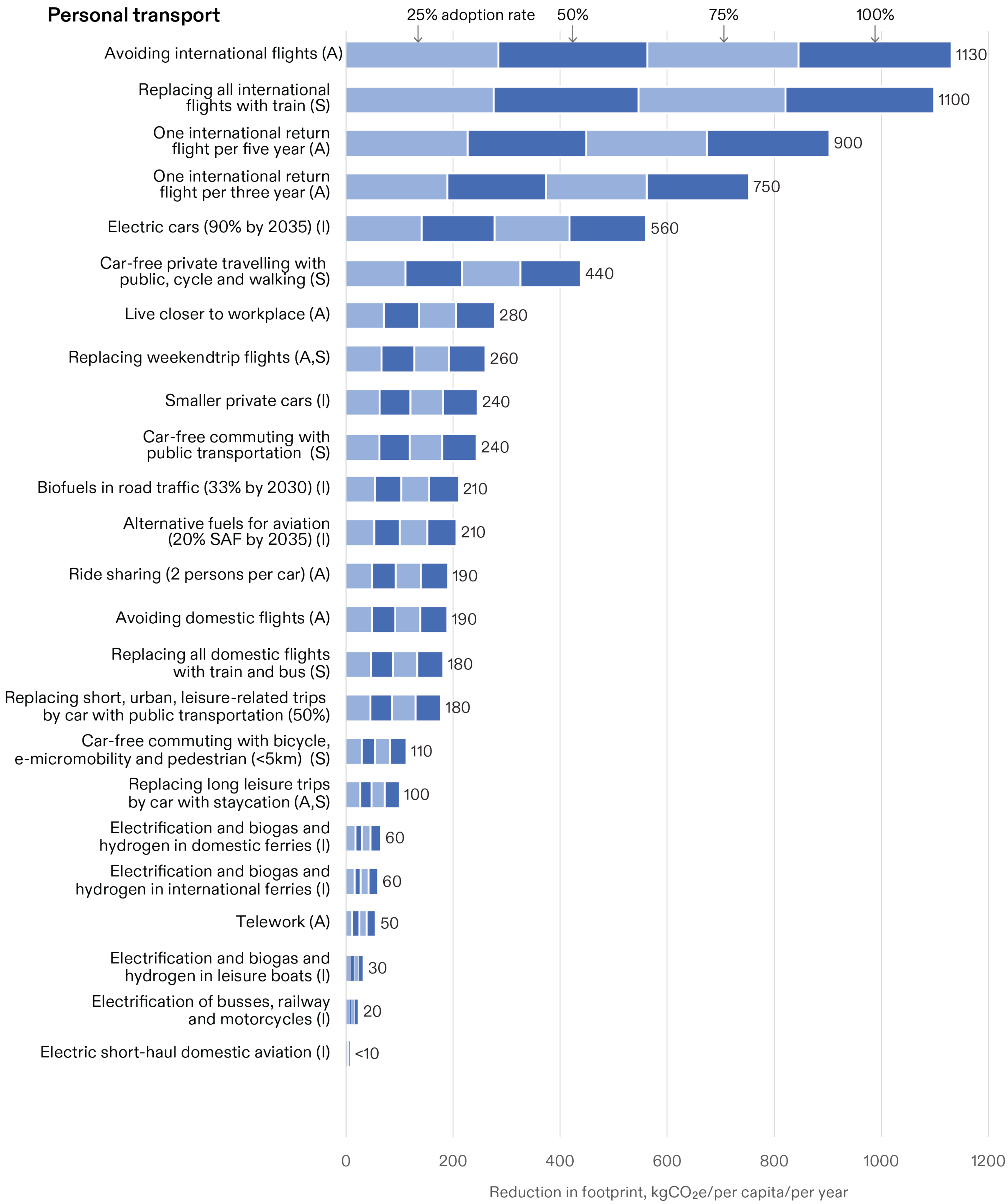
Figure 1.1: Current Norwegian lifestyle carbon footprint and its breakdown by consumption domain, shown together with 1.5°C- and 2°C-aligned targets for 2035.

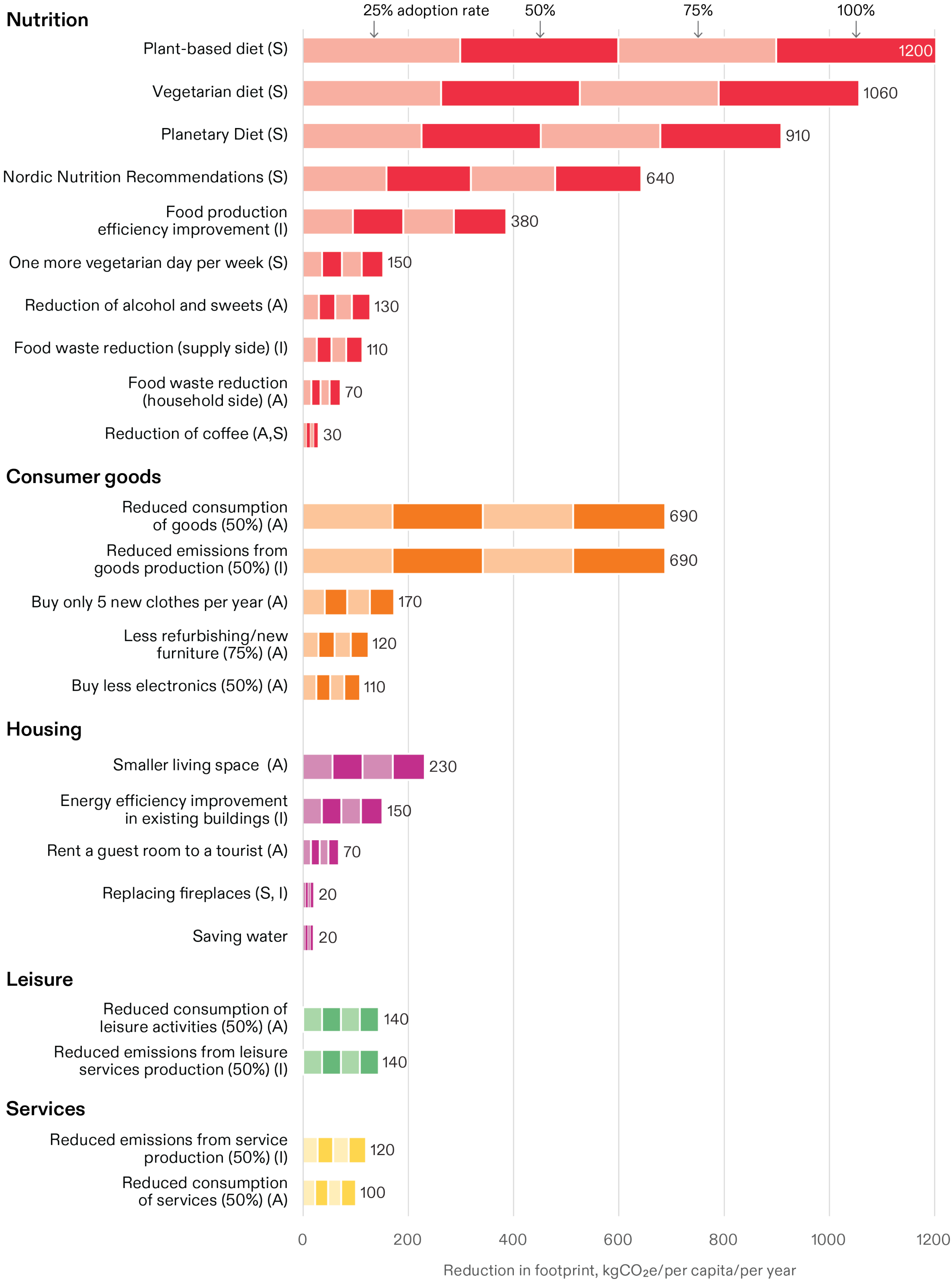
Options for reducing the average footprint

The study assesses the emission reduction potential of a range of options representing three approaches: Avoid – reducing consumption, Shift – meeting needs and demands differently, and Improve – making production and provisioning systems less polluting (Figure 1.2). Note that the calculated reduction potential of the low-carbon options is based on the average Norwegian's lifestyle, whereas in reality there is a huge diversity.

Figure 1.2: Estimated per capita carbon footprint reduction impacts (kgCO_2e/capita/year) of low-carbon lifestyle options

Note: The letters in the brackets after the option names refer to the approaches of Avoid (A), Shift (S) and Improve (I).




Nutrition
25% adoption rate
50%
75%
100%
Plant-based diet (S)
1200
Vegetarian diet (S)
1060
Planetary Diet (S)
910
Nordic Nutrition Recommendations (S)
640
Food production efficiency improvement (I)
380
One more vegetarian day per week (S)
150
Reduction of alcohol and sweets (A)
130
Food waste reduction (supply side) (I)
110
Food waste reduction (household side) (A)
70
Reduction of coffee (A,S)
30
Consumer goods
Reduced consumption of goods (50%) (A)
690
Reduced emissions from goods production (50%) (I)
690
Buy only 5 new clothes per year (A)
170
Less refurbishing/new furniture (75%) (A)
120
Buy less electronics (50%) (A)
110
Housing
Smaller living space (A)
230
Energy efficiency improvement in existing buildings (I)
150
Rent a guest room to a tourist (A)
70
Replacing fireplaces (S, I)
20
Saving water
20
Leisure
Reduced consumption of leisure activities (50%) (A)
140
Reduced emissions from leisure services production (50%) (I)
140
Services
Reduced emissions from service production (50%) (I)
120
Reduced consumption of services (50%) (A)
100
0
200
400
600
800
1000
1200
Reduction in footprint, kgCO2e/per capita/per year

High-impact options

Options estimated to achieve reductions of between 500 and 1,200 kgCO2e/capita/year or are found in the following four areas:

→ Diets with less meat, especially red meat (640 – 1200 kgCO_2e). The greatest reduction results from adopting a completely plant-based diet, although shifting to a vegetarian diet (including dairy products and eggs) also results in substantial reductions. Even adopting the so-called Planetary Diet or following the Nordic Nutrition Recommendations, both of which include some meat and fish, leads to a significantly reduction.

→ Reduced international flying, either by travelling less or by shifting to train (750 – 1130 kgCO_2e). For the minority of people who fly abroad privately several times per year, travelling less often or opting for train travel instead of flying can shrink the footprint even more than for the average person.

→ Climate-smart personal car travel, by switching from fossil fuel-based cars to electric vehicles (560 kgCO_2e).

→ Reduced purchasing of new consumer goods (690 gCO_2e, together with a deep decarbonisation of the production system (690 kgCO_2e).

Medium-impact options

Options with a medium potential are estimated to achieve reductions of between 200 and 500 kgCO_2e/capita/year per option on average. They are found in the following categories:

→ Reduced mobility and climate-smart transport (210 – 440 kgCO_2e). These options include using public transport instead of private cars for travel (other than commuting), cycling and walking, living closer to the workplace, taking climate-smart weekend trips (substituting flights), using smaller private cars, commuting car-free by public transport, using biofuels and using alternative fuels for aviation.

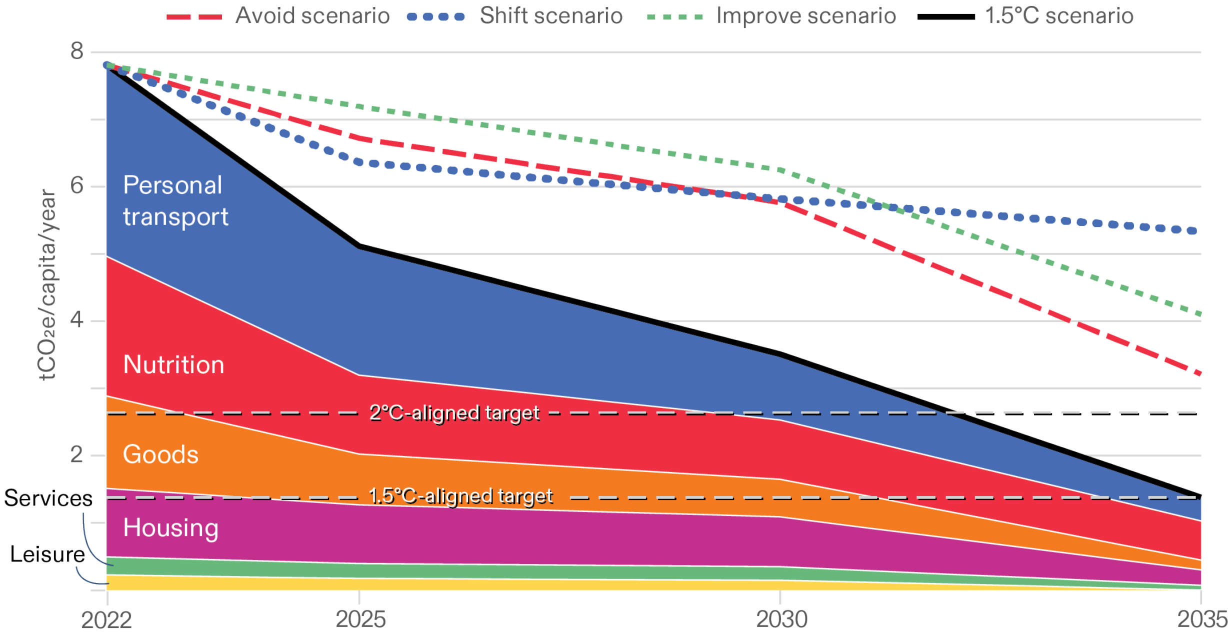
→ Smaller living space, resulting in lower energy consumption and reduced need for carbon-intensive construction materials (230 kgCO_2e).

→ Climate-smart agriculture, by adopting for example improved nutrient management and retention, enhanced agroforestry and carbon sequestration, and energy efficiency improvements (240 kgCO_2e).

Scenarios for 2035

The scenarios developed in the study show that current Norwegian lifestyles are incompatible with a fair transition to a stable and safe climate. In a scenario aligned with 1.5°C of warming, an 82% reduction is needed by 2035, requiring very ambitious changes across all lifestyle domains combined with rapid decarbonisation of production systems and lifestyle-supporting infrastructure (Figure XX). To achieve a 2°C-aligned target (2.6 tCO_2e/capita/year) the lifestyle carbon footprint needs to drop 66% by 2035. Compared to the 1.5°C scenario, this provides more leeway in choice of options and adoption rates. Even so, rapid and radical lifestyle changes combined with large production-side decarbonisation are required also in the 2°C scenario.

Figure 1.3: Estimated 1.5°C scenario for current lifestyle carbon footprint with selected low-carbon lifestyle options to meet the 2°C- and 1.5°C-aligned targets by 2035.



The analysis shows unequivocally that only by combining Improve, Shift, and Avoid options is it possible to reduce emissions as required. This highlights the need to complement conventional technical improvements in efficiency with behavioural changes.

The study underscores that transitioning to low-carbon lifestyles not only benefits the environment but also can enhance overall wellbeing, personal health, community resilience, economic prosperity and social equity. It gives examples of such benefits related to reduced traffic, meat consumption, and other lifestyle changes.

Policy directions

The study's focus on lifestyles does not imply that individuals alone can make the necessary changes, simply by shifting their preferences and habits. Our lifestyles are part of the cultures we grow up in and live in. They are to a high degree shaped by social norms and expectations, by the economic system and the incentives it provides, and by the technical infrastructure surrounding us. Hence, the lifestyle transition needed for a rapid reduction in greenhouse gas emissions requires changes in these social systems – changes that can only be realised through collective action, including innovative and ambitious public policies.

To lay the foundation for a low-carbon transition, Norway should consider formulating a new national vision for what a fully decarbonised advanced welfare society could look like in the 21st century, and what role it should play in the wider world. Such a vision needs to be based on extensive citizen dialogues, informed by input from experts, to be as broadly supported as possible.

Effective policy development requires better data on how people live, as well as better tools for assessing the related impacts. Considering the skewed distribution of emissions, these data should be available by income group.

Choice editing is one approach to policy making that is particularly relevant to lifestyle changes. It means that policy makers edit out options for carbon-intensive lifestyles and consumption, based on science and democratically decided criteria, and edit in more desirable alternatives by making them more easily available, affordable and attractive while ensuring that everyone can access life's necessities.

A small share of the population has a much larger footprint than the average person. Targeting high-consumption lifestyle specifically can greatly reduce overall emissions. Reducing carbon inequality is not only a matter of fairness and of gaining public acceptance for climate policies, but equally a matter of policy effectiveness.

A rapid transition to a low-carbon society and the lifestyle changes this entails may look daunting. However, it is a mistake to compare our current climate-disrupting way of life with a low-carbon lifestyle without considering what our lives may be like in a future world – one that is burdened by climate breakdown, with erratic weather, frequent disasters, soaring food prices and mass migration. The way we live will change, one way or the other – either in an orderly and co-ordinated fashion, or through a far more painful process that is forced on us by nature.

1 – Introduction

This study analyses how the lifestyles of average Norwegians impact the global climate. It assesses the country's *lifestyle carbon footprint*, and how these impacts could be reduced in line with international commitments to limit global warming to well under 2 degrees Celsius (°C), aiming for 1.5°C. In contrast to the official statistics on greenhouse gas emissions, which include emissions only from domestic sources, the footprint perspective includes emissions related to imported goods.

Footprint analyses therefore provide a better measure of the total emissions from people's consumption and lifestyles. This can complement the official statistics and give decision makers a more complete understanding of the drivers behind emissions. Several countries and regions have adopted consumption-based statistics as an official supplement to territorial emission statistics. For Norway, the first official consumption-based statistics were established in January 2024 (Wood et al. 2023).

The current study differs from earlier public analyses of the Norwegian carbon footprint (e.g. Steen-Olsen, Solli and Nersun Larsen 2021; Wood et al. 2023). It uses a hybrid methodology that allows for a more granular assessment of which products and lifestyle options have the greatest impact. Unlike previous studies, it also develops scenarios for how the lifestyle carbon footprint could be reduced until 2035 to be aligned with the objectives of the Paris Agreement.

There is increasing recognition that strategies for climate change mitigation need to be multi-pronged – including not only major shifts in technology, but also behavioural changes. This can be seen, for example, in the work of the Intergovernmental Panel on Climate Change (IPCC), which in its latest assessment devoted a separate chapter to mitigation actions on the "demand side" (IPCC 2022). In this context, the IPCC uses the Avoid-Shift-Improve framework, which is also used in the current study to identify and assess complementary options for reducing the lifestyle carbon footprint.

The present study's focus on lifestyles does not imply that individuals alone can make the necessary changes, simply by shifting their preferences and habits. Our lifestyles are part of the cultures we grow up in and live in. They are to a high degree shaped by social norms and expectations, by the economic system and the incentives it provides, and by the technical infrastructure surrounding us. Hence, the lifestyle transition needed for a rapid reduction in greenhouse gas emissions requires changes in these social systems – changes that can only be realised through collective action, including innovative and ambitious public policies.

A rapid transition to a low-carbon society and the lifestyle changes this entails may look daunting. It can easily be perceived as a request for unpopular sacrifices. However, research shows that many of the lifestyle changes that have large climate benefits are also good for our health and wellbeing. For example, shifts to mainly plant-based diets and to active transport result in demonstrated health benefits, while lifestyles that are less centred around consumption and more around social relations can improve mental health. Cities with fewer cars will be more liveable – less noisy and polluted and with more room for greenery and public spaces.

It is also important to recognise that the call for lifestyle changes will not affect everyone in the same way. The transition needs to be fair, with larger emission reductions from those with carbon-intensive lifestyles and high capacity for change (Gustavsen 2023). Meanwhile, those with low incomes, who often have modest carbon footprints, need to be able to consume enough to achieve decent living standards. This is the essence of the idea of a *fair consumption space*, where both overconsumption and underconsumption are addressed (Akenji and Bengtsson 2022).

Furthermore, it is a mistake to compare our current climate-disrupting way of life with a low-carbon lifestyle without considering what our lives may be like in a future world – one that is burdened by climate breakdown, with erratic weather, frequent disasters, soaring food prices and mass migration. The way we live will change, one way or the other – either in an orderly and co-ordinated fashion, or through a far more painful process that is forced on us by nature.

2 – Methodology

2.1 Carbon footprint calculations

The current study applies a *lifestyle carbon footprint* (LCF) approach to Norway, building on methods developed in two previous studies on 1.5-degree lifestyles in multiple countries (IGES, Aalto University and D-mat ltd. 2019; Akenji et al. 2021). The LCF approach estimates how an average person's way of life affects the global climate.[1] It identifies options for reducing these emissions, assesses the respective effectiveness of these options, and creates scenarios for how targets for emissions reduction could be met.

The analysis examines six lifestyle domains: food and beverages, housing and energy, personal transport, consumer goods, services, and leisure. The LCF analysis covers only the emissions associated with private consumption and lifestyles, not the emissions related to public consumption or investments by companies and governments.

The calculation method is consumption-based, covering greenhouse gas emissions related to both domestic production and imports. The calculations are based on consumption by Norwegians, hence they exclude emissions from products that are made in Norway and exported to other countries. However, while most other consumption-based studies use data on how much money is spent on individual categories of goods and services, the LCF studies are based largely on physical consumption data, such as person-kilometres travelled by car and kilograms of cheese consumed annually.

Such physical data are used for food and beverages, housing and energy, and personal transport – the three domains that in most countries account for the majority of lifestyle-related greenhouse gas emissions. The LCF of these domains is calculated by combining the physical consumption data with lifecycle assessment data on the greenhouse gas emissions associated with each product or service (carbon intensity).[2] The consumption data are obtained mainly from the national statistics (Statistics Norway 2023) surveys and publications, while a few data points are based on estimations. For full references, see Annex A.

For the other three domains – consumer goods, services and leisure – data on monetary spending are used similarly to conventional consumption-based studies. This is due to the limited availability of both detailed physical consumption data and related lifecycle assessment data. The emissions from consumer spending in these three domains are calculated using a multi-regional input-output (MRIO) model, which shows the carbon intensity of each major economic sector.[3] For specific data sources, see Annex A.

Using physical consumption data, rather than monetary data on consumer spending, allows a more detailed analysis of how much individual products and behaviours contribute to the overall carbon footprint. This makes

[1] In addition to emissions of carbon dioxide (CO_2), the study covers methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6), which are converted into CO_2-equivalents based on their relative warming effect over 100 years. Emissions from land use, land-use change and forestry (LULUCF) are not included.

[2] Most of the carbon intensities used in the study are from the database ecoinvent (Wernet et al. 2016). Where other data are used, the sources are indicated in the results chapter. Biogenic emissions, carbon released as CO_2, and methane from combustion or decomposition of biomass or bio-based products are not described separately in the ecoinvent "Allocation, cut-off by classification" model used in the calculation. Emissions related to the use of fuel wood and wood pellets in dwellings and holiday houses are estimated separately based on direct ammonium (NH_4) and nitrous oxide emissions (Statistics Norway 2023).

[3] The EXIOBASE model (Stadler et al. 2018) is used.

it possible to identify high-impact options for improvement. These data also make it easy to assess the potential of different approaches to emissions reduction, including through reducing consumption (“Avoid”), meeting needs and demands differently (“Shift”) and making production and provisioning systems less polluting (“Improve”).

The Avoid-Shift-Improve (ASI) framework originated in transport studies but is now commonly used also in other sectors, including by the IPCC in its most recent assessment report (IPCC 2022) and by the Norwegian Environment Agency in its assessment of climate actions towards 2030 and 2035 (Miljødirektoratet 2023; Miljødirektoratet 2024). The ASI framework provides a structured approach to identifying options for reducing the environmental impact of production and consumption systems.

2.2 Footprint targets for 2035

The scenarios developed in this study illustrate how Norway could reduce its lifestyle carbon footprint in line with the Paris Agreement. This means reducing emissions in a way that is consistent with the Agreement’s target range for temperature increase and that reflects the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC) – a key pillar of climate diplomacy.[4]

To this end, the study proposes two benchmark targets for Norway’s lifestyle carbon footprint in 2035, following an approach similar to the one used in the original report on 1.5-degree lifestyles (IGES, Aalto University and D-mat ltd. 2019) but using more recent data. The approach, inspired by the CBDR–RC principle, assumes that countries with high current per capita emissions must make more rapid reductions than others, resulting in a global convergence in per capita emissions. A rapid convergence results in a fairer sharing of the remaining carbon budget, while a more delayed convergence means that current inequalities in emissions would be maintained for longer.

Considering the small remaining carbon budget for the Paris Agreement’s temperature limits and the need for a fair transition, the study assumes that all countries will have achieved the same level of per capita emissions by 2035. Unless countries with high current emissions shrink their footprints more rapidly than is needed for the world as a whole, meeting the Paris objectives will be virtually impossible.

Two per capita emission targets for 2035 were calculated, based on emissions reduction pathways generated by the Carbon Budget Explorer (Dekker 2023). One of these targets is aligned with limiting global warming to 1.5°C, while the other corresponds with keeping warming “well below 2°C.” The Carbon Budget Explorer is an online tool developed by the Netherlands eScience Center, an independent foundation, in collaboration with the Dutch Environmental Assessment Agency. It allows users to generate global pathways until the year 2100, based on a selected temperature limit, on an acceptable risk of exceeding the temperature limit, and on other parameters. In building the pathways, it draws on selected scenarios from the IPCC Sixth Assessment Report database, a collection of more than 2,000 modelled long-term mitigation pathways, and more recent research (Forster et al. 2023).

The two targets used in this study, and the parameters for generating them, are presented in Table 2.1.

[4] The principle is included in the United Nations Framework Convention on Climate Change (UNFCCC), which provides the legal basis for international climate negotiations and reporting. It means that while countries have a common obligation to protect the global environment, including a stable climate, their responsibilities differ. High-income countries are considered to have a greater responsibility, reflecting both the pressure they place on the environment and the technologies and financial resources they command.

Table 2.1: Parameters used for calculating two lifestyle carbon footprint targets for 2035, and resulting targets

Temperature limit	1.5°C	2°C
Parameters		
Risk of exceeding the limit	50%	17%
Reductions in non-CO_2 greenhouse gases	Moderate (default setting)	Moderate (default setting)
Negative emissions by the end of the century	Lowest possible setting	Lowest possible setting
Start of global emissions reduction	Immediate	Immediate
Resulting emissions and targets		
Global greenhouse gas emissions in 2035	17.1 $GtCO_2e$	32.6 $GtCO_2e$
Targets for per capita emissions in 2035[a b]	1.9 tCO_2e /year	3.7 tCO_2e /year
Targets for lifestyle carbon footprints in 2035[c]	1.4 tCO_2e /year	2.6 tCO_2e /year

[a] Assuming a world population of 8.9 billion, based on PRB (2022).
[b] The per capita emission target was calculated by dividing the 2035 global greenhouse gas emissions in each pathway with a projected 2035 population of 8.9 billion.
[c] The lifestyle carbon footprint target was calculated as 72% of the per capita emission target, considering that lifestyle emissions do not include emissions from public spending and investments. The 72% figure is based on findings by Hertwich and Peters (2009).

For the 1.5°C target we use a 50% probability, as is commonly done in the climate policy literature. This represents a fair chance of keeping warming below 1.5°C with little or no overshoot.[5] For the 2°C target, we apply a lower risk (17%), considering the political consensus to keep warming "well below" this temperature.

For the emissions of non-CO_2 greenhouse gases, we have used a moderate setting, which means that these emissions are assumed to be reduced similarly to carbon dioxide.

For the negative emissions by the end of this century, we apply the lowest use possible in the Carbon Budget Explorer.[6] Negative emissions would be achieved if carbon dioxide removal (CDR) –for example, through forestation and direct capture of CO_2 from the air – exceeds the remaining emissions. Assuming high negative emissions in the latter half of this century reduces the urgency of making large reductions in the near future. However, CDR is unproven at scale and might conflict with food security and biodiversity protection (see, for example, Anderson et al. 2023). We therefore use a pathway assuming only a limited global deployment of CDR.

[5] Overshoot means that the global average temperature temporarily exceeds a temperature limit, such as 1.5°C, and is later reduced through negative emissions (carbon dioxide removal).
[6] This corresponds to the 20% of scenarios in the IPCC's Sixth Assessment Report Working Group III scenario database with the lowest utilisation of negative emissions.

The per capita emission targets presented in Table 2.1 refer to the total emissions in society. Considering that the lifestyle carbon footprint does not include emissions related to public spending and investments, the related targets need to be adjusted accordingly. Based on the findings by Hertwich and Peters (2009), 72% of society's emissions are allocated to lifestyles[7]. This assumes that the relative emission shares of lifestyles and other economic activities will remain unchanged until 2035. In other words, the emissions from public spending and investments are assumed to decrease at the same rate as those from lifestyles.

[7] This percentage is a global average, which has been used in earlier lifestyle carbon footprint analyses for multiple countries (IGES, Aalto University and D-mat ltd. 2019; Akenji et al. 2021). To ensure consistency with previous studies, this value is used also here. However, consumption-based analyses for Norway (Wood et al. 2023; Steen-Olsen, Solli and Nersun Larsen 2021) suggest that the public sector and investments have a larger share of the total Norwegian consumption-based emissions. This could indicate that for Norway the private footprint should be allocated a lower share of the total footprint target. However, the relationship between private and public spending and investments is complex. The public sector can enable carbon-intensive lifestyle choices but it can also play an important role in the transition towards low-carbon lifestyles.

3 – Overview of the Current Carbon Footprint for Norway

Norway's total average lifestyle carbon footprint is estimated at 7.8 tonnes of CO_2 equivalent (tCO_2e) per capita per year (Figure 3.1 and Table 3.1). To reach the 1.5°C- and 2°C-aligned carbon footprint targets proposed for 2035, the average lifestyle carbon footprint would need to drop by 82% and 66%, respectively. Nearly two-thirds of the Norwegian footprint is related to just two lifestyle domains: personal transport (36%, or 2.8 tCO_2e/capita/year) and nutrition (27%, or 2.1 tCO_2e/capita/year). Smaller contributions are from consumer goods (18%, or 1.4 tCO_2e/capita/year) and housing (13%, or 1.0 tCO_2e/capita/year). Leisure and services account for only a small part of the footprint (3% each, or 0.3 and 0.2 tCO_2e/capita/year, respectively).

Figure 3.1: Current Norwegian lifestyle carbon footprint and its breakdown by consumption domain, shown together with 1.5°C- and 2°C-aligned targets for 2035

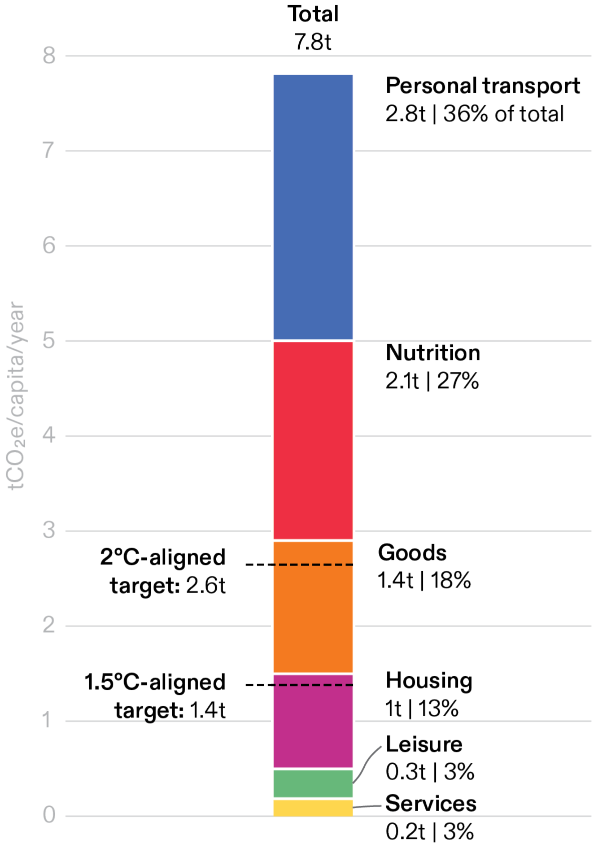


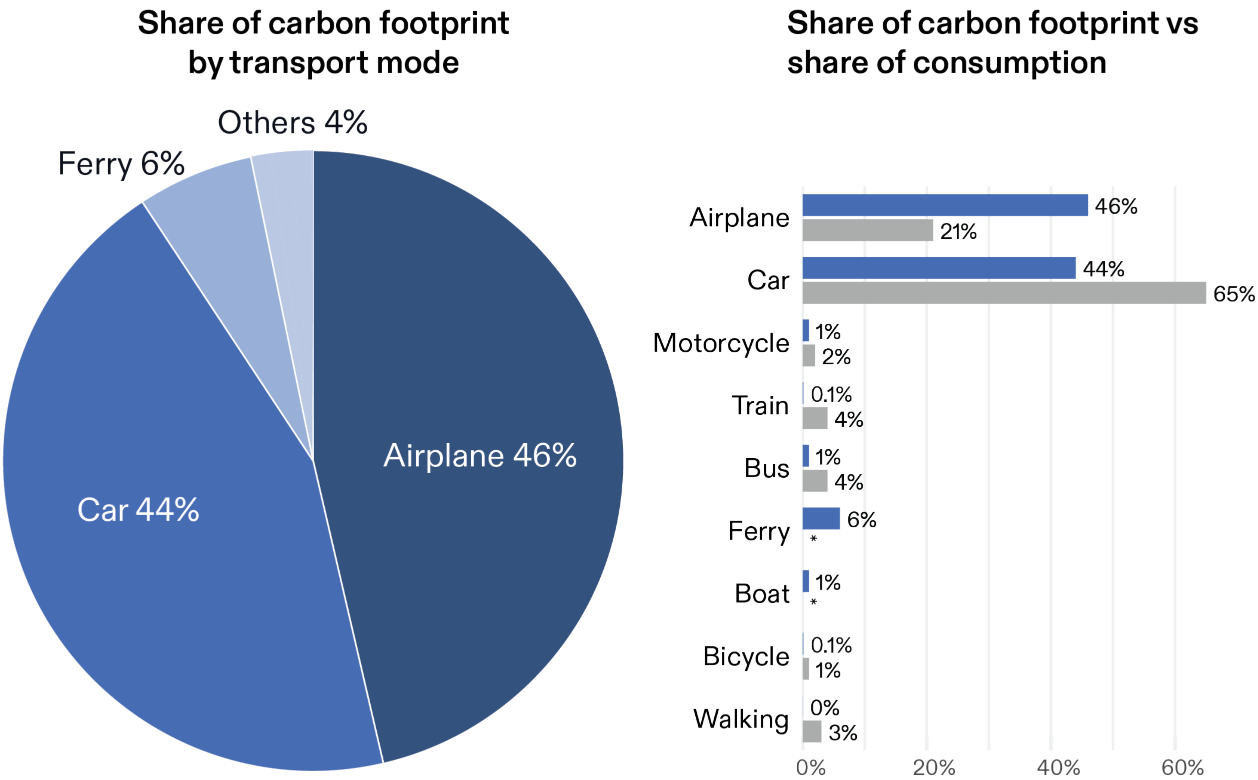
Table 3.1: Reduction targets for 2035 (tCO_2e/capita/year)

Scenario	Target (tCO_2e)	Reduction needed (tCO_2e)	Reduction needed (% of current)
2°C	2.6	-5.2	-66%
1.5°C	1.4	-6.4	-82%

3.1 Hotspots of lifestyle carbon footprints

This section elaborates the lifestyle carbon footprint estimate by looking in more detail at each consumption domain and its respective hotspots – that is, the products and lifestyle patterns that have the highest climate impact. The domains are listed according to their respective shares of the total lifestyle carbon footprint, from the highest to the lowest. For specific data sources and details on estimation calculations and results, see Annexes A and B.

Figure 3.2: Shares of the carbon footprint and of physical consumption for personal transport, by transport type



Carbon Footprint = 2,840 $kgCO_2e$/capita/year
Transportation demand = 16,730 p-km/capita/year

Personal transport

For the average Norwegian, personal transport accounts for more than one-third – 36%, or 2,840 kilograms (kg) of CO_2e – of the carbon footprint. The overall transport demand is relatively high (16,730 person-kilometres/capita/year), similar to other high-income countries (Akenji et al. 2021), with a low use of public transport (Figure 3.2).

Air travel is the largest contributor to the transport footprint, although fewer person-kilometres (p-km) are travelled by air than by private cars. Flights induce 1,310 $kgCO_2e$/capita/year (46% of the transport footprint) while accounting for only 21% of the transport demand. Flights contribute more to the carbon footprint than other modes of transport due to the notably higher carbon intensity.

Cars play the dominant role in meeting Norway's overall transport demand (65%, or 10,900 p-km/capita/year). On average, around 20% of the car kilometres are driven with electric cars, which are less than half as carbon intensive as conventional petrol and diesel cars. Electric cars (and other electrified vehicles) are not considered "zero-emissions" due to the inclusion in the calculations of emissions related to vehicle manufacturing, maintenance, road infrastructure and fuel (such as electricity consumption per person-kilometre).

Travelling by land-based public transport accounts for less than 10% of the overall transport demand (1,310 p-km/capita/year) – a comparatively low figure that reflects Norway's low population density and the focus of its services on urban areas. Buses and trains represent similar average transport demand. The carbon intensity of trains is low due to the high share of trains running with electricity.

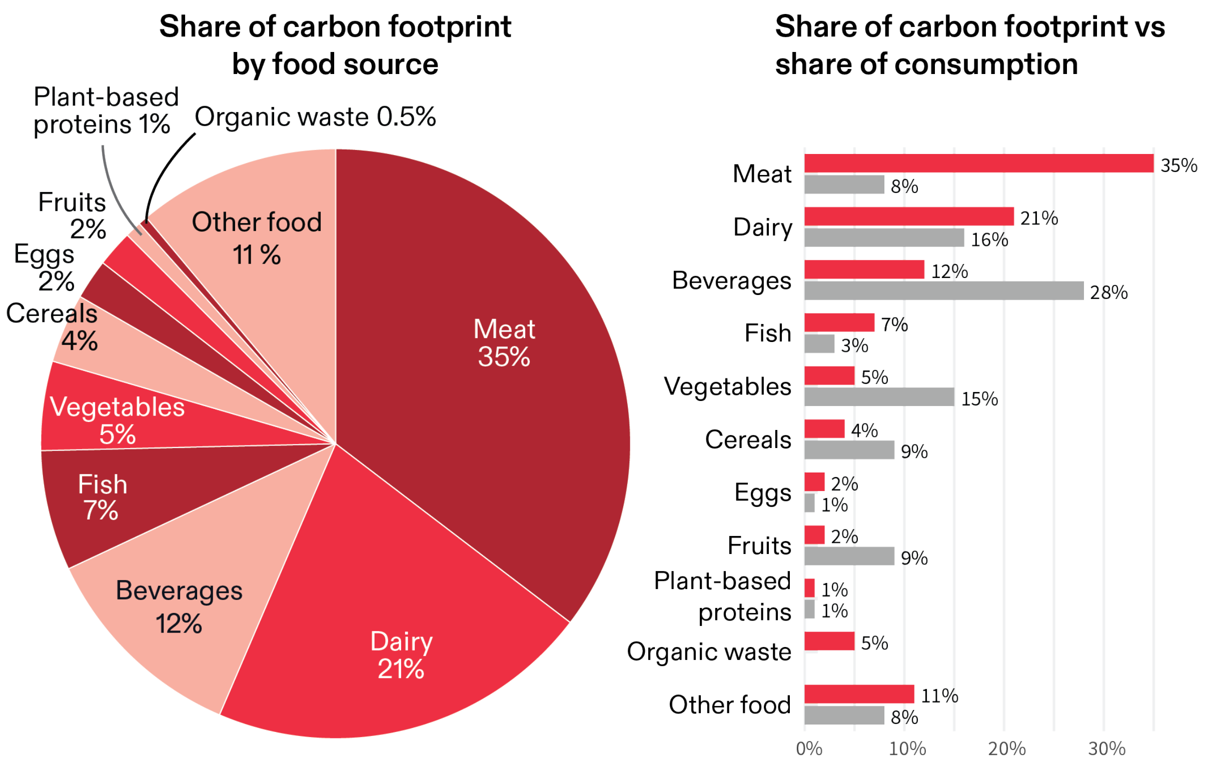
Because of Norway's long coastline, water transport plays an important role in meeting transport demand. However, domestic ferries – car ferries and fast ferries (i.e. speedboats and passenger boats) – international ferries and leisure boats contribute less than 10% (205 kgCO_2e/capita/year) to the personal transport-related footprint.

Domestic car ferries and fast ferries account for the largest share (41%) of the water transport-related emissions. This footprint is related to use of marine gas oil and liquefied natural gas in car ferries, and diesel and marine gas oil in fast ferries. Only a small portion of the fast ferries are electrified. International cruise ships are responsible for nearly two-fifths (38%) and leisure boats one-fifth (20%) of the water transport emissions.[8]

Cycling and walking account for a small share of the overall transport demand. Around 20% of the bicycle traffic is travelled with electric bicycles.

[8] For all ferries and leisure boats, only the emissions related to fuel combustion are included in the footprint calculations due to a lack of ferry- and boat-specific carbon intensities as well as to a lack of passenger transport data for all ferry and boat types. No emissions related to production or maintenance of ferries or leisure boats are included in the footprint calculations; thus, the emissions from overall water transport are likely to be underestimated.

Figure 3.3: Shares of the carbon footprint and physical consumption for nutrition, by food source. % of carbon footprint and % of food demand by weight.



Carbon footprint total = 2,080 $kgCO_2e$/capita/year
Food demand total = 900 kg/capita/year

Nutrition – Food and beverages[9]

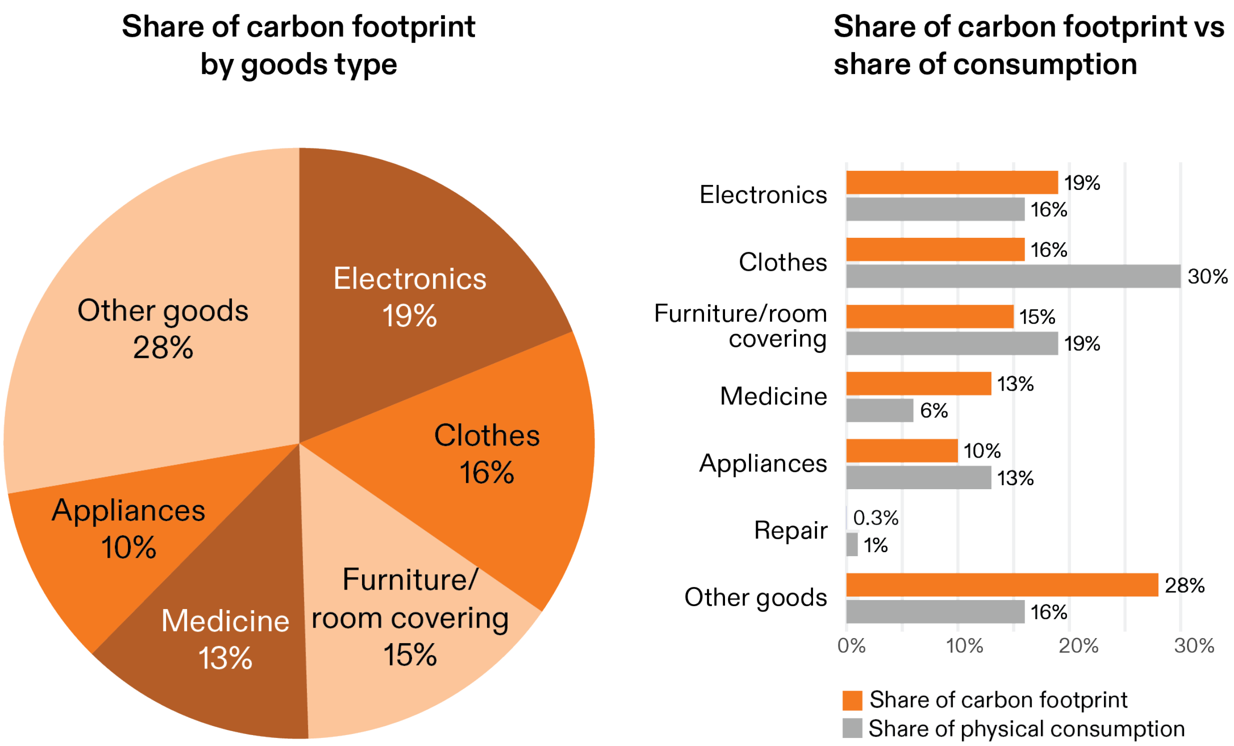
On average, the Norwegian diet contributes greenhouse gas emissions of 2,080 $kgCO_2e$ per person each year. Animal-based products contribute 65% of these emissions, whereas plant-based products account for 34% (Figure 3.3).

Meat has the highest impact, with a 35% share of the total food carbon footprint. In the average Norwegian diet, pork accounts for 35% of the meat consumed, beef 31%, poultry 29% and other meats 5%. Among meats, beef has the highest climate impact per kilogram, while poultry has the lowest. Beef makes up 25% of the LCF of food, while poultry accounts for 3%.

Dairy products are the second highest source of greenhouse gas emissions, with a 21% share. Cheese alone accounts for 8% of the total nutrition footprint. Fish is also a significant part of the Norwegian diet, contributing 7% of the food LCF. Beverage consumption accounts for an additional 12%, while the consumption of vegetables, potatoes, fruits and grains represents a combined share of 11%. Currently, Norwegians eat small amounts of plant-based proteins, such as legumes and nuts, and these contribute only 1% of the food LCF.

[9] Food consumption at the wholesale level. Food loss at the household and distribution side is included in total consumption amounts.

Figure 3.4: Shares of the carbon footprint and of physical consumption for consumer goods (in % of carbon footprint and % of monetary consumption), by goods type.



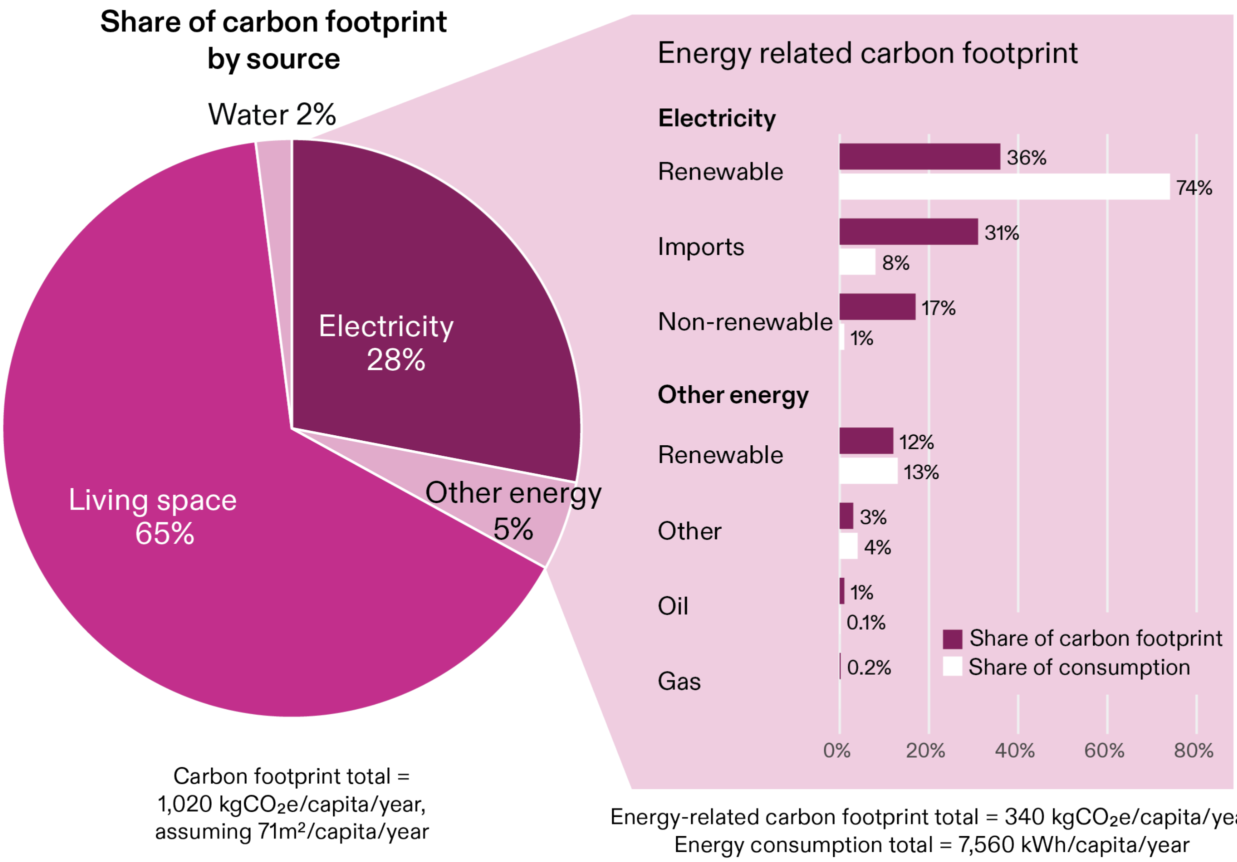
Carbon Footprint = 1,370 kgCO_2e/capita/year
Consumer goods expenditure total = 3,930 €/capita/year

Consumer goods

Consumer goods contribute 18% of Norway's overall carbon footprint (Figure 3.4). Other goods[10] account for nearly one-third (28%) of the carbon footprint of goods due to their relatively high carbon intensity. On other goods-category, 40% of the consumption is related to chemicals and chemical products containing raw-materials derived from fossil fuels or produced through chemical processes with high emissions (EEA 2023a). Other major contributors to the carbon footprint of goods are electronics (19%), clothing (16%), furniture and interior décor (15%), and medicine (13%).

[10] Includes rubber and plastic products, fabricated metal products (e.g. cutlery, tools, etc.), non-metallic products (e.g. glass, porcelain, etc.), paper products, chemicals (e.g paints, detergents, personal hygiene, etc.).

Figure 3.5: Shares of the carbon footprint and of physical consumption for housing (in % of carbon footprint and % of direct energy demand), by source



Housing

Housing contributes 13% (1,020 kgCO_2e/capita/year) of the average Norwegian carbon footprint. The average Norwegian has a residential floor space of 71 square metres (m^2), which contributes a carbon footprint of 660 kgCO_2e/capita and accounts for 65% of a person's housing-related footprint (Figure 3.5). Norwegians use high amounts of energy for heating due to the large average living space and the long winters. Electricity accounts for more than 80% of the residential energy demand but for less than one-third (28%) of the housing-related footprint.

The carbon intensity of grid electricity in Norway is low, at 46 gCO_2e/kWh, compared to the European Union (EU) average of around 250 gCO_2e/kWh[11]) (EEA 2023b). The average carbon intensity of Norway's electricity mix is based on production, imports, exports and consumption. Around 90% of the gross electricity consumption is based on domestic production, and the remaining 10% of electricity is imported (Statistics Norway n.d.a). Thus, the average electricity consumption mix (i.e. electricity that is used locally) is based on the domestic production, and the value is adjusted for power transfers with neighbouring countries. For more on calculating the average Norwegian electricity mix, see Annex A.

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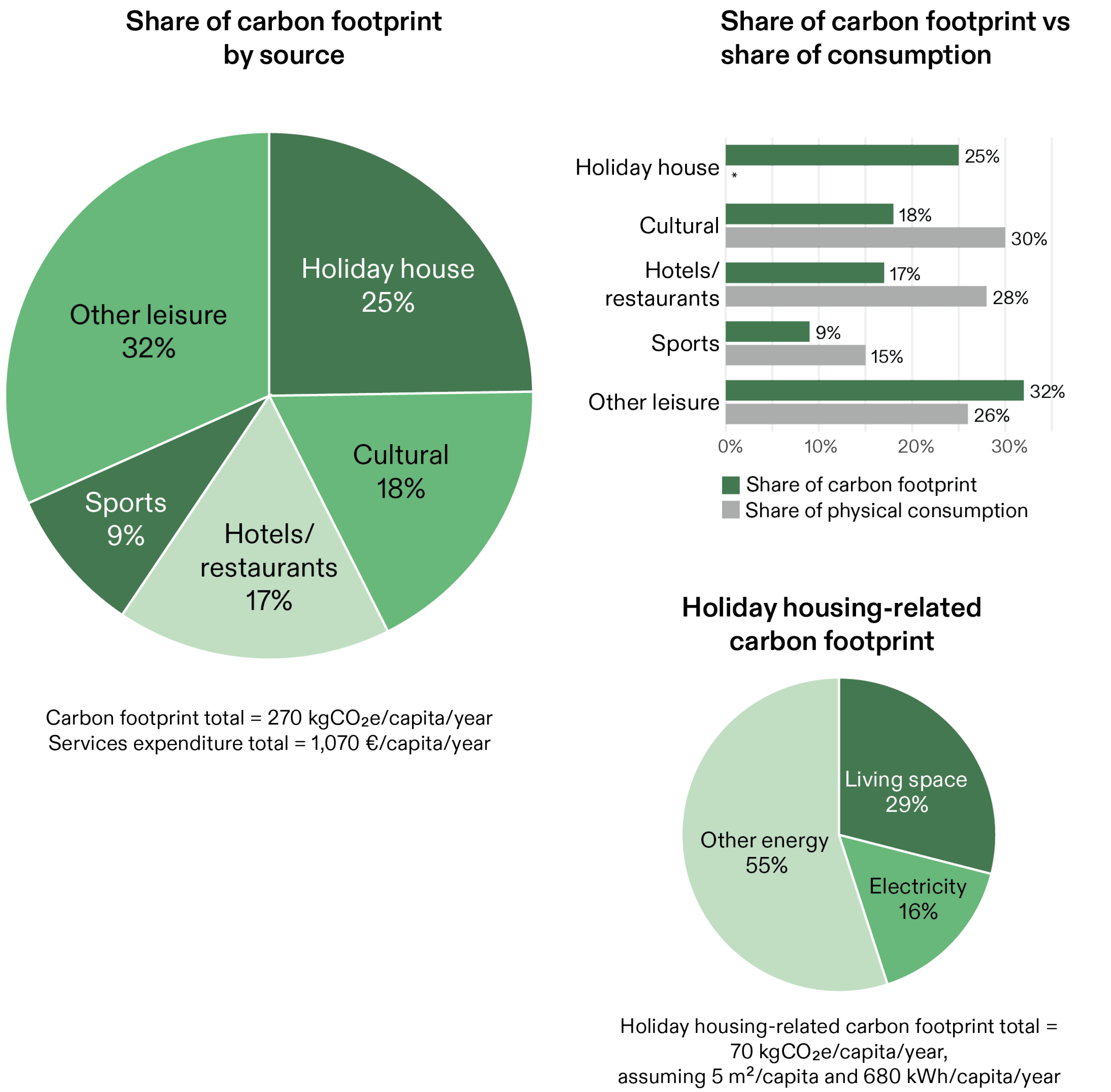
[11] Includes only direct greenhouse gas emissions related to fuel combustion. CO_2e represents CO_2 equivalent emissions-fuel combustion in public electricity and heat production (share of heat production is excluded from the intensities). A zero CO_2e emission factor was applied to nuclear power, renewables (including the biodegradable fraction of municipal solid waste), and to solid biofuels. The estimate includes the average emission factor for the EU-27 from 2022.

"Other energy used in dwellings" is well below the energy used for electricity consumption (one-quarter of the amount), and it accounts for only 5% of the housing-related footprint. These energy sources are fuel wood, district heating, heating oil and natural gas. After electricity, the second most-used energy source is wood-based fuels (fuel wood and wood pellets), which account for nearly two-thirds of "other energy used". District heating is the third most used energy source, relying on wood, other biomass, electricity, waste, coal and oil products for district heat production. District heating has a relatively low carbon intensity, compared to fossil-based heating oil and natural gas, due to a high share of renewable energy sources. Heating oil has one of the highest carbon intensities in housing, but relatively little is used.

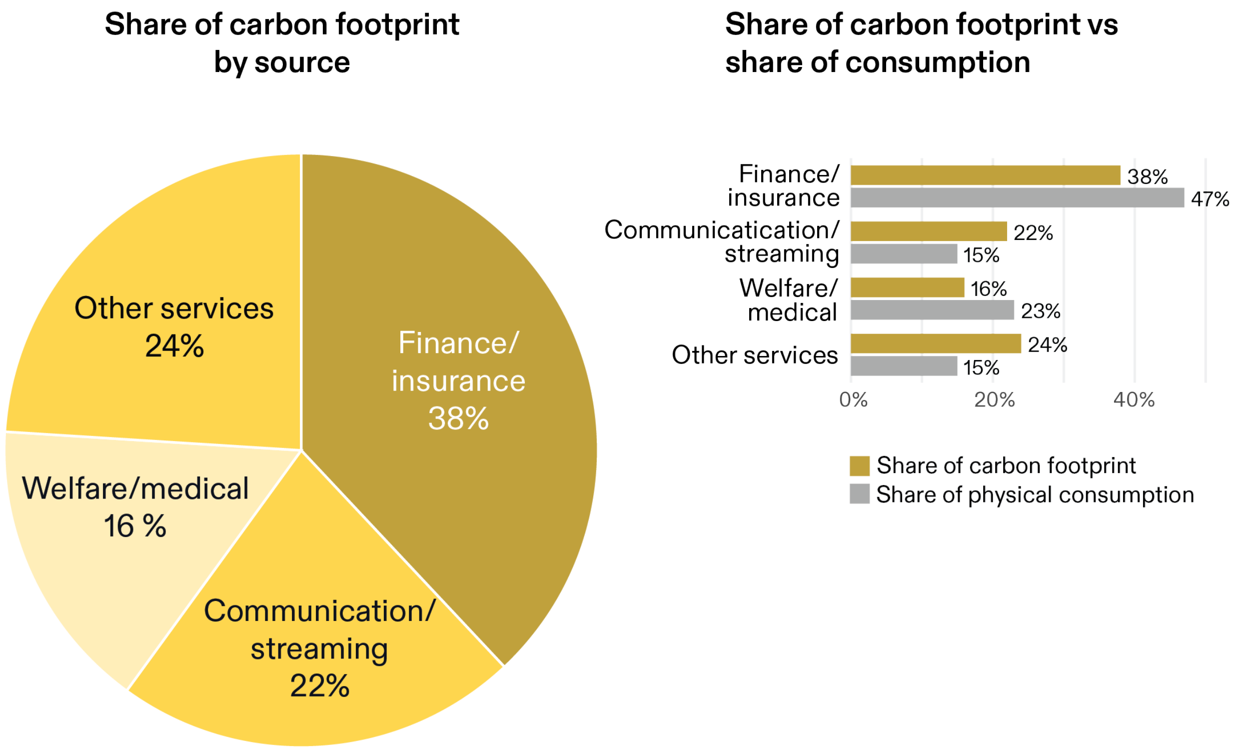
Figure 3.6: Shares of the carbon footprint and of physical consumption for leisure (in % of carbon footprint and % of monetary consumption), by source. For leisure, purchased food items are excluded from the hotel and restaurant services. The bottom figure for holiday houses represents the total LCF related to the average-size holiday house and related energy consumption.
*Consumption amounts for holiday houses are not shown due to different consumption units (kWh for energy consumption, m2 for living space)



Leisure

For leisure, 75% of the carbon footprint comes from hotels, restaurants, culture, sports and "other leisure" (which includes pursuits related to hobbies and recreational activities) (Figure 3.6). (Note that "restaurants" does not include the emissions from dining out, which are covered under the food domain, while travel to the destination is covered under the transport domain.) The remaining 25% of the carbon footprint of leisure comes from holiday houses, which includes the greenhouse gas emissions from energy consumption, construction and maintenance. When distributing holiday houses among the population, each person is allocated an average of 5 m^2.

Figure 3.7: Shares of the carbon footprint and of physical consumption for services (in % of carbon footprint and % of monetary consumption), by source.



Carbon footprint total = 240 kgCO_2e/capita/year
Services expenditure total = 3,870 €/capita/year

Services

Norwegians allocate a considerable portion of their spending to financial and insurance services. These account for the largest share of the total carbon footprint and for almost half of the monetary consumption in the service domain (Figure 3.7). On the other hand, communication/streaming[12] and other services[13] are the smallest expenditure categories, yet they contribute more to the climate impact of services due to their higher carbon intensity. The welfare/medical category includes healthcare, education, and assistance services provided by non-governmental organisations or private entities.

[12] Communication/streaming services are associated with energy use and carbon emissions from devices, network infrastructure and data centres.
[13] Includes services such as washing and dry-cleaning of textiles, hairdressing and other beauty treatment, funeral related activities, physical well-being activities and other non-classified personal services.

3.2 Carbon inequality of lifestyle carbon footprints – selected hotspots

Several studies show that there is a strong correlation between income and emissions, and that consumer emissions are very unevenly distributed (see, for example, Ivanova and Wood 2020; Chancel 2022; Gustavsen 2023; Khalfan et al. 2023; Ritchie and Roser 2023; UNEP 2023). In 2022, the top 10% of income earners globally were responsible for 48% of the global emissions, while the bottom 50% contributed only 7-12% of the total emissions. Furthermore, the top 1% of income earners are responsible for an estimated 15-23% of emissions (Chancel 2022; UNEP 2023).

In Norway, similarly large differences in carbon footprints have been estimated across income groups. The richest 10% of households account for around 22% of the country's total carbon footprint, while the poorest 10% account for only 4%.[14] The average carbon footprint of the richest 1% of households was an estimated 155 tCO_2e in 2019. The average carbon footprint among the richest 10% was 54 tCO_2e, while the 50% of the population with the lowest incomes and wealth had an average carbon footprint of only 15 tCO_2e.

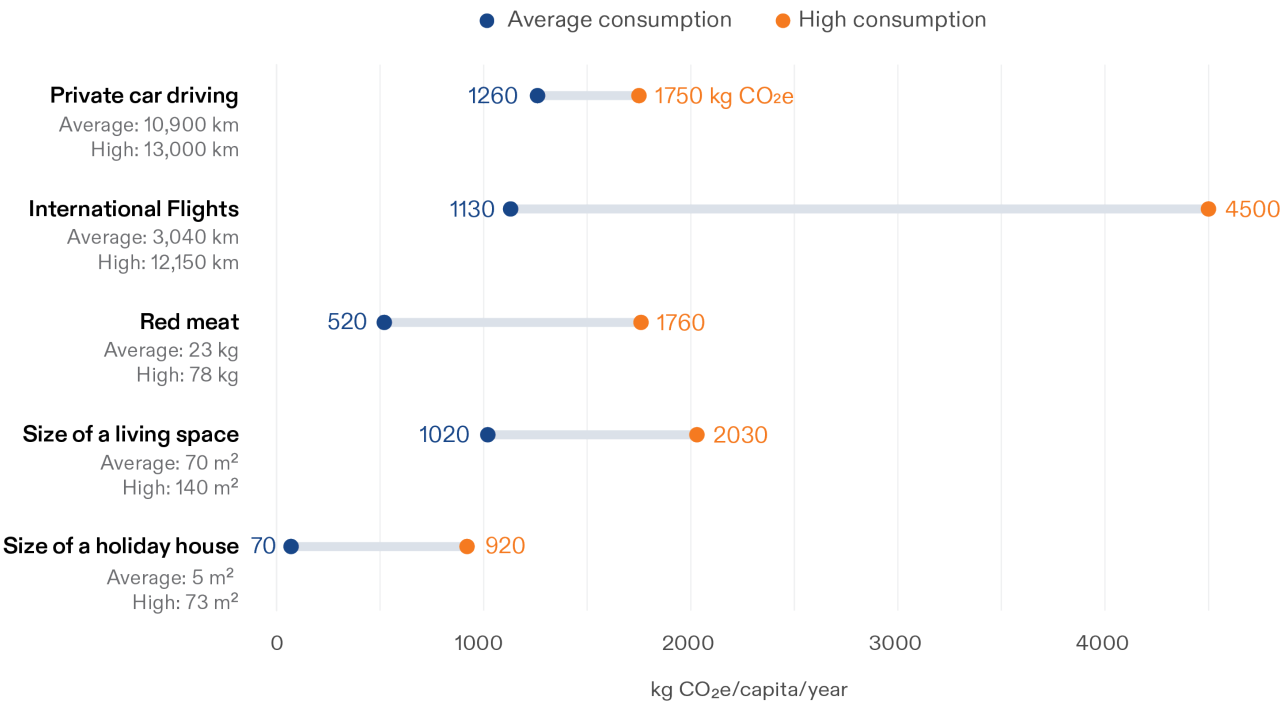
If the carbon footprint of the richest 20% in Norway is reduced to the same level as the average of the remaining 80%, then this wealthier population alone could reduce the country's total carbon footprint by around 20% and still have a good standard of living. In addition, it is often the people with the lowest incomes, the fewest choices and the least potential for reduction who are most vulnerable to the impacts of climate change (Gustavsen 2023; Oxfam 2023; UNEP 2023).

In general, this study estimates the footprint of the average person's lifestyle and does not show disparities in LCF across different income groups. However, this section compares the LCF of the average level of consumption to a high-consumption lifestyle for six selected goods and activities (Figure 3.8).

The selected options, emphasising carbon inequality, are related to climate hotspots of an average lifestyle, such as red meat, air travel and large living space. Some of the examples of hotspot inequalities are linked to income: for example, air travel tends to increase greatly with higher income (Ivanova and Wood 2020; Gustavsen 2023). However, other factors also can influence the size of a lifestyle carbon footprint, such as gender, age, geography, attitudes, life phase, etc. The examples presented here are based on available Norwegian statistics and illustrate how individual variations may cause the footprint to increase significantly above the average values. This also highlights that policies aiming to reduce these emissions must consider what factors are the main drivers for these high-consumption patterns. For a summary of the estimated results, see Annex B.

[14] Note that these calculations are based on emissions from households, not from individuals. Specifically, these data are total carbon footprint, including emissions from private consumption but as well from capital investments and public emissions. Consequently, the emissions data cannot be directly compared with the lifestyle carbon footprints data estimated in the current study.

Figure 3.8: Lifestyle carbon footprints of an average and a high-consumption lifestyle (kgCO₂e/capita/year), for selected high-impact lifestyle areas



Private car travel

For personal transport, private car travel is one of the hotspots in terms of transport demand and LCF. On average, people in Norway drive 10,900 person-kilometres by car annually for private purposes, resulting in an average footprint of 1,260 $kgCO_2e$/capita/year. However, car driving differs across the population and among regions. For example, people with the highest driving levels live in the surroundings of Bergen, Trondheim and Stavanger; in the areas of Nedre Glomma and Grenland; and in rural areas. Car driving is generally higher among men, higher income groups, couples with children, people aged 35-66 years, and households with more than one car (Grue, Landa-Mata and Langset Flotve 2021). Assuming an average yearly transport demand for private car travel of 13,000 kilometres for some of these groups[15], and an average petrol or diesel car, then the footprint from car driving increases to 1,750 $kgCO_2e$/capita/year – nearly half a tonne higher than the Norwegian average.

International flights

Flying is the other hotspot for personal transport, due to relatively high demand for this transport mode and especially to the high carbon intensity of flying. The average consumption of international flights for private purposes in Norway is around 3,040 km/capita/year, or around one international return flight a year; however, a small share of the population flies significantly more. Flying increases sharply with increasing income. Less than 5% of the population flies internationally three or more times per year, while a very small group takes more than ten return flights a year (Thoring 2023)[16]. Assuming an average flight distance of 3,000 kilometres per international flight, this would mean that the carbon footprint of people flying three or more times a year is 3.3 tonnes higher or more.

[15] Estimated car share of daily travel increasing from 53% to 63% (Grue et al. 2018).
[16] This data does not distinguish between leisure or business purposes. Therefore, there is need for more information to identify the main drivers behind the high consumption of flights among these groups in Norway.

Red meat

Meat consumption is a hotspot for the nutrition domain. On average, Norwegians consume around 23 kilograms of red meat a year. However, some parts of the population consume much less or no meat, while others consume notably more. In general, men consume more meat than women. Around 25% of the male population consumes more than 1.5 kilograms of red meat[17] a week (Helsedirektoratet 2017). This means that the carbon footprint of the group that consumes more than 1.5 kilograms of red meat a week is more than 1 tonne higher than the average (1,700 kgCO_2e per year, versus 520 kgCO_2e for the average).

Housing

For housing, the total living area per person is the main driver of the footprint. In general, the larger the house, the larger the footprint. This is due to both the energy use in the building (operation) and the construction materials needed. The average housing size in Norway has increased steadily and is today on average 71 m^2 per person and 150 m^2 per household. Norwegians have very spacious homes in comparison to a "sufficiently sized" living space (Rao and Min 2018; Vélez-Henao and Pauliuk 2023). However, large differences exist within Norway, with a small share of the population living in very large homes with outsized footprints. According to official data, 2.5% of houses are 300 m^2 or more (Statistics Norway n.d.b). Assuming a standard household size of 2.12 persons, then living in a 300 m^2 house will result in a footprint per person of 2,030 kgCO_2e – more than 1 tonne higher than the average (1,020 kgCO_2e).

Holiday houses

Cabins are the traditional and most common holiday homes in Norway. However, newly built cabins are no longer small and simple but often villa-like buildings, with an average size of 100 m^2 (Statistics Norway 2024). In some areas of the country, such as Lillehammer and Ringebu, newly constructed cabins are larger than average-size houses (Innlands Statistics 2022).

When all existing cabins are distributed equally across all Norwegians, this results in a 5 m^2 holiday house, with an LCF of 70 kgCO_2e/capita/year. However, because cabins in Norway are mainly privately owned and not open to the public, this average does not illustrate the differences in individual footprints from cabin ownership. The average size of a newly constructed cabin in Lillehammer is 155 m^2. Considering an average household of 2.12 persons, then this results in 73 m^2 per person and increases the footprint to 920 kgCO_2/capita/year. This considers construction material and energy usage but excludes emissions from land-use changes such as tree cutting or draining of peatlands.

The outsized impact of high-end consumption

The examples above illustrate the relationship between consumption patterns and carbon emissions and how these can be greatly affected by factors such as income, geography, gender, etc. In areas, such as private car travel, aviation, dietary choices, housing, and holiday house ownership in Norway, notable differences in emissions are apparent between average and high-income groups. Looking at the lifestyle options analysed above shows that a higher-consumption lifestyle, without being luxurious or extreme, can have a LCF that is 90% higher than the average. If we had looked at the extremely high levels of consumption – the outliers – the contrast would have been even bigger.

This highlights the need for differentiated interventions and responsibilities towards reducing emissions, addressing both unequal distribution and carbon inequality as an integral part of climate policy.

[17] Carcass weight.

4 – Options for Reducing Lifestyle Carbon Footprints

This section examines the reduction potentials of low-carbon lifestyle options towards meeting the 1.5°C and 2°C targets, based on the estimates for current lifestyle carbon footprints and proposed per capita targets. Key approaches and methods defining the reduction potential are explained before evaluating the impacts of low-carbon lifestyle options that could be applied.

4.1 Estimated impacts of low-carbon lifestyle options

For each of the six lifestyle domains (nutrition, housing, personal transport, goods, leisure and services), we identified several options for change, and assessed their respective potential in reducing the carbon footprint. The selected low-carbon options reflect the latest available literature on reducing greenhouse gas emissions related to lifestyles and behaviour (Salo and Nissinen 2017; Sitra 2017; Huan-Niemi et al. 2020; Project Drawdown 2020; Akenji et al. 2021; Miljødirektoratet 2023; UNEP 2022a; European Commission 2024a; European Commission 2024b; Eustachio Colombo et al. 2024). The list has been reviewed and supplemented to reflect the average lifestyle hotspots in Norway.

The list of low-carbon options includes both production and consumption options, thus offering different entry points to mitigation ("Avoid, Shift, Improve"; see section 2.1). The drastic reductions required to achieve the 1.5°C and 2°C targets by 2035 (82% and 66%, respectively) highlight the need for high-impact reduction options.

The reduction potentials of selected low-carbon lifestyle options were calculated based on data on physical consumption amounts and carbon intensity (see section 2 for the calculation method). The reduction impacts were estimated based on the collected consumption and footprint data by changing the intensity through production improvements and/or the amount through avoiding and shifting, depending on the nature of the options. The assumptions behind the calculations are based on Norwegian-specific sources (estimates, shares and projections), which we used to determine the mechanisms behind the reduction potential as accurately as possible.

Note that the estimated reduction potential is based on the current average footprint. While some of the options are based on future projections (such as the increase in the share of electric cars in the car fleet by 2030), the calculation does not model future emission trends that would potentially reduce or increase the current LCF in upcoming years.

The reduction potential of each option can be considered at the population or individual level. In other words, the reduction potential depends on the share of the population implementing the option or whether an individual chooses to implement the option partially or fully. Both parameters determine the reduction potential of an option. "Full implementation" means that individuals fully implement a low-carbon option and realise the maximum reduction potential of that option. "Partial adoption" means that an option is partially adopted, either by individuals or by society. The "full implementation" practices of each option are defined as assumptions (see Annex C), and the resulting maximum reduction potentials were estimated using life cycle analysis-based carbon footprint data by changing the carbon intensity and/or consumption amount of relevant components.

The results of the estimated carbon footprint reduction potential from full and partial adoption of options are summarised in Figure 4.1. For a detailed list of assumptions and methods for low-carbon lifestyle options, see Annex C.

Note that **the calculated reduction potential of the low-carbon options is based on the average Norwegian's lifestyle, whereas in reality there is a huge diversity in lifestyles, and households have different responsibilities and capacities for impactful changes**, depending on factors such as income (see, for example: Gustavsen 2023; Oxfam 2023), geographical settlement and living area (Anttonen et al. 2023). As shown in section 3.2, for those with higher-than-average consumption, the reduction potential is considerably higher.

High-impact options

The options with the highest potentials[18] are those estimated to achieve reductions of between **500 and 1,200 kgCO_2e/capita/year** or more per option on average. They fall in the following four areas:

→ **Diets with less meat**, especially red meat. The greatest reduction results from adopting a completely plant-based diet, although shifting to a vegetarian diet (including dairy products and eggs) also results in substantial reductions. Even adopting the so-called Planetary Diet or following the Nordic Nutrition Recommendations, both of which include some meat and fish, leads to a significantly reduced LCF.

→ **Reduced international flying**, either by travelling less or by shifting to train. For the minority of people who fly abroad privately several times per year, travelling less often or opting for train travel instead of flying can shrink the LCF even more than for the average person.

→ **Climate-smart personal car travel**, by switching from fossil fuel-based cars to electric vehicles.

→ **Reduced purchasing of new consumer goods**, together with a deep **decarbonisation of the production system.**

Two of these high-impact options are based on the "Shift" approach: substituting carbon-intensive meat and animal-based food products with plant-based options, and replacing flights with train travel. Reducing international flights and reducing purchasing of new consumer goods are both based on the "Avoid" approach. For consumer goods and personal cars, the "Improve" approach also was found to have high reduction potential.

[18] Because the identified options have overlaps and synergies among them, the estimated reduction potentials cannot be directly added together.

Medium-impact options

Options with a medium potential are estimated to achieve reductions of between **200 and 500 kgCO_2e/capita/year** per option on average.[19] They are found in the following categories:

→ **Reduced mobility and climate-smart transport.** These options include using public transport, cycling and walking instead of private cars for travel (other than commuting and leisure), living closer to the workplace, taking climate-smart weekend trips (substituting flights), using smaller private cars, commuting car-free by public transport, using biofuels and using alternative fuels for aviation.

→ **Smaller living space**, resulting in lower energy consumption and reduced need for carbon-intensive construction materials.

→ **Climate-smart agriculture**, by adopting for example improved nutrient management and retention, enhanced agroforestry and carbon sequestration, and energy efficiency improvements.

The options with a medium reduction potential are based on a variety of mitigation approaches, such as more efficient food production ("Improve"), living closer to the workplace ("Avoid") and car-free private travel ("Shift"). Most of the options are in the domain of personal transport.

Lower-impact options

In addition to these high- and medium-impact options, several changes have been identified that have more modest impact, resulting in reductions of less than **200 kgCO_2e/capita/year** per option on average.[20] Most of these options are related to personal transport. Nearly half of those are improvement-based, such as substituting fossil-based fuels with alternative, non-fossil sources or electrification in the case of ferries, public transport and aviation. For nutrition, most of the lower-impact options are related to "Avoid" options, such as lower consumption of alcohol and sweets, reduced household food waste, and reduction of coffee. For housing, options with lower impact are related to improvements (such as energy efficiency improvement of existing buildings), or to absolute reduction (such as saving hot water). For goods, leisure, and services, options in this category represent mainly the "Avoid" approach and are related to reduced spending.

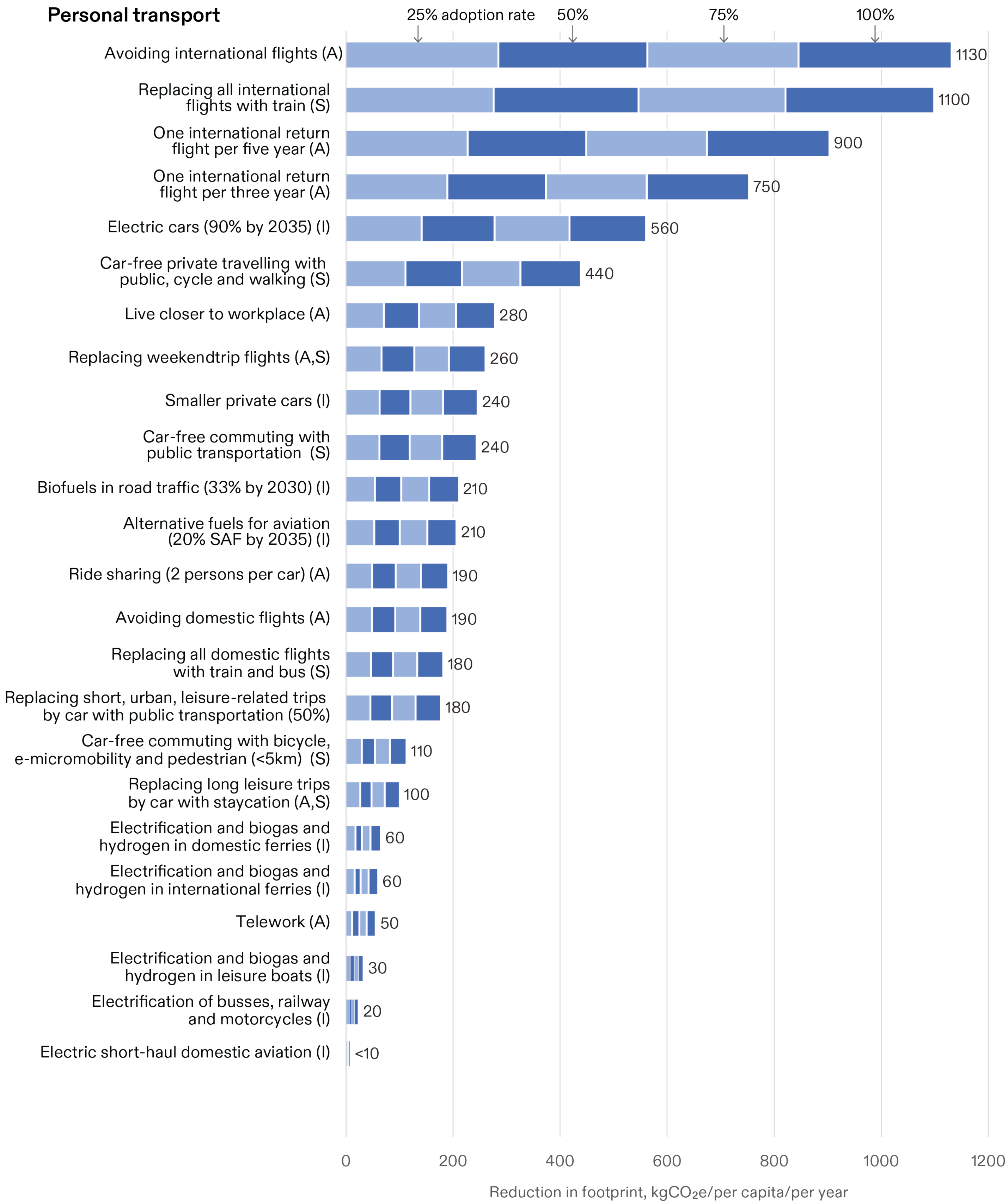
Although these options have lower estimated impacts than the ones listed above, this does not mean that they are insignificant and can be ignored. Considering the need for rapid and substantial reductions of the lifestyle carbon footprint, options that have relatively lower impact will also be necessary. Only combinations of multiple and diverse options, some with higher impact and others with lower impact, can achieve the required reductions.

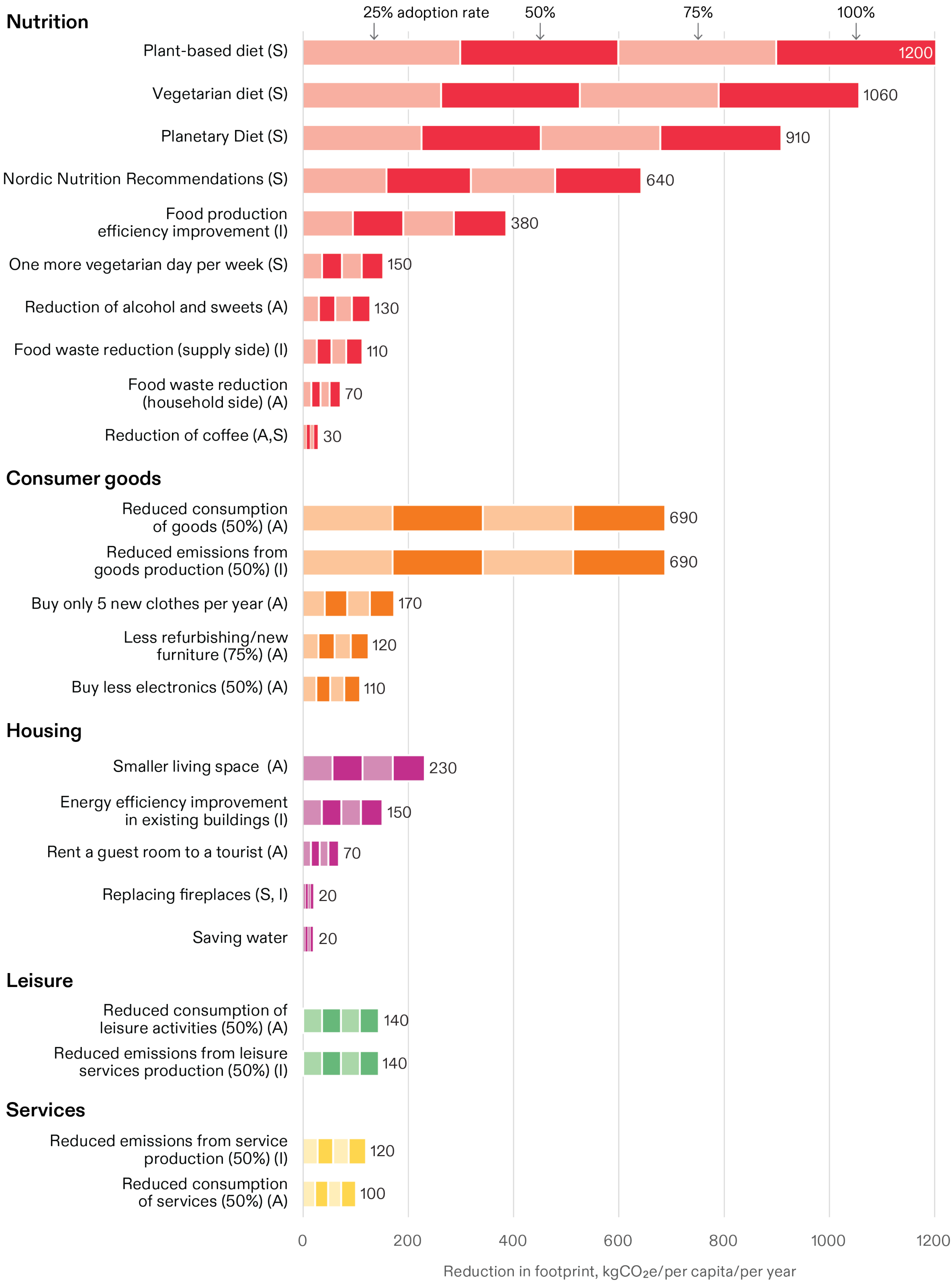
[19] Estimated to have more than 200 kgCO_2e/capita/year reduction potential in full implementation. Descending order by estimated average reduction potentials.

[20] Estimated to have less than 200 kgCO_2e/capita/year reduction potential in full implementation. Descending order by estimated average reduction potentials.

Figure 4.1: Estimated per capita carbon footprint reduction impacts (kgCO_2e/capita/year) of low-carbon lifestyle options

Note: The letters in the brackets after the option names refer to the approaches of Avoid (A), Shift (S) and Improve (I).




Nutrition
Plant-based diet (S)
Vegetarian diet (S)
Planetary Diet (S)
Nordic Nutrition Recommendations (S)
Food production efficiency improvement (I)
One more vegetarian day per week (S)
Reduction of alcohol and sweets (A)
Food waste reduction (supply side) (I)
Food waste reduction (household side) (A)
Reduction of coffee (A,S)
Consumer goods
Reduced consumption of goods (50%) (A)
Reduced emissions from goods production (50%) (I)
Buy only 5 new clothes per year (A)
Less refurbishing/new furniture (75%) (A)
Buy less electronics (50%) (A)
Housing
Smaller living space (A)
Energy efficiency improvement in existing buildings (I)
Rent a guest room to a tourist (A)
Replacing fireplaces (S, I)
Saving water
Leisure
Reduced consumption of leisure activities (50%) (A)
Reduced emissions from leisure services production (50%) (I)
Services
Reduced emissions from service production (50%) (I)
Reduced consumption of services (50%) (A)
25% adoption rate
50%
75%
100%
1200
1060
910
640
380
150
130
110
70
30
690
690
170
120
110
230
150
70
20
20
140
140
120
100
0
200
400
600
800
1000
1200
Reduction in footprint, kgCO₂e/per capita/per year

4.2 Options for preventing projected increases in lifestyle carbon footprints

In addition to the options for reducing the current lifestyle carbon footprint, the study explored selected options for preventing expected consumption increases and the related emissions. The reduction potential of these options, referred to as "prevented emissions", is more uncertain than that of the options assessed in section 4.1 and is therefore presented separately. Changes in government policies and regulations, as well as socio-economic trends (such as population growth and urbanisation patterns), together with future technological innovations, make it challenging to assess the likely prevented emissions. A list of these options, their respective estimated reduction potentials and the related assumptions is presented in Table 4.1.

Car sharing

For transport, car sharing was chosen due to its potential to reduce future carbon footprints by promoting more efficient use of vehicles. The Norwegian vehicle fleet has increased by 1 million cars since 2000 (OFV 2022). Enabling multiple individuals to use the same vehicle can help decrease the overall number of cars, resulting in lower greenhouse gas emissions from manufacturing and maintenance as well as from driving. This could also reduce the projected demand for mining metals needed for EV batteries and the related threats to biodiversity (International Resource Panel 2024). A reduction potential of 100 kgCO_2e/capita/year was calculated based on the projected growth of the current car fleet[21] (Table 4.1).

However, uncertainties related to the "rebound" and "lock-in" effects can greatly reduce the estimated effectiveness of car sharing. For example, rather than decreasing the number of cars, sharing schemes could increase overall transport demand or shift traffic from lower-emitting transport modes to car use. The effects of car sharing therefore depend on the design of the overall policy framework for car ownership and use (Nenseth and Opheim Ellis 2022). This should be approached as part of a broader strategy to rethink mobility planning and reduce overall demand for resource-intensive mobility. Due to these uncertainties, car sharing was not included among the low-carbon lifestyle options listed in section 4.1 but is presented separately.

Options for building construction

For housing, most of the climate impact is due to either the "embedded emissions" of new construction materials or the energy consumption during the use phase. The study estimated the potential gains from three options – two that reduce the need for new materials and one on energy saving for the use phase (see Table 4.1). The reduction potential of the three options is calculated assuming a possible future per capita living space of 30 m^2. Table 4.1 also shows the estimated emission reductions from each option for Norway as a whole.

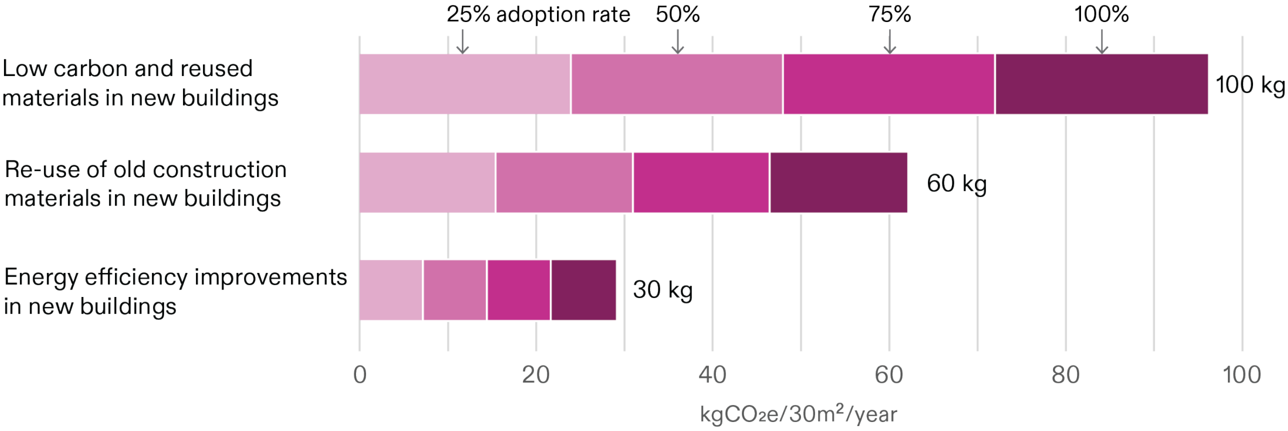
The first two options assessed are about 1) replacing carbon-intensive materials commonly used in construction with alternative, low-carbon materials, and 2) re-using construction materials from old, redundant buildings when constructing new ones[22] (or a combination of low-carbon and re-use[23]). As shown in Figure 4.2, reused materials have the greatest saving potential but a combination of re-used and low-carbon construction

[21] The emissions from increased car production only were included in the calculations.
[22] The maximum theoretical potential for reuse in new buildings varies from 20% to 100% between different parts of the building. Therefore only part of the materials are reused and the rest of the materials is assumed to be standard construction materials (Enova SF 2020).
[23] Reused materials are used according to the maximum theoretical potential for reuse and the rest of the material is assumed to be low carbon materials (Enova SF 2020).

materials results in an even greater reduction potential of nearly 100 $kgCO_2e$ for a 30 m^2 space, when building new residential buildings.

The third option looks at the reduction potential of more energy-efficient (passive house standard) buildings. The reduction potential of this option was estimated at 30 $kgCO_2e$ for a 30 m^2 space.

Figure 4.2: Carbon footprint emissions ($kgCO_2e/30m^2$) prevented with the selected options*.



*The reduction potential of the selected options is not reflected in the current footprint but instead measures emissions that can be prevented with the lifestyle choices.

Renting or sharing cabins

In Norway there are already nearly half a million cabins. Yet, the total area regulated for cabins could increase the amount of cabins up to 3.5 times (Syverhuset 2022). Even so, the average size of cabins is expected to increase (Statistics Norway 2024), with the standards and the related infrastructure also improving. In addition, people are travelling more frequently and for shorter periods of time to their cabins, raising concerns about the adverse climate impacts of holiday cottages. With up to 22% of Norwegian households owning a cabin and half of the population using one (Larsen and Sti 2020), significant impacts on consumption patterns and climate are expected.

The option for cabins is based on the assumption that the increasing demand would be met through renting or sharing existing facilities rather than new construction. The reduction potential for cottages is estimated assuming that no new cottages would be built and that the occupancy rate of existing cottages would increase. The reduction potential of 700 $kgCO_2e$ is given per average size (100 m^2) of new cottage in 2022 (Table 4.1).

The option for cabins underlines the inequality in the carbon footprint of lifestyles. In Norway, people with higher incomes can afford larger cottages with modern amenities and located in scenic landscapes (Steffanssen 2016). Owning and building such large cottages not only reflects economic capacity, but also contributes to the wider debate on sustainability and environmental protection in Norway (Steffanssen 2017). Nevertheless, the establishment of new cabins entails increased emissions, stemming from both construction activities and alterations in land use. Furthermore, the development of cabins and associated infrastructure – including roads, electricity and water supply – poses a threat to nature, potentially leading to degradation and biodiversity loss (Bagge et al. 2023).

Table 4.1: Assumptions for options measuring prevented emissions, and reduction potential per consumption unit and total annual reduction potential

Domain	Option	Assumption	Potential avoided emissions	
Personal transport	Car sharing	Annual increase in car fleet is avoided by car sharing services.	100 $kgCO_2e$/capita/year	0.6 million tCO_2e/year
Housing	Low carbon and re-used materials in new buildings	New buildings include re-used materials from old buildings and low-carbon construction materials from domestic sources for the remaining parts.	100 $kgCO_2e/30m^2$	11.8 $ktCO_2e$/year[a]
	Re-use of old construction materials in new buildings	Re-use of construction materials from old, demolished building in new buildings.	60 $kgCO_2e/30m^2$	7.6 $ktCO_2e$/year[a]
	Energy efficiency improvements in new buildings	Efficiency improvement of new buildings (passive house standard).	30 $kgCO_2e/30m^2$	3.5 $ktCO_2e$/year[a]
Leisure	Renting instead of building a cabin	Instead of building a new holiday house, rent the existing one. The average size of a new holiday house is 100 m^2.	700 $kgCO_2e/100m^2$	3.8 $ktCO_2e$/year[b]

[a] Estimated annual reduction potential is based on the annual increase of newly built buildings.
[b] Estimated annual reduction potential is based on the annual increase of newly built cabins.

Box 1 Examples for low-carbon city development

Current living spaces of 71 m^2 in Norway exceed the "sufficient" level (approximately 20 m^2/capita, Rao and Min 2018; Vélez-Henao and Pauliuk 2023). Because residences hold substantial embedded emissions related to building materials and inefficient energy systems (UNEP 2022b), this poses a dilemma for reducing the lifestyle carbon footprint. Addressing this issue requires a multi-faceted approach, including policy with regulations and incentives, and technological innovations to promote low-carbon living standards together with equity and wellbeing in communities.

New building codes and standards

By repurposing or re-using existing structures rather than building new ones, cities can minimise the environmental impact of urban development. This approach reduces carbon emissions, conserves natural resources and reduces pressure on infrastructure (Aigwi, Duberia and Nwadike 2023). In addition, the re-use of buildings often leads to the creation of mixed-use buildings (Armstrong, Soebarto and Zuo 2021), promoting walkable neighbourhoods and reducing car dependency, thus promoting sustainable transport modes.

Setting high standards for the renovation and refurbishment of existing buildings will promote resource efficiency and reduce waste related to the construction industry. Energy-efficient improvements, such as better insulation, and installation of renewable energy systems will help reduce energy consumption and related environmental impacts. In addition, the integration of shared spaces can lead to reduced energy use (Makkonen et al. 2023) and promote a sense of community and social interaction, which enhances the overall wellbeing and quality of life of residents (Nieuwenhuijsen et al. 2024).

Rethinking zoning to enable sustainable city development

Traditional zoning often segregates land uses, leading to urban sprawl, increased traffic congestion and reduced walkability. Redesigning land-use planning is crucial for integrating housing and sustainable development in cities and townships by rethinking how land is used and regulated to achieve long-term environmental, social and economic goals. However, with increasing urbanisation, the focus on land use and area planning is on cities. Attention should be paid to regionally neutral policy that also takes into account smaller municipalities (Halleraker 2024). This will ensure equal and nationwide opportunity to develop sustainable transport solutions and land-use changes.

Zoning review promotes mixed development, where residential, commercial and recreational areas co-exist in the same neighbourhood. This approach minimises the need for long commutes, encourages active/sustainable transport, and promotes lively, inclusive communities. Rethinking zoning emphasises transit-oriented development (TOD), which focuses on creating compact, walkable communities centred around public transport. By allowing higher densities and mixed land use near transit stations, zoning regulations facilitate easier access to jobs, amenities, and affordable housing options, while reducing greenhouse gas emissions from car travel (Salat and Ollivier 2017; C40 2021).

The Norwegian policy frameworks "Byvekstavtaler" and "Belønningsavtaler" support zero car traffic growth in city areas. This applies to the largest urban areas (and some smaller ones) and is implemented in co-operation between the central government and municipalities. The strengthened and wider introduction of such frameworks would support the reduction of traffic throughout the country (Regjeringen 2023).

Zoning regulations should integrate parks, greenways and urban forests to offer residents access to nature and outdoor activities, improving air quality and wellbeing while mitigating the urban heat island effect (Pisoni, Christidis and Navajas Cawood 2022; Nieuwenhuijsen et al. 2024). Encouraging community gardens and urban agriculture initiatives within residential areas through zoning policies can promote local food production and foster community engagement (Bricas 2019).

5 – Scenarios for Living Within a Fair Consumption Space

This section combines selected low-carbon lifestyle options (introduced in section 4) into scenarios for 2035, aligned with the 1.5°C and 2°C temperature limits. With the estimated current average lifestyle carbon footprint as the starting point, the two scenarios illustrate how a range of changes in the carbon intensity of production and in lifestyles, with different adoption rates, can meet the targets. The scenarios highlight the importance of enabling changes at both the individual/household and the wider systems levels.

Although the study develops scenarios for both 1.5°C and 2°C, it should be stressed that the primary objective is to try to limit global heating to 1.5°C or as close as possible to this temperature limit. Every fraction of a degree above that level would lead to more severe impacts on ecosystems, biodiversity, human health, food security, water resources and sustainable development. While achieving this target will require ambitious and co-ordinated global action, the benefits of staying within 1.5°C are significant (IPCC 2022). The Paris Agreement makes it clear that aiming for 2°C of warming has dire and, in several cases, unacceptable consequences.

The scenarios illustrate what a fair consumption space could look like with the remaining room for greenhouse gas emissions in 2035 divided evenly across the world's population. It thus reflects the responsibility and necessity of countries with higher-than-average current lifestyle carbon footprints to make greater changes than those with modest emissions.

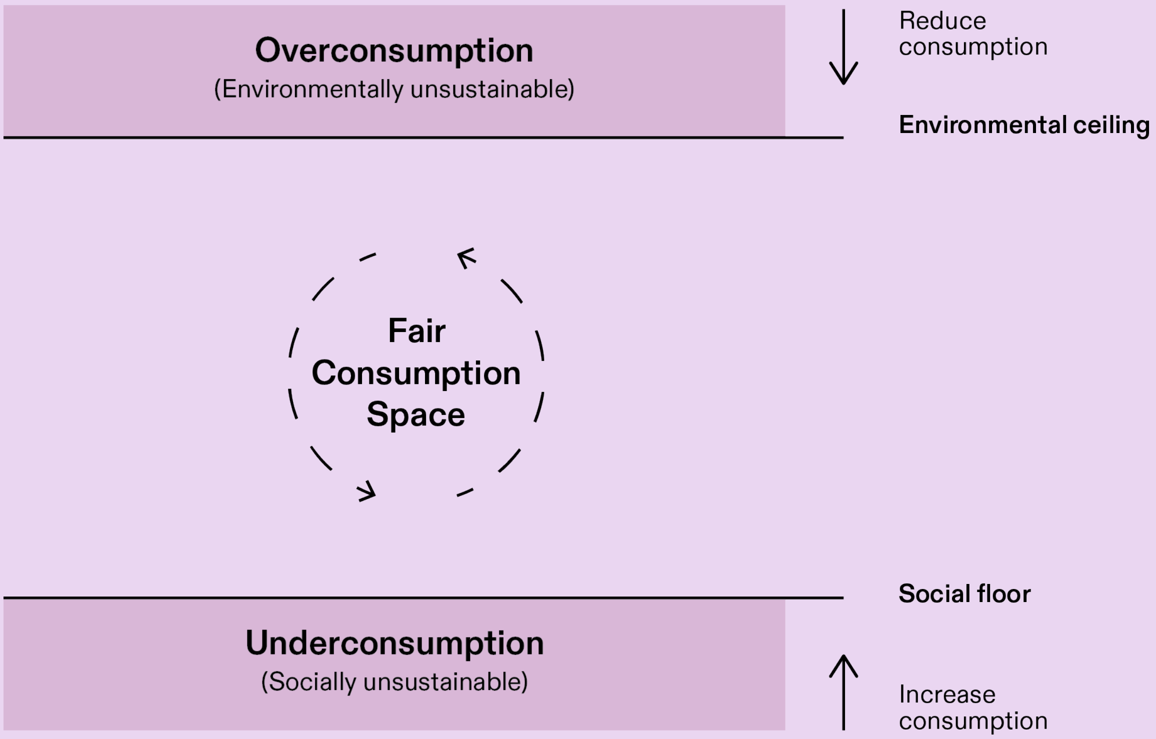
The scenarios naturally focus on changes needed for shrinking the lifestyle carbon footprint. However, it is important to see these changes in the context of a wider societal transformation where needs are met differently than now. Maintaining high levels of wellbeing within a fair consumption space requires innovation not only in technology, but also in social practices and relations.

The scenarios are based on the aggregated impacts of lifestyle options from the "Avoid, Shift and Improve" categories. However, calculating the aggregated impacts is not simply a matter of adding up the impact of individual options. This is because some options are incompatible or overlap, and there can also be synergies among options.

Furthermore, some of the lifestyle options do not fall squarely in one of the three categories. For example, car-free commuting with public transport falls into "Shift" and "Improve" categories, as the shift from car to public transport is often an individual's choice, but enabling widespread adoption also often requires systemic changes in infrastructure. Similarly, the efficiency improvement of household appliances is often a manufacturer's choice, but a household can choose to use more efficient appliances (thereby reducing its energy consumption) or to reduce the consumption and use of appliances in general.

Box 2 What is a fair consumption space?

A fair consumption space sets healthy boundaries for consumption, defined by resource limits and the regenerative capacity of the planet. It refers to an ecologically healthy perimeter that supports within it an equitable distribution of resources and opportunities for individuals and societies to fulfil their needs and ensure wellbeing. Within this space, there are a range of regenerative options, but there are also clear demarcating limits to over- and underconsumption. With a cap on emissions, overconsumption by one person affects the prospects of another, and encroaches into another's consumption space, requiring collectively working towards a more equitable distribution of limited carbon budgets.



The two main scenarios are broken down into separate sub-scenarios that only consider the options of a particular approach (Avoid, Shift, Improve). Illustrating sub-scenarios together in the main scenario including all approaches allows for a comparison of the impacts and effectiveness of individual choices and systemic changes. However, it is not realistic to assume that the Avoid-focused sub-scenario would be enabled without efforts to Shift and Improve (and vice versa). Thus, the aggregated impact of all approaches shows how they complement each other and enable greater reduction in lifestyle carbon footprints.

Note that the estimation of aggregated impacts does not attempt to model rebound effects from individual lifestyle options. The emission reductions from some options could be partially lost due to re-spending of money and time, resulting in increased emissions in other domains. This does not affect the validity of the scenarios but will affect the efforts made to turn them into reality. Detailed and frequently updated consumption statistics, ideally generated per income decile and by geography, can help identify and mitigate unfavourable consumption trends from an early stage.

The 1.5°C and 2°C scenarios, using adoption rates for selected aggregated options to meet the 1.4 tonne and 2.6 tonne targets set for 2035, are introduced in Figures 5.1 and 5.2 and in Tables 5.1 and 5.2. For a more detailed description of the scenarios, see Annex D.

5.1 Scenarios aligned with 1.5°C and 2°C pathways

Ambitious lifestyle changes are needed in all consumption domains to meet the 2035 targets in both the 1.5°C and 2°C scenarios, as shown in Figure 3.1 and Table 3.1. Achieving the 1.5°C target will require almost full adoption of the identified high-impact options across all domains. In comparison, the reduction needed to reach the 2°C target gives more leeway in terms of options taken and their adoption rates.

Table 5.1 summarises the options adopted in the 1.5°C and 2°C scenarios. The same options are included in both scenarios. The distinction between the scenarios is the different adoption rates of the options. More detailed adoption rates (i.e. differences in implementation rates) are introduced in Tables 5.2 to 5.4 and in Annex D.[24]

Differences and similarities for the 1.5°C and 2°C scenarios are introduced in Table 5.2. In the 1.5°C scenario, an 82% reduction is needed by 2035, requiring very ambitious changes across all lifestyle domains combined with rapid decarbonisation of production systems and lifestyle-supporting infrastructure (Figure 5.1 and Table 5.3). To achieve the 2°C-aligned target (2.6 tCO_2e/capita/year) the lifestyle carbon footprint needs to drop 66% by 2035. Compared to the 1.5°C scenario, this provides more leeway in choice of options and adoption rates. Even so, rapid and radical lifestyle changes combined with large production-side improvements are required also in the 2°C scenario (Figure 5.2 and Table 5.4).

[24] For some options in the scenarios the adoption rate is higher than assumed for the individual low-carbon lifestyle option introduced in section 4.1, in order to reach the target.

Table 5.1: Overview of carbon footprint reduction options used for the 1.5°C and 2°C scenarios, per lifestyle domain and approach (Avoid, Shift, Improve)

Domain	**Approach**		
	Avoid	**Shift**	**Improve**
Personal transport	Active travel in urban areas for cyclists and pedestrians. Teleworking, partially or entirely supported by reduced travel distances. Reduction of high-emitting leisure-related transport, such as flying, to once every 3-5 years.	Switch from private car travel to public transport in both urban and rural areas; shared mobility systems with high occupancy. Substitution of trains and buses for air-based travel domestically and in the EU.	Electric vehicles and biofuels for private vehicles; electrified public transport. Electrification, biogas and hydrogen for domestic ferries. Sustainable aviation fuels (SAF); electrification of short-haul domestic flights. Reduced carbon intensity of electricity.
Nutrition	Reduced household food waste, together with eliminated overconsumption of food and reduced consumption of sugar, alcohol and coffee.	Switch to mainly plant-based protein sources, having meat only for special occasions; following healthy Nordic Nutritional Recommendations.	Improvements in production-side efficiency together with large reductions in supply-side food waste.
Goods	Buying fewer clothes and electronics; avoiding unnecessary refurbishing.		Production-side efficiency improvements.
Housing	Reduced living space size and related energy consumption; reduced water consumption and related energy consumption.	Replacement of existing fireplaces (and wood burning) with air-heat pumps.	Greater efficiency of existing buildings through improved technical systems (heating, ventilation, etc.), smart homes and control systems; improved carbon intensity of electricity.
Leisure	Reduced spending on leisure services; greater focus on local leisure, culture and sport services.		Reduced emissions from leisure activities (production-side efficiency improvement).
Services	Reduced spending on services other than education, human health and social work services.		Reduced emissions from service activities (production-side efficiency improvement).

Table 5.2: Differences and similarities between the 1.5°C and 2°C scenarios

Personal transport

1.5°C scenario	*2°C scenario*
Commuting in urban areas is switched to 50% public transport and 20% cycling, micromobility and walking. The remaining kilometres for working are reduced 23% in urban areas through expanded teleworking and living closer to workplaces.	Commuting in urban areas is switched to 20% public transport and 20% cycling, micromobility and walking. The overall transport demand for working is reduced 5% in urban areas through expanded teleworking and living closer to workplaces.
In rural areas, commuting-related trips are reduced around 5% due to teleworking among white-collar workers.	In rural areas, commuting-related trips are reduced 2% due to teleworking among white-collar workers.
Long leisure-related private car driving is replaced fully with public transport in both urban and rural areas.	One-third of long leisure-related private car trips are replaced with public transport in both urban and rural areas.
50% of short leisure trips in urban areas are replaced with public transport.	25% of short leisure trips in urban areas are replaced with public transport.
Over half of the non-leisure and non-commuting related car driving is switched to public transport, cycling and walking.	One-fifth of the non-leisure and non-commuting related car driving is switched to public transport, cycling and walking.
International flights are fully replaced with rail-based travel, together with 20% reduction in related transport demand.	International flights are cut by 25%. Of the remaining kilometres, 50% are replaced with rail-based travel or with domestic and/or international ferries (with non-fossil fuels).
80% of domestic flights are replaced with train and bus connections. The remaining kilometres are electrified short-haul domestic flights to remote areas.	Half of domestic flights are replaced with train and bus connections. Very short-haul domestic flights are electrified, and the remaining international and domestic flights adopt 100% SAF[a].
Shared mobility systems are widely adopted, in tandem with reduced numbers and sizing of new cars (resulting in lower production-side impact).	Shared mobility systems are moderately adopted, in tandem with reduced numbers and sizing of new cars (resulting in lower production side impact).
90% of private cars[b] and 100% of buses, motorcycles and trains are electrified. Domestic and international ferries and leisure boats are electrified or run on biogas or hydrogen.	90% of private cars are electrified, and the rest run on 33% biofuel blends. All buses, motorcycles and trains are electrified. Domestic and international ferries and leisure boats are electrified or run on biogas or hydrogen.

Most of the remaining transport needs (41%) are met by trains (including trams and metros), 24% by electric vehicles and 20% by buses. Walking and cycling (including e-bikes) account for 9% and 4% respectively of the remaining transport demand, while domestic short-haul aviation accounts for only 1%.

Overall transport demand has decreased by around one-tenth (12%) and has shifted towards public transport (from 8% to 60%), with

- → Car kilometres down 68%
- → Bus kilometres up 380%
- → Train kilometres up 400%
- → Cycling up 160%
- → Walking up 140%
- → Flying down 97%

Around one-third (35%) of the remaining kilometres are travelled by private cars, of which one-third are biofuel and 70% are electric vehicles. Public transport use is divided between buses (14%) and trains (16%). Walking and cycling (including e-bikes) account for 10% and 6% respectively of the remaining transport demand. Domestic aviation is responsible for only 1% and international flights 7% (up from 3% and 18% currently).

Overall transport demand has decreased by 9 % and has shifted towards public transport (from 8% to 40%), with

- → Car kilometres down 50%
- → Bus kilometres up 290%
- → Train kilometres up 290%
- → Cycling up 100%
- → Walking up 70%
- → Flying down 60%

Nutrition

1.5°C scenario

Achieving the target requires nearly full adoption of a nutritionally balanced plant-based diet, and only small portions of animal-based protein sources (dairy, eggs, fish and meat) are saved for special occasions (2-3 times per year[c] each).

The caloric intake has been adjusted to 2,250 kcal/day based on the needs of healthy and physically active adults.

Alcohol and sugar are fully avoided, and coffee consumption is replaced with tea.

Almost all food waste from the household and supply chain is eliminated (90% for both).

Production-side efficiency improvements are fully adopted.

2°C scenario

Achieving the target requires 50% adoption of the Nordic Nutritional Recommendations[d], while the rest of the population has a nutritionally balanced plant-based or vegetarian diet. Animal-based products are eaten mainly on special occasions (1-2 times per week[c]), as meat consumption is reduced 70% and fish 63%. Dairy products and eggs are consumed 32-40% less than currently.

The caloric intake has been adjusted to 2,250 kcal/day based on the needs of healthy and physically active adults.

Alcohol and sugar are cut 75% and 75% of coffee is replaced with tea.

Over half of the food waste from the household and supply side is eliminated (60% and 75%, respectively).

Production-side efficiency improvements are fully adopted.

Goods

1.5°C Scenario	*2°C Scenario*
Overall spending on consumer goods is reduced 86%.	Overall spending on consumer goods is reduced 20%.
Only five new clothes items per year and 50% less electronics are bought.	Only five new clothes items per year and 50% less electronics are bought.
Unnecessary home refurbishing, such as renovation of functioning kitchens, is avoided.	Unnecessary home refurbishing, such as renovation of functioning kitchens, is avoided.
Spending on other goods and repairs is reduced by 85% for both. Medicine is reduced by 50%.	Spending on other goods and repairs is reduced by 50% for both. Medicine is reduced by 20%.
On the production side, an 80% improvement in carbon intensity is expected.	On the production side, a 50% improvement in carbon intensity is expected.

Housing

1.5°C Scenario	*2°C Scenario*
Living space is reduced to follow the decent living standards of around 20 m^2 on average (Rao and Min 2018; Vélez-Henao and Pauliuk 2023), and the related energy and electricity consumption used for heating, cooling and lighting is reduced accordingly.	Living space per person is reduced by around one-third (to 47 m^2 on average), and the related energy and electricity consumption used for heating, cooling and lighting is reduced accordingly. One room of around 20 m^2 is rented out for three weeks per year, saving emissions related to the constructed space and related energy.
Energy consumption in existing buildings is reduced around 45% with the full adoption of efficiency improvements.	Energy consumption in existing buildings is reduced around 25% due to efficiency improvements.
No more stoves and fireplaces are used in residential buildings and holiday homes for heating. The heating demand is replaced with efficient heat pumps.	No more stoves and fireplaces are used in residential buildings and holiday homes for heating. The heating demand is replaced with efficient heat pumps.
Water consumption and energy used for water heating is cut 35%.	Water consumption and energy used for water heating is cut 35%.
Overall energy consumption for housing has decreased around 85%, and imported electricity is no longer needed; thus, the carbon intensity of electricity is 25% lower than today.	Overall energy consumption for housing has decreased around 55%, and imported electricity is no longer needed; thus, the carbon intensity of electricity is 25% lower than today.

Leisure

1.5°C scenario	*2°C scenario*
Spending on leisure activities is reduced 60%. On the production side, an 80% improvement in carbon intensity is expected.	Spending on leisure services is reduced 20% On the production side, a 50% improvement in carbon intensity is expected.

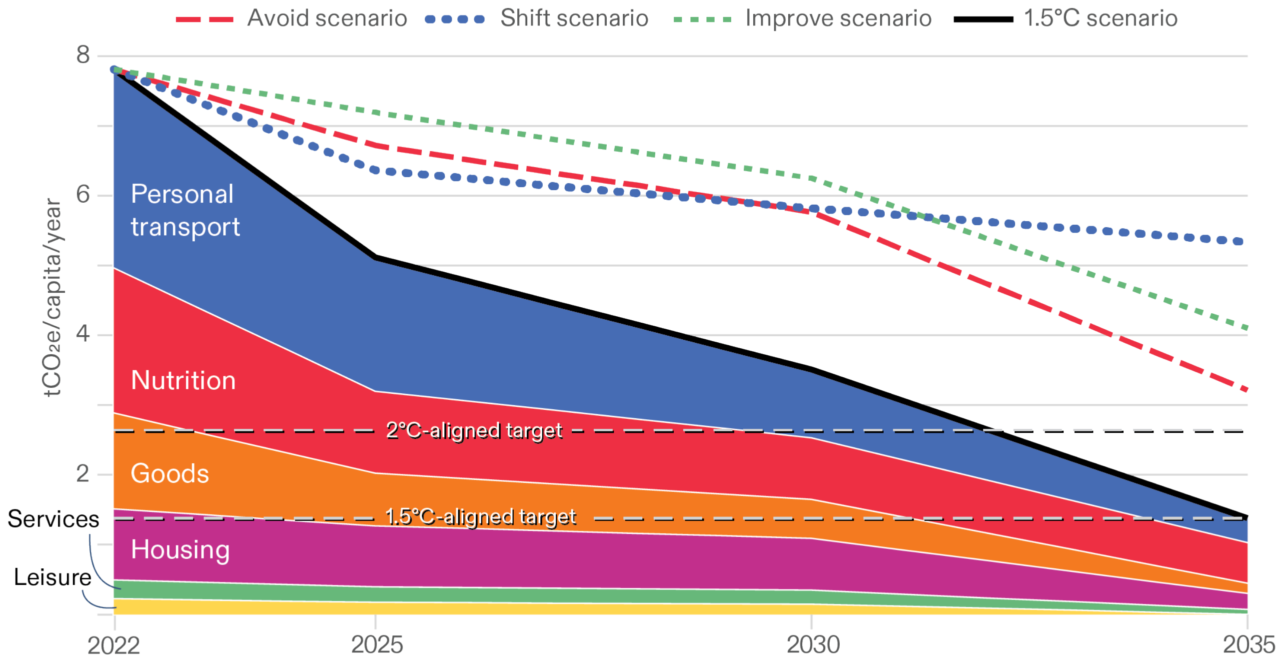
Services

1.5°C scenario	*2°C scenario*
Spending on services is reduced 85%. However, the reduction does not affect education, human health, and social work services. On the production side, an 80% improvement in carbon intensity is expected.	Spending on services is reduced 40%. However, the reduction does not affect education, human health, and social work services. On the production side, a 50% improvement in carbon intensity is expected.

[a] The use of 100% SAF is based on the assumption that there will be a significant reduction in the number of flights, which would potentially allow 100% SAF to cover the remaining flights.
[b] This is enabled by a notable decrease in the current transport demand for car travel, together with the overall reduction in car fleet and improvements in car sharing services. Replacing the current system with 100% electric vehicles would increase emissions notably, due to increased resource extraction.
[c] The number of servings is calculated by dividing the remaining meat consumption with the average meat intake in the Nordic Nutrition Recommendations diet.
[d] Daily per capita intake of 30 g of red meat, 60 g of poultry and 30 g of pork on average.
[e] Adoption rate is higher than assumed for the individual low-carbon lifestyle option introduced in section 4.1.
[f] Reduction should not apply to life/health-critical medicines.

1.5°C scenario

Figure 5.1: Estimated 1.5°C scenario for current lifestyle carbon footprint with selected low-carbon lifestyle options to meet the 2°C- and 1.5°C-aligned targets by 2035



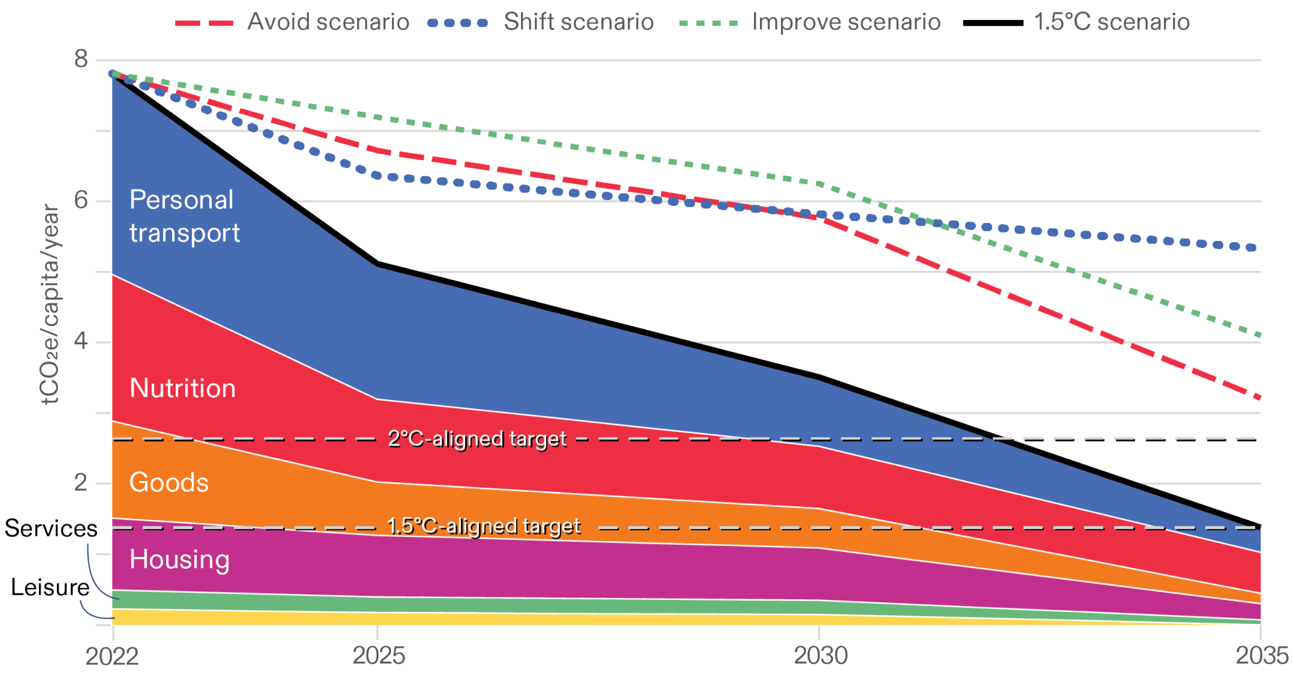
Note: Avoid, Shift and Improve approach-based scenarios include only options from the avoid, shift or improve categories, respectively. In the Avoid approach-based scenario, the reduction potential is based on a reduction in consumption amounts. Shift approaches represent options that shift from higher-intensity consumption to lower-intensity consumption (e.g. private car travel replaced with public transport). The improve approach scenario includes only options that improve carbon intensity.

Table 5.3: Comparison of footprints ($kgCO_2e$/capita/year), consumption amounts and intensities between the current lifestyle carbon footprint and the 1.5°C scenario by 2035.

	Current Lifestyle Carbon Footprint				2035 Lifestyle Carbon Footprint – 1.5°C Scenario			
Domain	**$kgCO_2e$/ capita/year**	**%**	**Amount**	**Intensity**	**$kgCO_2e$/ capita/year**	**%**	**Amount**	**Intensity**
Personal transport	2,840	36%	16,730 p-km	0.17 $kgCO_2e$/p-km	340	25%	14,660 p-km	0.02 $kgCO_2e$/p-km
Nutrition	2,080	26%	900 kg	2.3 $kgCO_2e$/kg	580	42%	690 kg	0.84 $kgCO_2e$/kg
Goods	1,370	18%	3,930 €	0.35 $kgCO_2e$/€	150	11%	630 €	0.24 $kgCO_2e$/€
Housing	1,020	13%	71 m^2 7,560 kWh	14.4 $kgCO_2e/m^2$	230	16%	20 m^2 990 kWh	11.6 $kgCO_2e/m^2$
Leisure	270	3%	1,070 €	0.19 $kgCO_2e$/€	70	5%	430 €	0.04 $kgCO_2e$/€
Services	235	3%	3,870 €	0.06 $kgCO_2e$/€	15	1%	1,350 €	0.01 $kgCO_2e$/€
Total	**7,810**				**1,380**			

2°C scenario

Figure 5.2: Estimated 2°C scenario for current lifestyle carbon footprint with selected low-carbon lifestyle options to meet the 2°C- and 1.5°C-aligned targets by 2035



Note: Avoid, Shift and Improve approach-based scenarios include only options from the avoid, shift, or improve categories, respectively. In the Avoid approach-based scenario, the reduction potential is based on a reduction in consumption amounts. The Shift approach represents options shifting from higher-intensity consumption to lower-intensity consumption (e.g. private car driving replaced with public transport). The improve approach is a scenario that includes only options improving carbon intensity.

Table 5.4: Comparison of footprints (kgCO_2e/capita/year), consumption amounts and intensities between the current lifestyle carbon footprint and the 2°C scenario by 2035.

	Current Lifestyle Carbon Footprint				2035 Lifestyle Carbon Footprint – 2°C Scenario			
Domain	**kgCO_2e/ capita/year**	**%**	**Amount**	**Intensity**	**kgCO_2e/ capita/year**	**%**	**Amount**	**Intensity**
Personal transport	2,840	36%	16,730 p-km	0.17 kgCO_2e/p-km	570	22%	15,160 p-km	0.04 kgCO_2e/p-km
Nutrition	2,080	26%	900 kg	2.3 kgCO_2e/kg	960	37%	760 kg	1.3 kgCO_2e/kg
Goods	1,370	18%	3,930 €	0.35 kgCO_2e/€	280	11%	1,340 €	0.21 kgCO_2e/€
Housing	1,020	13%	71 m^2 7,560 kWh	14.4 kgCO_2e/m^2	560	22%	47 m^2 3,380 kWh	12.0 kgCO_2e /m^2
Leisure	270	3%	1,070 €	0.19 kgCO_2e/€	140	5%	850 €	0.09 kgCO_2e/€
Services	235	3%	3,870 €	0.06 kgCO_2e/€	80	3%	2,680 €	0.03 kgCO_2e/€
Total	**7,810**				**2,580**			

5.2 Wellbeing co-benefits of the 1.5°C and 2°C scenarios

In the pursuit of sustainability and mitigating climate change, there is a growing recognition that transitioning to low-carbon lifestyles not only benefits the environment but also can enhance overall wellbeing. A growing number of countries see the importance of these linkages and are establishing related frameworks inspired by concepts like ”wellbeing economy” (Wellbeing Economy Alliance n.d.) and “doughnut economy” (Raworth 2017). Such concepts can be useful for identifying societal priorities and strategies encompassing both equitable wellbeing and planetary boundaries.

This section explores the complex relationship between adopting sustainable practices and improving individual and societal welfare. By examining the co-benefits associated with embracing low-carbon lifestyles, we uncover the multi-faceted ways in which sustainable choices contribute to personal health, community resilience, economic prosperity and social equity. The section explores how individuals, communities and policy makers can leverage these co-benefits to foster a more sustainable and fulfilling future for all.

Personal transport

A major shift towards public transport, cycling and walking will have substantial wellbeing benefits in addition to reduced greenhouse gas emissions. Air pollution is one of the main causes for early death both globally and in Norway, and the main culprits are road traffic and fireplaces (Låg 2022). Due to policies towards road traffic and wood burning in Norwegian cities, the air quality has improved, but between 120 and 1,200 people still die early each year due to air pollution in Norway. Reducing road traffic and improving air quality would greatly improve public health.

Another beneficial effect of fewer cars is reduced noise pollution, resulting in improved physical and mental health and wellbeing (Khreis et al. 2016; WHO 2018). With fewer cars, safety will improve as traffic accidents decrease (Retallack and Ostendorf 2020). With less space needed for cars (less maintenance and construction resources), there will be more room for diverse uses of public spaces such as green areas, more social interaction and infrastructure to support physical activity, and a prioritisation of active mobility (cycling and walking), further reducing air pollution, noise and urban heat island effects (Pisoni, Christidis and Navajas-Cawood 2022; Nieuwenhuijsen et al. 2024). Additionally, the beneficial effects that these changes have on public health will reduce costs in the healthcare system.

Nutrition

Shifting towards plant-based, more sustainable diets is necessary for climate change mitigation but will also lead to substantive health benefits, such as reduced cases of cardiovascular disease and cancer (see, for example: Saarinen et al. 2019; Laine et al. 2021; Barrett 2022; Kowalsky, Morilla Romero de la Osa and Cerrillo 2022). Reduced food waste will help reduce the need for food production, as a larger share of the food is eaten instead of being thrown away. This will reduce the need for fertiliser, water, and pesticides, with positive effects on biodiversity and the environment (Miljødirektoratet 2023).

For households, reducing food waste can save money (see, for example, Ananda, Gayana Karunasena and Pearson 2022). Donating more food to food banks will redistribute food to those who need it. Efficiency improvements on the production side (in agriculture) include processes such as nitrogen management, manure treatment for biogas and environmentally friendly distribution of livestock manure, technologies such as biochar and catch crops used (for example, for nutrient retention to reduce use of fertilisers) (Saarinen et al. 2019; Miljødirektoratet 2023). Such improvements in agricultural practices can decrease not only greenhouse gas emissions, but also water and air pollution.

Housing and household goods

Decreased size of living spaces can lead to reduced living costs, such as rent and energy, and reduced building costs for new homes. Additionally, smaller private living spaces could be more easily accepted if there is improved access to shared spaces for socialising, hobbies, etc. This can help build communities with stronger social bonds (De Botton 2008). Living in a smaller space, with less room available, may naturally limit the number of household appliances one can accommodate.

However, this constraint can be turned into an advantage through collaborative consumption or peer-to-peer rental platforms (Kim and Jin 2020). These innovative services provide individuals with the opportunity to rent or borrow various items and goods from others within their community. By opting to rent or borrow items instead of purchasing them outright, individuals can save money (Acquier, Daudigeos and Pinkse 2017), particularly on items that are needed only occasionally or for short-term use. Additionally, collaborative consumption contributes to environmental sustainability by reducing the demand for new products (Byers, Groth and Sakao 2015), thereby minimising resource consumption and waste generation.

Collaborative consumption platforms facilitate community building by connecting individuals who have items to share or skills to repair something with those in need. Examples include Folkeverksteder and Fiksefester, as well as more traditional flea markets at schools and voluntary work (dugnad) in the community. This fosters a sense of community spirit and promotes social connections among neighbours, enhancing the overall quality of community life (Rihova et al. 2018; Zhou 2023).

Replacing stoves and fireplaces (i.e. wood burning for heating) with efficient heat pumps reduces emissions of particles, volatile organic compounds, nitrogen oxides, carbon monoxide, polycyclic aromatic hydrocarbons and small amounts of sulphur dioxide. The health benefits of reduced particulate matter (PM10) and nitrogen oxide emissions are greatest in cities and densely populated areas (Miljødirektoratet 2023).

Water saving ensures that everyone has access to water for the necessities of life, even during a water shortage.

In the two scenarios analysed, overall energy consumption for housing has decreased by around 85%. This makes it possible to avoid unnecessary expansion of the electricity network and production, and other sectors such as transport can use the energy freed up from households for the increased use of electric vehicles. This can mitigate potential conflicts between the need to preserve biodiversity, nature, and Indigenous peoples' rights (Børstad et al. 2021), and the need for more renewable energy through windmill parks, solar parks or hydropower in Norway.

6 – Policy Directions Towards a Fair Consumption Space

The scenarios presented in this report show that current Norwegian lifestyles are incompatible with a fair transition to a stable and safe climate. This is not unique to Norway but applies to all high-income countries and well-off people everywhere. Stabilising the global climate in the coming decades, with as little additional warming as possible, will require a major reset of our societies, including the systems that shape our way of life.

This report's focus on lifestyles does not imply that individuals acting in their role as consumers can be expected to drive the transition to a decarbonised society. Collective decisions and innovative public policies are essential. This section suggests overarching directions for such policies.

Society's reorientation needs to be guided by a new vision, reflecting our collective priorities and the realities of a finite planet. High-income countries such as Norway, which have benefited for many decades from the availability of cheap and concentrated fossil energy, and where people enjoy high living standards and the safety of a robust welfare state, have a special responsibility and crucial role to play in this process.

To lay the foundation for a low-carbon transition, Norway should consider formulating a new national vision for what a fully decarbonised advanced welfare society could look like in the 21st century, and what role it should play in the wider world. Such a vision needs to be based on extensive citizen dialogues, informed by input from experts, to be as broadly supported as possible.

Norway's responsibility goes beyond rapidly reducing domestic emissions and shrinking its consumption footprint. It also involves assisting low-income countries in leapfrogging to zero-emission systems. However, such international co-operation must not be used as carbon offsets that legitimise continued high levels of emissions domestically. Furthermore, Norway's continued expansion of oil and gas extraction is a problem for its image as a climate leader and a responsible member of the global community.

Given the central role of lifestyles in driving the climate crisis, better data are needed on how people live, as well as better tools for assessing the related impacts. With more detailed and frequently updated information on lifestyles and consumption patterns and their impacts, public policies can be better targeted and more effective. Considering the skewed distribution of emissions, these data should be available by income group.

Box 3 Choice editing of high-impact consumption in Norway

Choice editing involves using specified criteria and standards to filter out unsuitable options in the range of products and services available. It is a common governance tool that has been used, for example, to reduce smoking substantially and to improve traffic safety. While traditional choice editing has been primarily through the filter of public safety, health, and security, in climate emergency governments need to incorporate and prioritize sustainability in their choice editing criteria (Akenji and Bengtsson 2022).

The following are a few examples of how policies based on choice editing could be applied in the three areas identified as high-impact options in Norway (section 4):

Replacing meat, especially red meat, as the main source of protein

- → Educate the public, especially children and youth, about preparing and eating healthy and sustainable food; engage well-known chefs in campaigns on climate-smart and healthy living and diets.
- → Ensure that all canteens in public institutions have regular "green days" and always offer well-composed plant-based meals; encourage private companies and restaurants to adopt similar programmes.
- → Support livestock and dairy farmers in shifting to plant production.
- → Provide space in or near cities for community-based farming, ensuring affordability also for low-income households.
- → Tax meat according to its climate impact while making climate-friendly food more affordable.

Reducing international flying and shifting to trains for long-distance private travel

- → Invest in rail infrastructure and train wagons, making trains more frequent, reliable and comfortable.
- → Promote and support local and regional tourism to enable staycations and shorter-distance vacations.
- → Require travel websites and agents to recommend rail transport options to customers.
- → Encourage private and public employers to offer additional days off for employees who vacation by train.
- → Ban frequent flyer loyalty programmes that encourage excessive travelling; instead, establish a frequent flyer levy, making flying progressively more expensive the more a person flies.
- → Ban advertising of long-distance tourism or require such messages to clearly indicate the climate impact of flying.
- → Restrict the opening of new flight routes from Norwegian airports and cap the number of flights, either on each route or in total.

Purchasing fewer new consumer goods

- → Establish rules for minimum expected lifetime for selected categories of goods.
- → Require producers to provide long-term warranties, to design products for easy repair, and to provide reasonably priced spare parts.
- → Make producers take responsibility for end-of-life collection and safe treatment (recycling where applicable) of their products.
- → Support "libraries of things" where residents can access a wide range of products for free or for a low fee.
- → Support repair services and second-hand businesses through reduced value-added tax (VAT).
- → Establish and support local meeting points for maintenance, repair and re-use.

Assessment tools also need to elucidate critical dependencies – the various ways in which Norwegian society and residents' lifestyles depend on ecosystems and resources around the world. Norway should consider strengthening its statistics system in this area and the capacity to conduct footprint analyses such as those presented in this report, ideally extended to cover impacts on biodiversity, freshwater depletion and other global environmental challenges.

Choice editing is one approach to policy making that is particularly relevant to lifestyle changes and a transition to a fair consumption space (see, for example: Akenji and Bengtsson 2022; Framtiden i våre hender and Hot or Cool Institute 2023). Choice editing means that policy makers *edit out* options for carbon-intensive lifestyles and consumption and *edit in* more desirable alternatives by making them more easily available, affordable and attractive while ensuring that everyone can *access* life's necessities. Such a three-pronged approach can shift the window of consumption opportunities towards lower-carbon options while safeguarding against socially undesirable effects.

The last point – ensuring that climate policies do not place additional burdens on low earners – is one of the keys to gaining public acceptance. There is strong evidence that fairness is the most important determinant of public acceptance of climate policies (Bergquist et al. 2022). An important part of the choice editing approach is the use of multiple policy tools to discourage or prevent problematic consumption options while enabling better options.

To be effective, policies addressing lifestyle carbon footprints need to reflect the considerable differences across income groups. A small share of the population has a much larger lifestyle carbon footprint than the average person. Targeting these lifestyle patterns specifically can greatly reduce overall emissions. Reducing carbon inequality is not only a matter of fairness and of gaining public acceptance for climate policies, but equally a matter of policy effectiveness. To make average emissions fall as needed, the disparity between high-emitters and low-emitters must be reduced.

Cities are crucial arenas for shaping lifestyles. The urban form and the available infrastructure for housing, transport, energy and communications have a major impact on residents' carbon footprints. This makes cities key to the climate transition. Local governments, with support from the national level if needed, should consider promoting experiments with new models for satisfying the needs and wants of urban residents, in ways that are less resource- and energy-intensive but still enable them to live healthy and fulfilling lives.

Local governments should also explore how changes in rules and economic incentives can enable lifestyles with lower carbon footprints, for example through:

→ Zoning regulations that promote diversity and proximity, with easy access to workplaces, schools and basic services.

→ Free or reduced prices for public transport in the winter, when active mobility is less attractive and many people rely on cars.

→ Additional taxes on newly built single-family homes above a certain size, which could be exempted for households with special needs.

→ Requirements for developers to demonstrate that proposed new buildings will have lower lifetime carbon emissions, including embodied emissions, than renovating existing ones.

→ High-profile demonstration projects showing how repurposing existing buildings can result in attractive mixed-purpose neighborhoods.

→ Removing public parking lots in city centers and reserving a share of the remaining spaces for car sharing.

→ Restricting construction of new holiday houses and imposing area neutrality as a leading principle for spatial planning. Providing for more public cabins and cabin sharing and affordable local holiday activities.

Finally, the government's approach to understanding and measuring the wellbeing and future prospects of Norwegians needs to factor in changes in the environment - both how Norwegian lifestyles contribute to climate breakdown and how the worsening impacts of climate change affect the country. As a complement to its current national climate targets, the government should establish short- and medium-term consumption-based emissions reduction targets. These targets should be monitored and outcomes reported every year, followed by revisions of the national climate strategy. These targets further need to be tied to equity and the achievement of shared wellbeing within the country. Unless there is a change of indicators by which the government measures success, there will be little change in government planning and investments.

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Annexes

Annexes are available at www.framtiden.no/fair-consumption-space-norway-annexes

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