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# DELIVERABLE 2.3

## EFFECTIVE OPTIONS FOR A TRANSITION TO 1.5° LIFESTYLES AT THE HOUSEHOLD LEVEL

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# EU 1.5° LIFESTYLES PROJECT SUMMARY

## POLICIES AND TOOLS FOR MAINSTREAMING 1.5 ° LIFESTYLES

*The four-year project (2021-2025) EU 1.5° Lifestyles is part of the European Union's Horizon 2020 research and innovation program. It involves researchers, practitioners as well as advisory board members from Finland, Hungary, Japan, Latvia, the Netherlands, Spain, Sweden, and Germany.*

**The project's main aim** is to foster the mainstreaming of lifestyles in accordance with the aspirational 1.5° climate target and to facilitate transformations sought by the Paris Agreement and the EU Green Deal. For this purpose, the project develops guidance for policy makers, intermediary actors and individuals based on scientific evidence on how lifestyle choices affect individual carbon footprints, and how political, economic, and social contexts enable or constrain shifts to sustainable lifestyles options.

**The uniqueness of the project approach** is that it recognises the importance of political acceptance for change, demonstrates potential contributions of individuals and households, and clearly articulates where limited agency by households needs intervention from policy and requires structural changes. In doing so, the EU 1.5 Lifestyles connects analyses of lifestyle perspectives at the household level in the four realms of nutrition, mobility, housing, and leisure with inquiries into relevant political, technological, economic and social structures at various levels of governance.

**To mainstream 1.5 degrees lifestyles**, the project develops practical recommendations, which can be integrated into everyday life as well as into EU and national policies. Along the way, the project provides stakeholders at national and EU levels with:

- o a quantification of climate and health impacts on shifting lifestyles in the EU and within three G20 countries (Indonesia, South Africa, Mexico);

- o an overview on potentials for and barriers to change at the household level, including options for transitioning to 1.5 degrees lifestyles as well as associated potential risks and opportunities;

- o an assessment of structural barriers and enablers for systemic transformations necessary for 1.5 degrees lifestyles;

- o assessments of scenarios for economic and welfare systems, and business models compatible with 1.5 degrees lifestyles.

To co-produce outputs and involve target group members, several stakeholder workshops are held, and instructive communication materials are disseminated, including concrete guidance for both citizens[1] and decision-makers on transitioning to 1.5 degrees lifestyles.

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[1] We refer to citizens instead of consumers in our work to underline the potential of people to contribute to democracy and the well-being of their communities instead of acting as a mere consumer of goods.

# EXECUTIVE SUMMARY

The 1.5°C target of the Paris Agreement can only be achieved via system change, with both decarbonisation of production and the adoption of low-carbon lifestyles at scale. The Horizon 2020 project "EU 1.5° Lifestyles" has provisionally quantified the potential of low-carbon lifestyle options for climate mitigation in 5 EU countries. To further understand the feasibility of such societal transformation for achieving the 1.5°C target, it is, however, fundamental to discuss these results and define reduction pathways by engaging with citizens. Citizens are the agents for change and can offer on-the-ground evidence of barriers and enablers of lifestyle changes, giving insights for effective solutions.

The EU 1.5° Lifestyles project recognises the central role of citizens in co-designing feasible climate mitigation pathways and envisioning a future where well-being is achieved in an equitable and environmentally sustainable way. This report focuses on citizens' engagement in the identification of effective options for a transition to 1.5°C lifestyles at the household level. First, it describes the analytical work of the project that has led to the preliminary quantification of greenhouse gas emission reduction potential of a list of lifestyle change options. After that, it describes how these results have been used in designing and creating a puzzle game for citizens' engagement. The Puzzle was used in two rounds of labs with citizens in the 5 countries of the project.

The first round of labs explored the level of acceptance of different lifestyle changes and the barriers faced by citizens adopting such changes. The results of the labs indicate higher acceptance for changes that imply less radical shifts in consumption behaviours and habits and, in particular, changes that primarily or solely imply a financial investment. The second round of labs explored positive co-benefits, as well as conflicts, arising from low-carbon lifestyle changes. The numerous health, economic, and social relationship benefits identified can be used as a starting point to design approaches to climate mitigation in line with well-being and other social goals. The conflict analysis was complemented by discussing solutions, at both the individual and system level, for upscaling the adoption of changes with high impact reduction potential. Such solutions can be enabled by a number of policy options discussed in the final section of this report.

Overall, this work provides fundamental indications for the further upscaling of low-carbon lifestyle options with strong potential for society-wide adoption. At the same time, it proposes approaches for designing ambitious policies and structural interventions to enable options with limited adoption rates but more substantial climate mitigation potential.

# INTRODUCTION

In 2015, 196 governments adopted the Paris Agreement to mitigate the worst effects of the climate crisis (United Nations, 2015). They set a collective goal of "limiting global warming to well below 2, preferably to 1.5°C above pre-industrial levels". The target was re-discussed in 2022 at COP27, where countries further stressed the urgency of accelerating action, recognised that the impacts of warming are already being felt in all parts of the world, and acknowledged that carbon budgets consistent with achieving the Paris Agreement goal are now small and depleting rapidly (United Nations, 2022).

Climate mitigation strategies are often framed around reducing emissions to achieve carbon neutrality. Net zero goals, however, tend to focus on technological solutions and efficiency improvements in production while downplaying the need for reductions in consumption and other lifestyle changes (Alfredsson et al., 2018). This is in contrast with the evidence that carbon emissions directly related to lifestyles account for around 70% of global emissions, including from housing, transport, food, and other goods and services (Ivanova et al., 2016). This significant share of the carbon budget is directly linked to our daily activities. Accordingly, achieving the 1.5°C target requires transitioning towards lower-carbon lifestyles at more sustainable consumption levels (Akenji et al., 2021). Realising this transition requires change at both individual and system levels.

The EU 1.5° Lifestyles project recognises the contributions of individuals and households, and clearly articulates where limited agency by households needs intervention from policy that unlocks structural changes. Analysing lifestyle perspectives at the household level in each main consumption domain is thus key to identifying pathways for a transition to 1.5° society. To do so, the project consortium works with European citizens and stakeholders to identify low-carbon lifestyles options and their reduction potentials, their rate of acceptance and/or rejection, and possible solutions to overcome implementation challenges at the household level.

In this vein, engaging with citizen is crucial to understand their preferences, barriers for adopting more sustainable lifestyles, and what they feel would be needed from individuals, policymakers and businesses for supporting sustainable lifestyles at the scale of the whole society. This was done in two rounds of 'citizen thinking labs' in all five case countries.

The first round focused on the participants' individual carbon footprints, the acceptance of a set of lifestyle options for its reduction, and potential barriers to these options as well as conditions for their acceptance. The second round of 'thinking labs' aimed to deepen the understanding of the requirements for the adoption of the lifestyle options, and to co-create solutions for increasing adoption.

This report describes the identification and assessment of 50 main lifestyle options for reducing carbon emissions. It then presents how these options analysed have been used to create the puzzle later used in the Citizen Thinking Labs. Finally, the report discusses the level of acceptance of the options emerging from engagement in the labs, the barriers encountered or perceived by the

citizens for adopting the options, and a set of policy recommendations informed by citizens' feedback.

# OPTIONS FOR A TRANSITION TO 1.5° LIFESTYLES AT THE HOUSEHOLD LEVEL

Lifestyle changes represent a practical and viable means of reducing individual emission levels. The primary goal of this project is to identify impactful lifestyle changes and ways in which they can be adopted into mainstream practices.

This chapter serves to elaborate on our process of identifying the set of lifestyle options used in the project, the impacts (i.e. emission reduction potential) associated with these options, the gap that these options would need to fill and how we assessed the acceptance of lifestyle changes through our Citizen Thinking Labs (henceforth: CTLs). Finally, we explain how we worked with citizens to identify conflicts and problems that could arise when trying to adopt high-impact lifestyle changes, along with the solutions they developed at both personal and structural levels.

## LIFESTYLE OPTIONS, IMPACTS & DECARBONISATION PATHWAYS

### Selecting 50 impactful Lifestyle options for the project

With the aim of identifying 50 of the most relevant low-carbon lifestyle options, we followed a three-stage research process. First, literature review was performed to compile a list of more than 500 low-carbon lifestyle options. These options were ranked in terms of their assumed impact level on carbon reduction into the categories low, medium and high. Second, we shortened this initial list by merging overlapping options and selecting only the most relevant options i.e. those options that would have a measurable (i.e. high or medium) impact on reducing carbon footprints of households. Third, this list was validated through international expert interviews.

The starting point for the literature review was the 1.5-degree lifestyles report by IGES et al., (2019), in which various lifestyle options were identified and linked to their potential (carbon) reduction impacts on the basis of peer-reviewed scientific literature. Following IGES et al., (2019), our research on low-carbon lifestyle options honed in on four main consumption domains: nutrition, mobility, housing, and leisure. Within each of these domains, we differentiated between options according to the sustainability strategy implied: efficiency, consistency or sufficiency. In other words, would options use less resources for the same output, would they use renewable or nature-friendly technologies, or would they reduce the demand for consumption.

In doing so, we aimed to identify different lifestyle options associated with each domain and the sustainability strategy required to successfully adopt these different options. Existing empirical studies and literature focusing on the five case countries of the project (Germany, Hungary, Latvia, Spain, Sweden) held special consideration and were complemented by international studies covering more than one country. Publications from 2015 onwards were selected to reflct more

recent policy initiatives, such as the Paris agreement, with some exceptions for especially relevant papers from before 2015. Scientific standards, such as relevance of journals or publications in the field, peer review etc. were considered for selecting studies from the databases Google Scholar, Web of Science, and Scopus. To operationalise the research process, the partners developed a set of 31 English search strings that were translated into each case country language and supplemented with other case country specific terms if needed. This included search terms and keywords like "alternative lifestyles", "climate neutral living" and "sustainable households".

On the basis of our literature review including more than 97 studies and articles, a list of more than 500 options for household shifts to 1.5-degree lifestyles was compiled.

We then rated the priority level (low, medium, or high) of the identified options for selection based on the extent to which adopting a lifestyle option would impact an individual's carbon footprint in daily life i.e. if an option would have a high, medium, or low impact in carbon reduction. The rating was done in a qualitative manner using the expert knowledge of our team (i.e. from the consortium partner who analysed the respective literature) and potential statements from the author(s) of the article, if available.

We also reformulated, specified or divided options that included more than one option (e.g. "I will eat organic and seasonal fruits and vegetables" to "I will eat organic fruit and vegetables" and "I will eat seasonal fruit and vegetables") in order to enable quantification of distinct options. Numerous options of the initial list were discarded in the selection process because they were deemed either impractical to reasonably quantify, given overlap with most other options (e.g. " I will shift household spending from goods to charitable donations and donate food, clothes, furniture.), only applicable to a very small percentage of the population (e.g. "I will refrain from using mega yachts"), or where the impact seemed to be too controversial or outside the scope of our approach (e.g. "I will have less/no children"). The goal was to arrive at a shortlist of about 50 options that could be used for next steps in the project (e.g. analysis of reduction potential, structural barriers, and rebound effects of the options).

The shortlist of 50 options was reviewed and ranked again according to their carbon reduction impact (low, medium, or high) in a consensus workshop within our consortium before being validated through semi-structured expert interviews with national and international experts in the field of sustainable consumption and practices.

In total, 30 interviews were conducted including 10 interviews on international and 20 interviews on case-country level. Interviewiees from the repective case countries were experts in the field of sustainable consumption and at least on one of the consumption fields of the project (e.g. mobility, nutrition, houring or leisure). In addition, some interviewees had additional expertise with specific groups or segments of the population (e.g. young people, elderly people, low-income households, rural communities or immigrants). With this choice we wanted to bring more divers perspectives into our selection and discussion of lifestyle options. The interviews on national level confirmed our choices of lifestyle options, provided useful remarks on case country specificities and sometimes prompted some ideas for slight rephrasing.

We also consulted experts regarding the likelihood of implementing various lifestyle options. However, the evaluation of their responses was inconclusive. In many instances, the same options were deemed both easy and difficult to implement by different experts, often within the same country. Numerous experts also noted that the likelihood of implementation depends on the

segment of the population or individual choices. Consequently, we did not differentiate between options based on the likelihood of adoption in the subsequent stages of our work.

The interviews on international level targeted experts that provided additional knowledge on topics like social cohesion, education and trend-forecasting. With that we were able to collect information on how specific lifestyle options would impact people's health, how they could affect social connection or what other side effects were to be expected. This was a valuable input that was later on used in other work packages (e.g. WP4).

The final step included stylistic editing of the options and making them usable for a puzzle game format as well as for communication activities within the project. You can find the final list of options including an explanation below in figure 1- figure 5.[2]

The main limitations of this methodology are the use of qualitative (instead of quantitative) criteria for selecting options and existing gaps in the available literature on lifestyle change in different countries.



Figure 1: Lifestyle options in the consumption domain Nutrition.

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[2] The final list of option is formulated as shown below. For the puzzle we reformulated the options slightly to provide a prompting tone to the players., e.g. "Avoid foodwaste at home" became "I will avoid foodwaste at home"

*Figure 2: Lifestyle options in the consumption domain Housing.*



*Figure 3: Lifestyle options in the consumption domain Mobility.*

*Figure 4: Lifestyle options in the consumption domain Leisure.*

*Figure 5: Lifestyle options in the consumption domain Other.*

## The puzzle game as a multi-purpose tool and gamification approach

In order to make the greenhouse gas reduction potential of the project's lifestyle options visible and to approach the topic in a playful way for citizens, a project version of the Climate Puzzle[3] was developed for each case country ([Nielsen, 2020](#)).

The project version of the puzzle uses the same game board and card sizes as the original puzzle but has been redesigned to align with the project's color identity. The options and their explanations printed on the cards, as well as their calculations, are exclusively based on the project's outcomes and are therefore entirely different from the original puzzle. The procedure for choosing the options and calculating their carbon footprint reduction potential is explained in detail in the following section ("[Integration of the Carbon Footprint Reduction Potential](#)").

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[3] The original Climate Puzzle was developed in an earlier 1.5-Degree Lifestyles project ([Lettenmeier et al., 2019](#)) to make the research results accessible to non-experts ([Nielsen, 2020](#); [www.climatepuzzle.fi](#)).

*Figure 6: Swedish, Latvian and Spanish pieces of the Climate Puzzle (from left to right).*
*The puzzle was produced in 5 European languages.*

We embraced this gamified approach for the CTLs because it:

o   provides the participants in an illustrative way a quick understanding of the climate change mitigation potential of different options,

o   relates the big issue of climate change to the participants' own life in an understandable and activating manner,

o   makes visible the preferences of participants towards different lifestyle carbon footprint reduction options, and thus

o   enables the participants to discuss the reasons behind their preferences and express their views on the structural changes required for mainstreaming 1.5-degree lifestyles.

During the CTLs the Climate Puzzle was used in the following way:

o   The participants' individual lifestyle carbon footprints were calculated prior to the workshops by Leiden University based on a lifestyle survey filled out by the participants and the carbon intensities in 2015 calculated in WP1 of the project (see also below in Chapter "*Calculation of (decarbonisation) pathways till 2030 and 2050*".

o   The participants chose a number of lifestyle options suitable for their personal situation from approximately 60 puzzle pieces of four different sizes. The size represents the option's greenhouse gas emissions reduction potential, in order to reduce the participants' personal carbon footprint to the 1.5-degree lifestyle target for 2030. In addition, the participants separated the options not chosen in different piles indicating options they didn't want to choose for personal reasons, they were not able to choose for structural reasons i.e. lack of adequate infrastructure, that were irrelevant for their personal lifestyle (e.g., they put aside cards suggesting to reduce car use if they did not own a car), or that they were implementing already.

o   Participants placed their chosen options on the board to see if they were sufficient to close the gap between their current footprint and the 2030 footprint target, still assuming carbon intensities from 2015. They then added the option cards to a timeline from the present to 2030 to create a personal climate plan.

o   The puzzle was used in pairs and played one after the other while the respective partner

served as a discussion and reflection counterpart during the process. Pairs were made up of participants with similar carbon footprints if possible. After the puzzle was run, the organisers interviewed the participants about their selections and reasoning. The results of these interviews were both utilised in the further course of the CTL to steer the discussion towards relevant options and in the further course of the project to distil barriers and enablers as well as conditions of acceptance for different options.

## Integration of the carbon footprint reduction potential of the lifestyle options in the puzzle game

Out of the 50 options selected in WP2, WP1 provisionally quantified the lifestyle carbon footprint reduction potential of 44 options for each case country building on the carbon footprint calculation methodology of the project (see also *"Calculation of (decarbonisation) pathways till 2030 and 2050"* chapter and Cap et al., 2024). The impacts in carbon footprint reduction of the lifestyle options were calculated for each case country of the project considering what changes they imply in terms of consumption levels and modes, as well as emission intensities. This also includes climate impacts along the supply chain. To illustrate*, a shift from a conventional car to public transportation* involved eliminating the greenhouse gas emissions linked to the manufacture of a personal passenger car and the fuels needed during its use and calculating the respective impact of personal use of public transport as a service.

The reduction potentials were then used to determine the size of the puzzle pieces, with higher impact options having bigger puzzle pieces. The options were rescaled to become more relevant or to offer the users several levels of implementing an option. For example, average amounts of flying hours (per person per year) can appear low because many people do not fly at all. Therefore, the puzzle also contains a card suggesting flying 18-20 hours less per year which is much higher than average but not especially high for frequent flyers (see Figure 12). The puzzle thus also provided cards in different sizes and impacts for certain options.

The options were grouped on cards of four colours and four sizes in the following way (see Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, Figure 13):

- o Mobility = orange, Nutrition = green, Housing = yellow, Leisure = blue

Reduction potential is indicated in the following ranges:

- o Small (S): 1 - 124 kg $CO_2$e / person / yr

- o Medium (M): 125 - 489 kg $CO_2$e / person / yr

- o Large (X): 490 - 1599 kg $CO_2$e / person / yr

- o Extra Large (XL): > 1600 kg $CO_2$e / person / yr

As either the carbon intensity or the typical consumption patterns of different products and services may differ from country to country, some options were available on cards of different sizes for different countries. For example, switching to renewable electricity is printed on an L-sized card for Germany, Spain and Hungary, on an M-sized card for Latvia, and on an S-sized card for Sweden, due to the differences in per-capita electricity consumption and current share of renewables in the electricity mix between these countries. Figures 9 to 13 represent typical puzzle piece sizes for the options.

The unit of each option is indicated on the cards in absolute terms (e.g., 50 km/person/day or 50 m$^2$/person). If the unit reads 50 km per person per day, it means that the impact of the card relates to one person who is, e.g., switching from fossil fueled car-driving to walking or cycling over a distance of 50 km per day (see Figure 7). If the person drove 60 km instead of 50 km, the impact would be a bit bigger. If a person is living with their family (e.g., 3 people) on 100 m$^2$ and switches their heating system from fossil to renewable, the impact per person would be smaller than depicted on the card because each person has roughly a living space of 33 m$^2$ (vs. 50 m$^2$ assumed on the card in Figure 7).
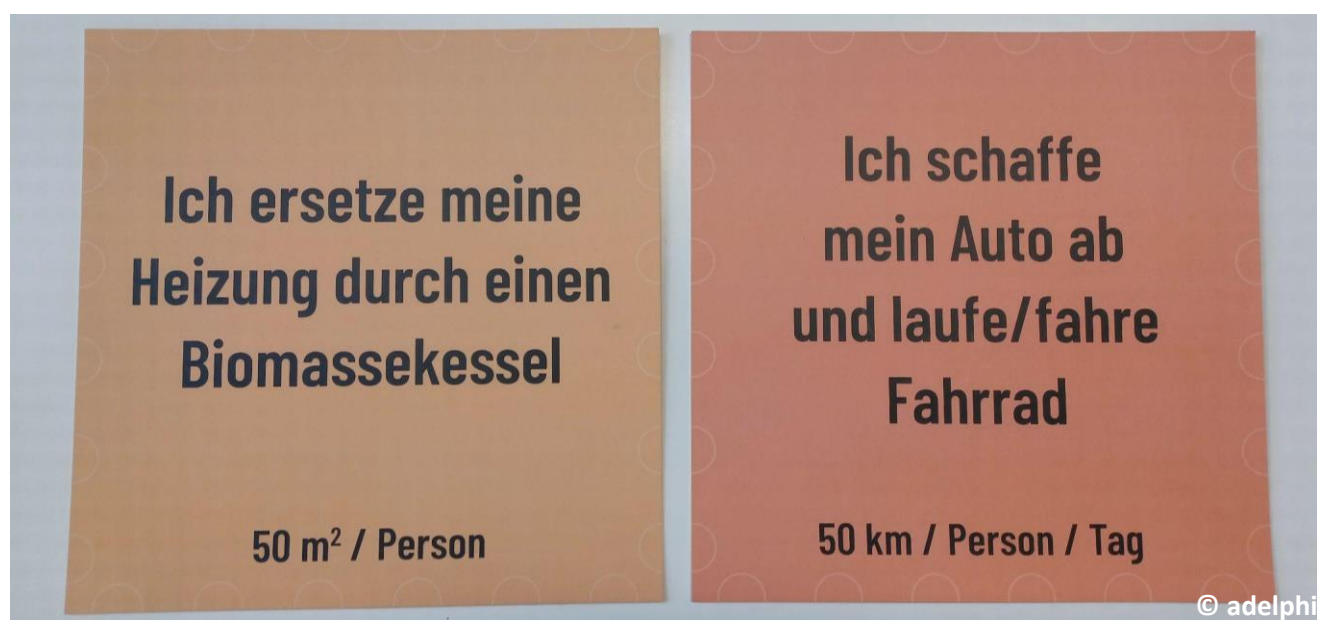


*Figure 7: XL-sized cards from the German puzzle version (from left to right):*
*First card reads "I will replace my heating system with a biomass boiler",*
*the second card reads "I will give up my car and walk or cycle instead".*

Some options were so broad and, therefore, overlapping with many other options that they were impractical to reasonably quantify. These options were added to the puzzle on round cards (see Figure 13 and right-hand photo in Figure 8). Figures 9 to 13 show the options used in the most representative size, i.e. the size that it had in either all or most of our case countries.

*Figure 8: Photos from the German CTL1 including the selection of options of an exemplary participant (left) and the timeline with climate plan of another participant (right).*



*Figure 9: Options and card sizes, symbolising the carbon reduction potential, in the consumption domain Nutrition.*

I will give up one big household device, such as a dryer
(1 device / person)

I will repair my ICT products and use them for longer

I will use second-hand ICT devices and pass old ones on

I will buy environmentally certified ICT products

I will save hot water
(3 - 5 liters / person /day)

I will install efficient lighting

I will switch to energy efficient household devices

I will share a household device with neighbors
(1 device / person)

I will replace my heating system with a biomass boiler
(30-50 m2 / person)

I will insulate my house
(30 - 50 m2 / person)

I will replace my heating system with a heat pump
(30 - 50 m2 / person)

I will switch to renewable electricity
(1000 kWh / person / year)

I will give up excess square meters
(15 – 20 m2 / person)

I will lower the room temperature of my home
(30 - 50 m2 / person)

I will install a solar thermal system

I will install my own solar panels
(400 – 1000 kWh / person / year)

I will choose shared housing
(–10-15 m2 / person)

I will reduce energy use with the help of smart devices
(30– 50 m2 / person)

*Figure 10: Options and card sizes, symbolising the carbon reduction potential, in the consumption domain Housing.*

I will give up my car and walk or cycle instead
(25 km - 50 km / person / day)

I will give up my car and walk or cycle instead
(10 - 15 km / person / day)

I will carpool
(20 - 40 km / person / day)

I will replace my car with the use of public transport
(15 - 50 km / person / day)

I will switch from a conventional car to an electric car
(5,000 - 12,000 km / person / year)

I will replace my SUV with a less CO2-intensive car
(7,000 - 12,000 km / person / year)

I will carpool
(5 - 15 km / person / year)

I will switch from a conventional
car to an electric car
(2,500 - 4,000 km / person / year)

When moving houses, I will move
closer to my workplace
(-10 km / person / workday)

I will switch to a smaller car
(5,000 - 10,000 km / person / year)

I will favor working in the
home office
(-5 km / person / workday)

I will replace my car by using a
car-sharing service
(5,000 -10,000 km / person / year)

I will switch to a
smaller car
(1,000 - 2,000 km /
person / year)

*Figure 11: Options and card sizes, symbolising the carbon reduction potential, in the consumption domain Mobility.*

I will fly less
(18 h - 20 h / person / year)

I will drive less for hobbies and leisure
(200 km / person / week)

I will fly less
(5 hours / person / year)

I will get a small(er) pet,
if I get a new one

I will go on vacation by train
instead of plane
(2,000 – 3,000 km / person / year)

I will drive less for hobbies
and leisure
(15 - 50 km / person / week)

I will reduce driving
during holiday trips
(1,500 – 2,000 km / person / year)

I will buy less clothes and shoes
(400 – 600 € / person / year)

I will buy pet food
with a smaller
carbon footprint

I will reduce
driving during
holiday trips
(300 - 1,000 km /
person / year)

*Figure 12: Options and card sizes, symbolising the carbon reduction potential, in the consumption domain Leisure.*

*Figure 13: Non-quantifiable options were printed on round cards (consumption domain Other).*

## Calculation of (decarbonisation) pathways till 2030 and 2050

Identifying gaps in carbon footprints could involve identifying a current individual carbon footprint and estimating a gap from a relevant target, as described in sections "*The puzzle game as a multipurpose tool and gamification approach*" and *"Integration of the carbon footprint reduction potential of the lifestyle options in the puzzle game"*. However, to best understand the dynamic nature of carbon footprints and greenhouse gas emissions, it is important to first understand how they may change over time. To understand the potential of lifestyle changes to reduce future carbon footprints, we created a scenario based on ambitious economic and technological developments, but without any explicit lifestyle change. This scenario model was created with SSP1-RCP1.9, an IPCC mitigation pathway used to assess potential emissions development. The SSP1-RCP1.9 scenario is built from socioeconomic variables aligned with sustainable development and an emissions trajectory in line with 1.5°C of warming (van Vuuren et al.,2017; Rogelj et al.,2018). The IMAGE implementation of this pathway was used to perturb supply-use tables from EXIOBASE. For more detailed methodological explanations, please see Cap et al. (2024).

Our scenario suggests that the household carbon footprints of our five case countries will decrease from the base year in 2030 and continue to decrease through 2050 (Figure 14). Germany has the largest 2015 footprint (9.5 tCO$_2$e/capita), and Hungary the smallest (4.9 tCO$_2$e/capita). By 2050, both Latvia and Spain have smaller footprints than Hungary, and Sweden's relatively smaller decrease leads to both Sweden and Germany having the same footprint (3.7 tCO$_2$e/capita). Latvia's footprint decreases by 62% from 2015 (5.8 tCO$_2$e/capita) to 2050 (2.2 tCO$_2$e/capita). Hungary's household carbon footprint shows the smallest decrease (35%) from 2015 to 2050 (3.2 tCO$_2$e/capita). The emissions reduction observed in this scenario is possible despite the increase in per-capita household consumption levels included.

While the technical potential for reduction seems promising, none of the five case countries will reach the 2030 target of 2.4 tCO$_2$e/capita or the 2050 target of 0.6 tCO$_2$e/capita target (Figure 14). The increased consumption and persisting unsustainable consumption patterns cannot be fully mitigated by sustainable technology, and thus cause excess emissions. Overshoots range from 0.8 tCO$_2$e/capita in Latvia in 2030 to 3.0 tCO$_2$e/capita in both Germany and Sweden in 2050.
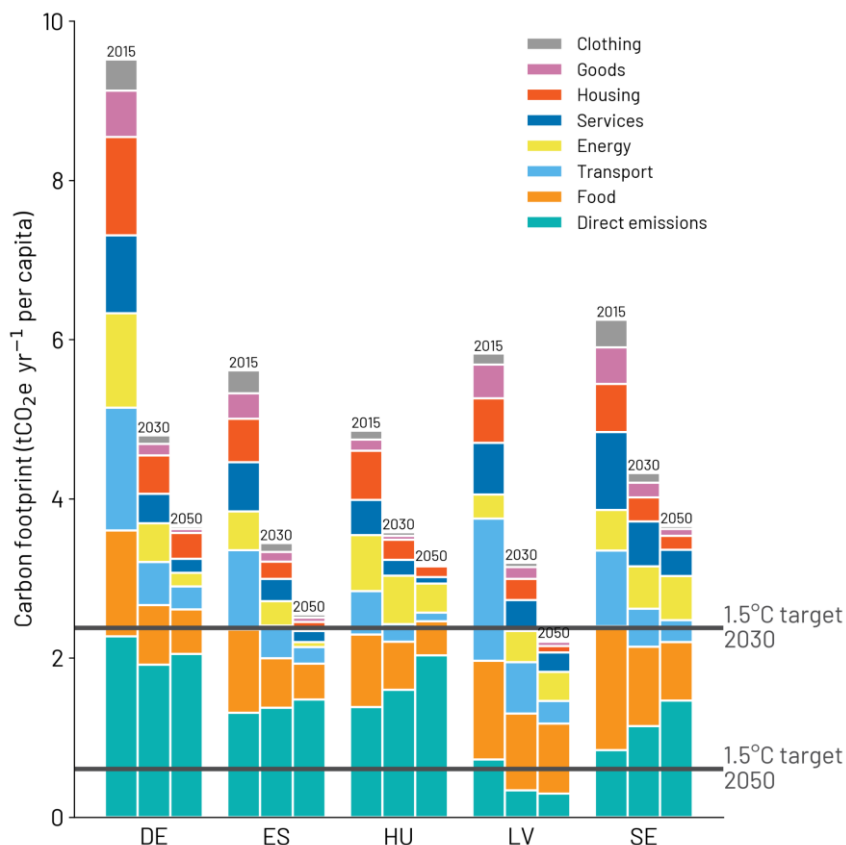
*Figure 14: Carbon footprints for the five case study countries in 2015, and household carbon footprints in 2030 and 2050
following a scenario with technological change without lifestyle change.
(Source: Cap, S.; et al. (2014)).*

The potential for reducing carbon footprints through technological advancements varies across countries, influenced by distinct economic structures, consumption patterns, and scenario parameters. Indirect emissions, linked to upstream processes of consumption activities, decline in this scenario. This reduction is attributed to technological shifts, including a transition towards predominantly renewable energy sources, adoption of more sustainable fuels for transportation in industry, and increased efficiency in various industries.

One of the factors driving indirect emissions reduction in our scenario is a decrease in emissions intensity. This term refers to the decrease in greenhouse gas emissions associated with one euro of household consumption. Across the case countries, the weighted emissions intensity of an average consumption portfolio decreases by more than 80% from 2015 to 2050. If it were possible to keep household consumption (expenditure) per capita constant with all else equal in the scenario, emissions upstream of household consumption theoretically could be reduced to less than one-fifth of the 2015 level. Of course, our scenario includes an increase in GDP per capita, which is partially enabled by improved economic productivity, which is assumed to proportionally increase household expenditure.

Conversely, direct emissions — resulting from households' combustion of fossil fuels for transportation, space heating, and cooking — show an upward trend in this scenario. Our scenario assumes that higher household income is associated with greater expenditure on fossil fuels. Direct emissions typically account for about one-fifth of a household carbon footprint in the EU. However,

that share doubles to an average of more than 40% of our case countries' household footprints by 2050. Here we observe that direct emissions increase every year in Spain, Hungary, and Sweden. In contrast, direct emissions decrease every year in Latvia, and in Germany, direct emissions decrease to their lowest level in 2030 before slightly rebounding in 2050.

Even with an overall reduction in emissions intensity, certain sectors are more difficult to decarbonise. This is reflected in our case countries' carbon footprints. For example, dairy is one of the top contributing product categories (out of 200) in all years for all countries except Spain. While per-capita emissions from dairy products will halve by 2050, the non-$CO_2$ emissions from the food and agriculture sector are relatively difficult to decarbonise, so dairy (and other animal-based foods) will remain a major contributor to Europe's carbon footprint if consumption does not change. In contrast, electricity from coal is a major contributor to the footprint in Germany, Spain, and Hungary, but emissions from coal-fired power plants are reduced by more than 95% per capita by 2050 due to the phase-out of coal in our scenario.

Consumption patterns at the country level influence future footprints. In our scenario, we assume that consumption will increase based on current patterns. This means that patterns such as the share of passenger distance travelled by car or the prevalence of district heating compared to gas boilers are maintained in 2030 and 2050. In this scenario, we assume that countries with heavy use of internal combustion engine vehicles, such as Germany, will continue to drive these vehicles in the future. The same is true for emissions from space heating, another key component of household energy use. District heating, which is popular in Sweden and Latvia, does not generate direct emissions at the household level like burning fossil fuels in an in-house boiler, which is more popular in the other case countries. So, this heating pattern is extrapolated into the future with this scenario, meaning that fewer space heated-related emissions need to be removed in these countries compared to the countries with a larger share of gas-heated homes.

Overall, our scenario demonstrates that lifestyle change will be an essential part of emission mitigation for the 1.5°C target in 2030 and 2050. Rapid technological change cannot eliminate excess emissions from increased consumption, but even maintaining 2015 levels of consumption at current patterns might not be enough to reduce household footprints to a 1.5°C-compatible level.

## CITIZEN THINKING LABS I: EVALUATING ACCEPTANCE AND REJECTION OF OPTIONS

### Aim & approach

CTLs are workshop formats in which small groups of 20-25 citizens come together to work on specific questions or problems and co-create solutions, which are then analysed and utilised in the course of the project.

This approach, which can be considered a social learning method, was chosen to include real citizens and learn from their views and experiences in a bottom-up process while simultaneously facilitating knowledge sharing. CTLs took place in 5 case countries (Germany, Hungary, Latvia, Spain and

Sweden) in the fall of 2022 and followed the same concept and guidelines in each case country.[4] The aim of the one-day long CTLs was to collect feedback from citizens on preferences for specific lifestyle options i.e. which lifestyle options would face high or low acceptance rates.  Additionally, we sought to understand *why* certain lifestyle options were rejected by participating citizens. Furthermore, we wished to collect feedback on conditions of acceptance for seemingly unpopular lifestyle changes by asking the question:  under what conditions would citizens accept those lifestyle options with low acceptance rates?

Establishing a trusting environment was essential for a successful workshop. Participants needed to feel at ease and inclined to openly and honestly share their private beliefs and perceived issues. Consequently, we deliberately maintained a small yet diverse sample of people in our labs.

# Recruitment

Recruitment was executed professionally by recruitment agencies in Germany, Latvia, Spain, and Sweden. In Hungary, the local case country partner oversaw the process. Recruiting took place according to a quota plan (cf. Annex 1) to ensure a representative demographic composition of participants in each case country in terms of age, gender, level of education, and rural or urban living situation.

Additionally, we aimed to ensure that at least 25% of participants recruited had high incomes since these are known to have a higher carbon footprint and hence need to adopt more lifestyle changes to reach the goal of 2.5t $CO_2$/capita by 2030[5]. Finally, to allow for variety in values and knowledge of the participants, we tried to ensure that a minimum of 25% of participants were not part of the ecologically aware or green milieu. This was operationalised differently in each case country. For instance, in Germany and Spain, it was done through different "test questions" during the recruiting, e.g., whether people had a "pronounced interest in environmental and climate protection" vs. a "neutral attitude" or whether they "did not show any particular interest in the topic." In Hungary, an additional question was asked referring to whether candidates were part of organisations working on sustainable lifestyles related topics.

In all countries, we recruited more participants than necessary to account for potential dropouts. Participants were compensated for their time, as we required their full-day involvement.

As indicated in below, a total of 121 citizens took part in the CTLs, with 22 participants from Germany, 24 from Hungary, 22 from Latvia, 24 from Spain, and 21 from Sweden.

*Table 1: Sociodemographic composition on participants of CTL1 per case country.*

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[4] Please refer to a more detailed methodology in our forthcoming journal article Vadovics, E., Richter, J., Tornow, M., Ozcelik, N., Coscieme, L., Lettenmeier, M., Csiki, E., Domröse, L., Cap, S., Losada Puente, L., Belousa, I., Scherer, L. (in review). Preferences, enablers, and barriers for 1.5°C lifestyle options –Findings from Citizen Thinking Labs in five EU countries.

[5] In some cases (e.g., in the Hungarian lab) when individual carbon footprints of the participants were around 2.5 tons already, the goal in the Climate Puzzle task was to reach 0.7 t by 2050.

| Socio-demographic data | Sub-category of sociode-mographic data | Germany (22 citizens) | Hungary (24 citizens) | Latvia (22 citizens) | Spain (24 citizens) | Sweden (21 citizens) |
|---|---|---|---|---|---|---|
| **Age** | 18-30 | 4 | 5 | 5 | 7 | 1 |
| | 31-50 | 6 | 10 | 9 | 10 | 6 |
| | over 50 | 12 | 9 | 8 | 7 | 14 |
| **Gender identity** | Men | 11 | 12 | 10 | 10 | 11 |
| | Women | 11 | 12 | 12 | 14 | 10 |
| | Non-binary | 0 | 0 | 0 | 0 | 0 |
| | Prefer not to respond | 0 | 0 | 0 | 0 | 0 |
| **Location** | Large City | 14 | 9 | 12 | 8 | 14 |
| | Suburb near a large city | 0 | | 2 | 1 | |
| | Small city or town | 6 | 5 | 5 | 10 | 7 |
| | Rural area | 2 | 10 | 3 | 5 | |
| **Household net income** | First quintile (Q1) | 12 | 2 | 9 | 15 | 8 |
| | Second quintile (Q2) | 2 | 7 | 3 | 5 | 5 |
| | Third quintile (Q3) | 6 | 7 | 3 | 3 | 2 |
| | Fourth quintile (Q4) | 1 | 4 | 5 | 1 | 2 |
| | Fifth quintile (Q5) | 1 | 3 | 2 | 0 | 4 |
| | Prefer not to respond | 0 | 1 | 0 | 0 | 0 |

*(The quintiles used for household net income (from low to high) can be found in Annex 2.)*

# Design of the day

Design of the labs involved various phases of design thinking, including learning and reflection, deliberation, and decision making. Central to the CTLs was the Climate Puzzle (cf. chapter *"The puzzle game as a multi-purpose tool and gamification approach"*), which required participants to select from the set of 44 quantified lifestyle options that would enable them to reduce their carbon footprint to 2.5t (or at least close to it).

The project team provided necessary input, covering project information, the carbon footprint calculation approach, and the significance and urgency of the 1.5°C climate goal.



*Figure 15: Participants and facilitators during step 1 & 2 "Introductions in a plenary setting"*
*of the CTL1 in Hungary (left) and Sweden (right).*

The pairs for the following round of the puzzle game were assembled so that both participants had a similar footprint. This was intentional to facilitate learning and honesty and to avoid "blaming" or judging a partner for having a higher carbon footprint.

Lifestyle options spanned the consumption domains of nutrition, housing, mobility, leisure, and others that had already been developed and quantified during the project thus far (cf. chapter *"Selecting 50 meaningful Lifestyle Options for our project"*).

The set of options according to consumption domain that were used in the puzzle can also be found in a downloadable format on the project's website, here: https://onepointfivelifestyles.eu/news/how-can-we-move-towards-15deg-living.

The climate puzzle ensured the engagement to the CTL exercises through helping citizens to visualise the lifestyle changes necessary and their associated impacts for reaching the individual 2.5t climate goal. Participant pairing- during which participants took turns in playing and supporting one another in the climate puzzle- helped to encourage and facilitate the discussion surrounding obstacles and enablers for implementing different lifestyle options (please refer to chapter *"The puzzle game as a multi-purpose tool and gamification approach"* to understand how the puzzle was played). The project team had trained a group of facilitators to answer questions from participants.

*Figure 16: Climate Puzzle board game in pairs (step 3), with facilitation in Hungary (left)
and Germany (right).*

Participants' preferences for lifestyle options, motivations for selecting or already implementing specific lifestyle options, as well as the reasons/obstacles for not selecting certain lifestyle options i.e. least preferred options, were documented by the project team for further analysis.

In the afternoon, participants were allocated to small groups to discuss conditions for accepting those options discarded from their implementation portfolio. Moderators were responsible for the final selection of options for discussion while paying attention to having a composition from different consumption domains.



*Figure 17: Facilitated group discussion (step 4) on conditions of acceptance for
the least preferred options in Hungary (left) and Spain (right).*

The project team gathered qualitative information on reasons for rejecting certain lifestyle options and strategies to overcome these barriers (i.e. conditions of acceptance for "unpopular" lifestyle changes). Data was documented in predefined templates in a uniform manner across all case countries for further analysis. More information on the methodology and proceedings used for the CTLs can be found in the forthcoming paper *Preferences, enablers, and barriers for 1.5°C lifestyle options – Findings from Citizen Thinking Labs in five EU countries by Vadovics et al., in review*.

An exemplary outline for our CTLs can be found below.

*Table 2: Example of the structure for the first round of CTLs.*

| TIME | CONTENT |
|---|---|
| **9:30 - 9:45 (15')** | *Arrival & Reception* |
| **9:45 - 10:15 (30')** | Welcome & Short Introduction to workshop<br>*(Step 1)* |
| **10:15 - 10:45 (30')** | Introduction for the day, including input on climate change, personal carbon footprint<br>*(Step 2)* |
| **10:45 - 11:00 (15')** | *Coffee break 1* |
| **11:00 - 12:30 (90')** | Climate Puzzle, part 1 (in pairs)<br>*(Step 3.a)* |
| **12:30 - 13:30 (60')** | *Lunch Break* |
| **13:30 - 14:30 (60')** | Climate Puzzle, part 2 (in pairs) followed by plotting most and least preferred options as a group<br>(Step 3.b) |
| **14:30 - 14:45 (15')** | *Coffee Break 2* |
| **14:45 - 16:45 (120')** | Group Discussions on overcoming barriers and conditions of acceptance for implementing least preferred options (including coffee break)<br>(Step 4) |
| **16:45 - 17:15 (30')** | Plenary workshop summary & closing |

## Results CTL1: Acceptance and barriers

Participants were tasked with determining whether they accepted a given option, meaning that they were willing to implement the corresponding lifestyle change either presently or in the future. Conversely, they could reject the option if they were not willing to implement the corresponding lifestyle change, or could render them "not relevant" if it was not applicable to their lifestyle situation (e.g. if they did not have a car, they would render all driving related options "not relevant"). The following tables show the acceptance rates for each of the LS options.[6] An acceptance rate of 100% means that all participants have either already adopted this option as part of their lifestyle or are willing to do so from now onwards. The lower the number, the lower the number of participants accepting that LS option.

*Table 3: Acceptance rate per country in the consumption domain Nutrition.*

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[6] The four non-quantifiable options in the domain "Other" were not part of this analysis.

| Nutrition | Average | Germany | Hungary | Latvia | Spain | Sweden |
|---|---|---|---|---|---|---|
| I will avoid food waste at home | **96.3%** | **90.9%** | **95.5%** | **95.2%** | **100.00%** | **100.0%** |
| I will eat only as much food as I need to stay healthy | **95.4%** | **100.0%** | **100.0%** | **95.2%** | **86.36%** | **95.2%** |
| I will drink tap water in place of bottled water | **85.8%** | 70.6% | **100.0%** | 68.4% | **95.45%** | **94.7%** |
| I will drink tap water instead of manufactured drinks | **82.9%** | 75.0% | **95.8%** | 72.2% | **90.48%** | **81.0%** |
| I will eat only seasonal vegetables and fruits | **78.2%** | 65.0% | **83.3%** | 71.4% | **91.30%** | **80.0%** |
| I will reduce animal-based products in my diet | 72.5% | **80.0%** | **90.5%** | 55.0% | **81.82%** | 55.0% |
| I will eat only organic vegetables and fruits | 63.0% | 35.0% | 72.7% | 47.4% | **90.00%** | 70.0% |
| I will replace red meat with white meat | 59.5% | 33.3% | 55.6% | 63.6% | 63.16% | **81.8%** |
| I will switch to a vegetarian diet and eat no more meat or fish | 25.1% | 30.0% | 31.8% | 5.0% | 20.83% | 38.1% |
| I will switch to a vegan diet | 14.4% | 22.7% | 26.1% | 9.5% | 4.17% | 9.5% |

Table 4: Acceptance rate per country in the consumption domain Mobility.

| Mobility | Average | Germany | Hungary | Latvia | Spain | Sweden |
|---|---|---|---|---|---|---|
| I will favour working at a home office | **76.9%** | 55.6% | **100.0%** | 45.5% | **83.33%** | **100.0%** |
| I will give up my car and walk or cycle instead | 68.4% | 22.2% | **80.0%** | 72.2% | **92.31%** | 75.0% |
| I will replace my car with the use of public transport | 62.0% | 58.3% | 60.0% | 64.7% | **76.92%** | 50.0% |
| I will switch from using a conventional car to an electric car | 59.7% | 10.0% | 66.7% | 70.6% | **76.19%** | 75.0% |
| When moving house, I will move closer to my workplace | 57.9% | 45.5% | 53.8% | 61.5% | 53.85% | 75.0% |
| I will carpool | 47.9% | 42.9% | 33.3% | **87.5%** | 38.46% | 37.5% |
| I will switch to using a smaller car | 47.7% | 62.5% | 45.5% | 38.5% | 37.50% | 54.5% |
| I will replace my SUV with a less $CO_2$-intensive car | 45.0% | 0.0% | 50.0% | 50.0% | 25.00% | **100.0%** |
| I will replace my car by using a car-sharing service | 43.5% | 33.3% | 66.7% | 40.0% | 27.27% | 50.0% |

*Table 5: Acceptance rate per country in the consumption domain Housing.*

| Housing | Average | Germany | Hungary | Latvia | Spain | Sweden |
|---|---|---|---|---|---|---|
| I will install efficient lighting | 100.0% | 100.0% | 100.0% | 100.0% | 100.00% | 100.0% |
| I will switch to using energy efficient household devices | 97.8% | 100.0% | 100.0% | 100.0% | 100.00% | 88.9% |
| I will insulate my house | 92.7% | 100.0% | 94.4% | 94.1% | 100.00% | 75.0% |
| I will save hot water | 88.9% | 80.0% | 83.3% | 95.5% | 95.65% | 90.0% |
| I will repair my ICT products and use them for longer | 87.3% | 80.0% | 91.7% | 85.0% | 95.45% | 84.2% |
| I will lower the room temperature of my home | 86.8% | 90.9% | 81.0% | 78.9% | 100.00% | 83.3% |
| I will install my own solar panels | 86.4% | 85.7% | 94.4% | 83.3% | 90.91% | 77.8% |
| I will reduce energy use with the help of smart devices | 84.3% | 83.3% | 77.3% | 88.2% | 95.00% | 77.8% |
| I will switch to renewable electricity | 83.7% | 65.0% | 100.0% | 83.3% | 91.67% | 78.6% |
| I will buy environmentally certified ICT products | 83.1% | 85.7% | 78.3% | 80.0% | 91.30% | 80.0% |
| I will use second-hand ICT devices and pass old ones on | 77.5% | 78.9% | 50.0% | 100.0% | 83.33% | 75.0% |
| I will install a solar thermal system | 66.8% | 66.7% | 41.2% | 63.6% | 100.00% | 62.5% |
| I will replace my heating system with a heat pump | 58.7% | 66.7% | 62.5% | 38.5% | 40.00% | 85.7% |
| I will replace my heating system with a biomass boiler | 55.8% | 50.0% | 45.5% | 33.3% | 100.00% | 50.0% |
| I will give up one big household device, such as a dryer | 53.4% | 38.5% | 60.0% | 52.9% | 73.68% | 41.7% |
| I will share a household device with my neighbours | 38.0% | 38.9% | 26.3% | 66.7% | 22.22% | 35.7% |
| I will give up excess square meters | 28.6% | 25.0% | 15.0% | 23.1% | 41.67% | 38.1% |
| I will choose shared housing | 20.6% | 12.5% | 10.5% | 27.8% | 33.33% | 19.0% |

*Table 6: Acceptance rate per country in the consumption domain Leisure.*

| Leisure | Average | Germany | Hungary | Latvia | Spain | Sweden |
|---|---|---|---|---|---|---|
| I will buy fewer clothes and shoes | 89.1% | 86.4% | 87.0% | 90.9% | 86.36% | 95.0% |
| I will drive less for my hobbies and leisure | 79.0% | 85.7% | 82.4% | 63.2% | 88.89% | 75.0% |
| I will reduce the driving associated with my holidays | 74.5% | 61.5% | 78.9% | 64.7% | 93.75% | 73.3% |
| I will fly less | 72.8% | 71.4% | 87.5% | 61.5% | 75.00% | 68.4% |
| I will buy pet food with a smaller carbon footprint | 69.0% | 50.0% | 73.3% | 75.0% | 75.00% | 71.4% |
| I will go on vacation by train instead of plane | 68.5% | 52.9% | 81.8% | 41.2% | 87.50% | 78.9% |
| I will get a small(er) pet, if I get a new one | 34.9% | 66.7% | 28.6% | 41.7% | 9.09% | 28.6% |

Analysing the results from participants across all countries, the following observations emerge. Overall, participants showed a tendency towards preferring options related to housing and leisure over those related to mobility and nutrition. They also preferred options that did not require significant lifestyle changes, with a greater willingness to adopt those options mainly requiring financial investment (Vadovics et al., in review).[7] Based on our data, given that most of the higher-impact lifestyle options inherently involve at least some change in lifestyle, it is unsurprising that these options were generally less attractive to participants in our CTLs.

Participants in the labs identified numerous barriers, both structural and personal, to the implementation of the LS options.

In the following section, we look in more detail at each consumption domain, highlighting which options were less accepted, and describing the barriers to their implementation identified by participants.

LS options that received a significant number of similar reasons or challenges across several case country labs are highlighted. These are the options for which participants from at least two of the five countries provided justifications for their low acceptance.

### Nutrition

Regarding the nutrition domain, participants in all labs highlighted significant barriers to adopting a vegetarian or vegan lifestyle. Personal reasons, particularly **health concerns**, led to the tendency of a low acceptance of these options. Especially in the German, Latvian, Spanish, and Swedish labs, this was largely due to **prevailing attitudes and social norms**. For German and Hungarian participants, the **association of meat with 'quality of life', 'enjoyment' and 'affluence'** was particularly strong. In Spain, cultural elements and social pressure significantly contributed to the popularity of meat and fish in their daily diet. Latvian and Swedish participants emphasised the **desire for full freedom of choice**.

In terms of structural barriers, German and Swedish participants identified economic challenges as a barrier to adopting new food options, citing the **high cost of vegetarian and vegan substitutes**. Similarly, Spanish participants highlighted the **impacts of vegan or vegan lifestyle on the local economy** i.e. seafood and fishing industry stand as primary economic sectors as an important barrier.

*Table 7: Main barriers mentioned by CTL1 participants for the consumption domain Nutrition.*

| Lifestyle Option | Barriers |
|---|---|
| **I will switch to a vegan/vegetarian diet** | Meat is seen as part of the quality of life and wellbeing |
| | Meat substitutes are too expensive |
| | Concerns for health or insufficient nutrition |

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[7] A more detailed discussion of those findings can be found in the paper: Vadovics, E., Richter, J., Tornow, M., Ozcelik, N., Coscieme, L., Lettenmeier, M., Csiki, E., Domröse, L., Cap, S., Losada Puente, L., Belousa, I., Scherer, L. (in review). Preferences, enablers, and barriers for 1.5°C lifestyle options –Findings from Citizen Thinking Labs in five EU countries.

 **Mobility**

For the mobility domain participants expressed a strong reluctance towards options linked to private car use, mainly due to **personal preferences**. The **convenience** associated with the use of cars in daily routines and for holidays emerged as a common factor among participants from Germany, Spain, and Sweden. Spanish participants emphasised the **importance of cars for potential emergencies**, attributing a sense of security and reassurance to their daily use. In Hungary, **cultural and normative aspects** rooted in a historical context contributed to the rejection of carpooling as a **"restriction of individual freedom"**.[8]

With regards to public transport and car-pooling, from a structural perspective, participants in all case countries pointed to **deficiencies in infrastructure, particularly in rural areas, and regulation**.

*Table 8: Main barriers mentioned by CTL1 participants for the consumption domain Mobility.*

| Lifestyle Option | Barriers |
|---|---|
| **I will switch from using a conventional car to an electric car** | Concerns about technical performance |
| | Concerns about the actual sustainability of electric cars |
| | Fear of excessive costs through electric cars |
| **I will replace my car with the use of public transport** | Convenience in everyday life and holidays |
| | Importance of cars for potential emergencies |
| | Lack of public transport network, especially in rural areas |

**Housing**

The consumption domain of housing revealed a number of personal and structural barriers. Concepts such as sharing household items or living space with neighbours were least accepted, mainly due to **concerns about disruption to daily routines and convenience**. Participants from Germany, Spain, and Sweden expressed **concerns about potential conflicts** arising from shared use of appliances and emphasised the importance of proper appliance handling.

Hungarian participants highlighted the **deeply ingrained social norm of owning a house or apartment** as a primary goal in life, making it a challenge to change this widespread perspective, especially because as a result there is a serious lack of houses and flats for rent.

Structurally, the tendency to be reluctant to downsize was due to **economic pressures in the housing market**. In Germany, Latvia, and Sweden, participants noted the **existing difficulty in securing new accommodation**, particularly in larger cities. This shortage made the transition to more affordable, smaller dwellings a significant financial hurdle. Latvia, in particular, highlighted

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[8] It must be noted that some participants confused the categorisation of options that are irrelevant for them with options that they do not want to implement hence, the number of participants that were against carpooling or public transport may be higher/smaller than indicated by the results.

**concerns about overcrowding in cities**, which exacerbated the challenges faced by citizens in finding adequate housing.

*Table 9: Main barriers mentioned by CTL1 participants for the consumption domain Housing.*

| Lifestyle Option | Barriers |
|---|---|
| **I will give up excess square metres** | Difficult to find affordable flats |
| | Economically tense situation in housing market |
| | Overcrowded cities |
| **I will choose shared housing** | Intimacy and privacy concerns |
| | Concerns for potential conflicts |
| | Norms and status of owning an own flat |
| **I will install a heat pump/solar panels/better insulation** | Property owners' legal responsibility for renovation |
| | Lack of funding or economic incentives |

**Leisure**

Regarding the consumption domain of leisure, various barriers were identified, particularly in relation to the substitution of air travel by rail. German and Latvian participants cited personal reasons, noting the link between travelling to warm, sunny destinations and their **personal well-being and recreation**. They believed that these destinations were only accessible by air, which led to their reluctance to give up air travel. In addition, there was a **sense of injustice** among participants - they were reluctant to stop flying while others continued to do so. **Family ties** emerged as a significant barrier to reducing air travel, particularly in the German and Swedish discussions. Structurally, participants from Germany, Spain, Latvia, and Sweden identified barriers related to train services, which they described as **inflexible, unreliable, and prohibitively expensive**.

Table 10: Main barriers mentioned by CTL1 participants for the consumption domain Leisure.

| Lifestyle Option | Barriers |
|---|---|
| **I will go on holiday by train instead of plane** | Preference to travel to warm and sunny destinations |
| | Personal well-being and recreation |
| | Feeling of injustice: other people still fly too |
| | Lack of regulations |
| | Personal family links |

## Results CTL1: Conditions for acceptance

In the afternoon session of our first CTL, participants discussed the conditions for acceptance of the above-mentioned options. By defining what would have to change at a structural and personal level in order for them to accept the options that had previously been neglected.

**Nutrition**

Participants defined various conditions related to nutritional lifestyle options. At a structural level, participants in several countries mentioned that reluctance to adopt sustainable diets could be reduced by **introducing more transparent organic labels**, **enforcing additional regulations** and **improving consumer information**. Specific requests from Hungarian, Latvian and Swedish participants included the need for more information on a wide range of vegan and vegetarian dishes. For example, Swedish participants recommended that **vegan bloggers could play a role in inspiring citizens with innovative recipes, potentially influencing cultural and social norms**.

To overcome the financial barrier associated with expensive vegan and vegetarian substitutes, especially compared to meat, participants from Germany and Sweden emphasised the importance of **making these alternatives more affordable**. In Spain, participants suggested **government subsidies for fresh and local produce**, for example in school canteens, to make plant-based diets more accessible to a wider segment of society as well as increase knowledge on plant-based diets beginning from the early ages. In a similar way, participants in Hungary suggested **lower taxes for fruits and vegetables**, and **higher for meat and dairy**, the opposite to what is the situation currently. In addition, participants from Hungary, Latvia and Sweden suggested that **supermarkets and restaurants should actively promote a wider range of plant-based alternatives**.

Table 11: Main conditions of acceptance mentioned by CTL1 participants for LS options
in the consumption domain Nutrition.

| Lifestyle Option | Conditions for acceptance |
|---|---|
| **I will switch to a vegan/vegetarian diet** | Cheaper prices for meat substitutes |
| | Better promotion of the variety of vegetarian/vegan alternatives and dishes |
| | More transparent organic labels and consumer information |
| | Better availability of meat alternatives in supermarkets and restaurants |

## Mobility

With regard to public transport and car-sharing, participants in all case countries identified a lack of sufficient framework conditions and regulations at a structural level, especially in rural areas. **Improving the availability, reliability and safety of public transport** was identified as a key factor in promoting increased use. In Sweden, participants highlighted the potential of **enabling remote working** in various professions as a viable solution to reduce daily dependence on private cars.

Participants in Spain recommended the **introduction of additional regulations** to encourage the use of smaller, more fuel-efficient vehicles, coupled with **improved dissemination of information on fuel consumption**. Similarly, participants from Latvia suggested an **increased focus on providing information on the environmental and economic benefits** of electric cars.

*Table 12: Main conditions of acceptance mentioned by CTL1 participants for LS options in the consumption domain Mobility.*

| Lifestyle Option | Conditions for acceptance |
|---|---|
| **I will switch from using a conventional car to an electric car** | Sharing and promotion of new user experiences |
| | Accepting societal trends and norms |
| | Lower total costs of ownership (also enabled by government subsidies) |
| **I will replace my car with the use of public transport** | Enabling remote working in more professions |
| | Better settings and regulations for public transport and carpooling |

## Housing

To make it more attractive to move to smaller dwellings when circumstances change, Lab participants from Germany, Hungary and Latvia recommended the **implementation of technological advances, such as the creation of housing exchange platforms**. They also suggested **removing administrative barriers** to housing exchanges and other market arrangements to help

more citizens find housing that suits their current personal and economic circumstances.

Regarding housing options that require technological investment, German participants stressed that it wasn't their legal responsibility as tenants to install certain features, such as solar panels or heat pumps. Instead, they suggested that **property owners should take responsibility for installing technical equipment related to heating and electricity or improving insulation**.[9]

In the Latvian CTL, one suggestion was to **increase government support** in the form of regulations for changing heating systems. Similarly, in Spanish and Hungarian CTLs, the participants reported the necessity of **more and better economic support** for housing improvements since they require high financial investment.

To mitigate the challenge of limited living space per person or per apartment, participants from Hungary, Sweden and Germany suggested **making public spaces more accessible and inclusive for all citizens**. For example, by making these spaces usable for activities that would typically take place at home, such as cooking in outdoor kitchens or socialising with friends. Latvian and Swedish lab participants recommended the **development and promotion of decent quality shared and multi-generational housing** as a solution to the lack of awareness of successful shared housing projects.

*Table 13: Main conditions for acceptance mentioned by CTL1 participants for LS options in the consumption domain Housing.*

| Lifestyle Option | Conditions for acceptance |
|---|---|
| **I will give up excess square metres** | Setup and promotion of information regarding exchange platforms for flats |
| | Lifting administrative hurdles for flat exchanges |
| | Make public space more accessible and inclusive |
| **I will choose shared housing** | Make public space more accessible and inclusive |
| | Develop and promote decent quality shared and multigenerational housing |
| **I will install a heat pump/solar panels/better insulation** | Introduce economic incentives |
| | Promote home improvements |
| | Increase government support for heating system change through regulations and settings |

**Leisure**

At a structural level, participants from Germany, Spain, Latvia and Sweden identified barriers related to train services, which they described as inflexible, unreliable and too costly. In proposing solutions, participants from these countries expressed their willingness to increase their use of trains if certain

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[9] The majority of respondents in Germany were tenants rather than homeowners, and therefore had limited influence on improving insulation, changing the heating system or installing solar panels.

improvements were made, such as **increasing the reliability of train services**, providing **economic incentives through reduced prices**, and **introducing better luggage services for trains**.

To address what they called "false incentives", participants from Latvia and Germany suggested **improving pan-European rail infrastructure and ticketing systems**. **Stricter regulations limiting air travel** were suggested by participants and seen as a valid solution to reduce the perceived sense of social injustice.

It was also recommended to **raise awareness of the high environmental impact of air travel** in general.

*Table 14: Main conditions for acceptance mentioned by CTL1 participants for LS options in the consumption domain Leisure.*

| Lifestyle Option | Conditions for acceptance |
|---|---|
| **I will go on holiday by train instead of plane** | More regulations to restrict air travel |
| | Train trips should become more convenient and cheaper |
| | Lower prices and better reliability of trains |
| | Improvement of Pan-European railway infrastructure and tickets |

No significant relation was found between the participants socio-demographic profile (their age, gender, income, and size of location) and their carbon footprint and levels of acceptance of different options.

## Limitations of results

Due to time constraints, it was not possible to discuss all 44 options during the afternoon session. Consequently, information on motivations and conditions of acceptance was only collected for a limited subset of our options.

The focus was on collecting barriers and enablers for options that many participants rejected ("do not want to do"), options that have a high-carbon impact, or options that participants felt motivated to talk about. The number of discussed options varied, with Sweden covering four (one in each consumption domain) and Hungary covering eight options.

This, taken together with the relatively small sample of 121 citizens across all CTLs, means that the resulting dataset on personal and structural barriers, as well as conditions of acceptance, is non-representative and cannot be generalised to all EU countries or even one of the case countries.

In the morning session, where preferences for certain options were identified, we assume that some degree of social desirability influenced option choices of players. For example, people might not have admitted that they do certain things (therefore describing them as irrelevant to them, e.g., driving SUVs, flying a lot) and due to peer pressure, they may have "overestimated" the actions they would be willing to implement in the future.

Finally, the introduction and framing of the topic of climate change e.g. the description of its urgency has slightly differed between countries, i.e. in the first lab in Germany the project team did a more

neutral framing and then recommended an emphasis on urgency in the following labs to stimulate choices and potentially higher acceptance rates of options (including difficult ones) by participants.

# CITIZEN THINKING LABS II: A DEEPER DIVE INTO SOLUTIONS FOR IMPLEMENTING HIGH-IMPACT OPTIONS

## Aim & approach

The aim of the second round of labs was to further substantiate insights from the first round of CTLs and delve deeper into the requirements necessary to adopt the needed lifestyle changes rendering them more acceptable and fostering quicker implementation.

Our focus was particularly on exploring the **"problems"** that citizens might have in envisioning life in a 1.5° world, where many lifestyle changes were already feasible and had been adopted. Moreover, we strived to engage citizens in identifying solutions and to overcome problems on both **a personal and structural level.**

Lastly, we sought to extract insights into citizens' **positive associations towards a 1.5° world.**

Similar to the first round of CTL, we conceived a one-day workshop along the approach of social learning with the aim to include real citizens and learn from their views and experiences in a bottom-up process while simultaneously facilitating knowledge sharing among the citizens.

We again, incorporated elements of reflection, discussion, and co-creation, which was preempted by a phase of introductory activities   and creating a safe space[10].

To maintain consistency in outcomes among the various CTLs in the five case countries, all labs followed a unified methodology developed by adelphi and the project team. Additionally, adelphi arranged training workshops for national implementers to further standardise the process.

The day commenced with a visualisation exercise imagining the world in 2030. The scenario is based on a document by David Pfau and was adjusted to our purposes by the project team (cf. Annex 3). A similar scenario was used during the STLs in WP3. In this scenario, global net emissions had been significantly reduced to 2.5t of carbon equivalents per person per year. The text utilised for the exercise included lifestyle changes encompassing the domains of nutrition, housing, mobility, and leisure. The set of lifestyle changes included in the scenario predominantly featured those that have a high emission reduction potential, i.e. if implemented to the extent indicated, would enable individuals to reduce their carbon footprint to 2.5 t by 2030.[11] We chose the 2030 horizon (and lifestyle options with enough impact to allow citizens to reach the 2.5 t goal by 2030) because this time frame is much more relatable for citizens than the 2050 time frame. While some country variations regarding impact exist for the lifestyle options chosen, we aimed to generate comparable results for potential conflicts and their solutions across case countries, hence it made sence to use

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[10] A short video clip about the CTL in Hungary can be found here: https://onepointfivelifestyles.eu/news/stakeholder-thinking-lab-2-hungary

[11] We have double checked with WP1 that the chosen set of (high-impact) options add up to (or go beyond) the  emission reduction required.

the same set of lifestyle options for our different case countries

Hence the following lifestyle options were included in the scenario[12]:

1. I will lower the room temperature of my home (2 degree)
2. I will choose shared housing (i.e. live smaller) [36m2 per person for Germany]
3. I will insulate my house
4. I will install my own solar panels
5. I will go on vacation by train instead of plane [fly 50% less per year per person in Germany]
6. I will drive less for my hobbies and leisure [drive 50% less per person per year in Germany]
7. I will switch from using a conventional car to an electric car
8. I will avoid food waste at home
9. I will reduce animal-based products in my diet (80%)
10. I will eat only as much food as I need to stay healthy
11. When moving house, I will move closer to my workplace (50% closer)
12. I will carpool

The scenario also includes lifestyle options for which acceptance rates where low in our first CTL. However, we had collected so called "conditions of acceptance" for these options and included them in the scenario document thus potentially increasing the probability of their acceptance. For example, in our first German CTL participants stated that in order to accept carpooling as a lifestyle choice, they would require accessible and easy-to-use carpooling platforms to find their co-passenger or co-driver. For living on less square metres, participants expressed that swapping big apartments for smaller ones would require a rent cap and that the process of swapping needed to be simple i.e. with no or limited bureaucratic hurdles. As a result, these "conditions" of acceptance (carpooling platform, rent cap etc.) were included in our visions of a 2030 world.
The objective was to ascertain whether, given these required conditions, citizens would indeed adopt high-impact lifestyle changes, and if not, identify additional barriers.

The 2030 world scenario was pre-recorded on tape and presented to participants from the case country either through playback or live reading during a "dream journey session" at the start of the workshop day. Participants closed their eyes and were systematically guided through the session in steps. Subsequently, a dedicated time for individual reflection followed, during which participants composed letters to real or imaginary friends, contemplating their thoughts on the scenario. The participants were guided by the following questions:

- o How do you feel about this vision (positive/negative)? What has improved or negatively affected your life?

- o What was missing in the vision? Which additional changes can you see for the world in

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[12] In the scenario we had included country specific data on the reduction of living space or mileage driven for leisure and hobbies. The example included here represents the figures of the German scenario.

2030?

o   Where do you see risks/conflict/tension?

The purpose of the reflection phase was to prompt participants to contemplate the envisioned future and to help facilitate group discussion later on.

Participants were organised by the local facilitators into four small groups, each covering two consumption domains resulting in the following groups with 3-5 participants each:

- o   Nutrition & Leisure
- o   Nutrition & Mobility
- o   Housing & Mobility
- o   Housing & Leisure

Within these groups, they discussed the positive and negative reactions to envisioned lifestyle changes in their 2030 lives.

Participants were also asked to identify anticipated problems, conflicts, or inconveniences in the 2030 world they had envisioned. Moderators guided each group, documenting the outcomes on whiteboards.



*Figure 18: Morning session in the Hungarian CTL2: Participants discussing positive changes (on green sticky notes) and mention potential conflicts (pink sticky notes).*

During the lunch break, the moderators consolidated findings from the morning session, potentially incorporating examples of problems uncovered from the initial CTL, and displayed them on a new board.

In the afternoon session, participants discussed ideas for solutions to these problems at both personal (What can I as an individual/a household do?) and structural (What do politics and society need to do?) levels.



*Figure 19: Afternoon session in Swedish CTL2: Moderators collecting solutions to conflicts on individual and structural level.*

*Figure 20: Moderators collecting solutions to conflicts (pink sticky notes)*
*on individual and structural level (green and yellow sticky notes) in the German CTL2.*

The data was then documented using pre-prepared templates in all case countries to facilitate further analysis.

An outline for our CTL II can be found below.

*Table 15: Example of the structure for the second round of CTLs.*

| TIME | CONTENT |
|------|---------|
| **09:00-09:30 (30')** | Arrival, Reception and Breakfast |
| **09:30-10:45 (75`)** | Introduction for the day & Getting to know each other Welcome; Triades; Introduction |
| **10:45-11:05 (20')** | Introduction for the day, including input on climate change, personal carbon footprint |
| **11:05-11:20 (15`)** | Break |
| **11:20-13:00 (100')** | Vision - Part 1: Vision of 2030 <br><br> Individual Reflection <br> Group Discussion on positive and negative aspects of the vision (4 groups of 4-5 people) |

| | |
|---|---|
| **13:00-14:00 (60`)** | Lunch |
| **14:00-15:30 (90')** | Vision - Part 2: Tensions/conflicts and Solution pathways<br><br>Group Discussion on conflicts and solutions for element of the vision (4 groups of 4-5 people) |
| **15:30-15:45 (15')** | Break |
| **15:45-16:20 (35`)** | Gallery Walk (visiting and exchanging about whiteboards of other groups) |
| **16:20- ca.17:00 (30-40')** | Final round of impressions and feedback, and Goodbye |

# Recruitment

We aimed at recruiting 20 to maximum 25 participants per case country. This was done with the help of recruitment agencies as in the previous CTL, with the exception of Hungary that recruited their participants directly from the previous CTLs, and through working with NGOs in the field.

As before, the sample to be recruited was to match the demographic situation of each case country in terms of age, gender, level of education, and rural or urban living situation and income via marginal distribution.
We also applied one additional quota, which was used in the last CTL as well, i.e. at least 25% of participants should not have a pronounced interest in environmental and climate protection.

We recruited more participants than necessary to account for potential dropouts and we compensated participants for their time in the 8-hour lab. However, last-minute dropouts have affected the target number of participants, resulting in a smaller sample size than anticipated (e.g. 17 instead of 20 participants in Germany). The table below shows the socio-demographic characteristics of the lab participants.

*Table 16: Socio-Demographic composition of CTL2 participants per case country.*

| Socio-demographic data | Sub-category of sociodemographic data | Germany (17 citizens) | Hungary (16 citizens) | Latvia (19 citizens) | Spain (18 citizens) | Sweden (19 citizens) |
|---|---|---|---|---|---|---|
| **Age** | 18-30 | 2 | 3 | 3 | 7 | 2 |
| | 31-50 | 6 | 9 | 8 | 10 | 7 |
| | over 50 | 9 | 4 | 8 | 1 | 10 |
| **Gender identity** | Men | 9 | 6 | 9 | 8 | 9 |
| | Women | 8 | 10 | 10 | 10 | 10 |
| | Non-binary | 0 | 0 | 0 | 0 | 0 |
| | Prefer not to respond | 0 | 0 | 0 | 0 | 0 |
| **Location** | Large City | 10 | 8 | 12 | 10 | 13 |
| | Suburb near a large city | 0 | 3 | | 2 | |
| | Small city or town | 5 | 3 | 7 | 2 | 6 |
| | Rural area | 2 | 2 | | 4 | |
| **Household net income** [13] | Low Income | 7 | 3 | 13 | 4 | 13 |
| | Middle Income | 6 | 7 | 4 | 9 | |
| | High Income | 4 | 3 | 0 | 5 | 6 |
| | I would prefer not to say | 0 | 3 | 2 | 0 | 0 |

*(The quintiles used for household net income (from low to high) can be found in Annex 2).*

# Results CTL2: Perceived benefits

In the following, we provide examples of **positive reactions or outcomes and perceived improvements to life** that participants envisioned when confronted with the 1.5° world vision.[13]

In order to summarise the findings and provide a better overview, we have included tables at the beginning of each consumption domain section, showing the benefits mentioned by the participants in **at least three case countries**. The texts following the tables provide the results in more detail for each case country individually.

**Nutrition:**

*Table 17: Perceived benefits in the consumption domain Nutrition,*
*that were mentioned by participants in at least three case countries.*

| Lifestyle Option(s) | Perceived benefits/life improvements |
|---|---|
| • *I will avoid food waste at home*<br>• *I will reduce animal-based products in my diet (80%)*<br>• *I will eat only as much food as I need to stay healthy* | • *improved physical health*<br>• *financial benefits*<br>• *improved quality of food (less pharmaceuticals / chemicals)* |

*Comments from German participants:*
In their reflection on the vision in the domain of nutrition, some of the participants highlighted the crucial necessity of reducing food waste or overconsumption at home, particularly concerning meat. They shared the belief that this practice could also help them **reduce health risks such as diabetes** and **high blood pressure.**

Those who reflected reducing their consumption of animal-based products envisioned various positive impacts. They noted that this could potentially **make them feel healthier** due to increased vegetable intake. They would **expect shifts in personal habits and tastes over time** to gradually adapt to a vegetarian diet. For some participants **meat could become more exclusive, heightening the enjoyment** and **appreciation** of food. Some participants acknowledged that despite the importance of meat in cultural and religious practices like Eid al-Adha, they would strive to reduce its consumption. Other participants pointed out that mainstreaming vegetarian alternatives could potentially help **reduce its prices**. Additionally, they believed that decentralising production of animal-based products could **enhance overall food quality while improving animal welfare**, thereby **lessening feelings of guilt** associated with consumption. Besides, this could also lead to a **reduced content of harmful substances,** like pharmaceuticals, in animal-based products.

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[13] Participants often also had negative reactions to some of our options or to parts of the visions. Those will be presented in a chapter further down.

In summary, these changes in dietary habits could emphasise **health benefits, cultural considerations, and the potential for enhanced food quality and animal welfare**.

*Comments from Hungarian participants:*
In the perspectives shared from Hungary, participants envisioned various potential scenarios regarding the reduction of animal-based products. Generally, they anticipated that this shift could lead to **healthier and happier individuals.** Additionally, they imagined a future where **large-scale meat production disappears**, replaced by more common domestic livestock practices like raising chickens in better conditions (i.e. free-range and organic).

Moreover, participants anticipated the availability of **good quality, affordable, and chemical-free food**, foreseeing potential positive impacts on **both financial aspects and physical health.**

Furthermore, there was anticipation of a rise in prominence of the vegan lifestyle, potentially **fostering social cohesion.** Participants envisioned a scenario where land previously dedicated to animal-based food production transitions to cultivating vegetables on a smaller, more human scale. Participants hypothesised this would lead to a shift from machinery to human labour, which was considered to be a potential societal development by participants.

Regarding food waste reduction, participants recommended the widespread use of applications that facilitate the **exchange of still-good quality leftover food** between businesses and households. Additionally, at a more structural level, new service and business models should be developed to enable the flow of food from those with surplus to those in need.

*Comments from Latvian participants:*
Participants from Latvia expressed that reducing animal-based products could bring several benefits that **positively will impact their quality of life.**
Some of the benefits were connected with **diversifying their diet**, e.g., awareness of the diversity of vegetarian dishes and availability of organic food in public cafes and restaurants. Participants also felt positively about possible **improvement of their health** when switching to a plant-based diet.

Some benefits were **nature protection** oriented, e.g., preservation of pesticide-free agricultural land and diversity of species (especially bees) that **increase well-being**.
Also, benefits that **support small and local farming** were shared, e.g., growing of food for private needs and support for local food producers. These benefits reflect changes in personal habits and in attitude towards the local community.
As the area of change that characterises satisfaction, **sustainable waste management**, e.g., zero-waste production and circularity to avoid waste, was also mentioned.

*Comments from Spanish participants:*
Participants from Spain anticipated various positive effects, including **reduced food production, transport, packaging,** and **overall environmental impact** as a beneficial result of the initiative to

curb food waste. Additionally, they expect that waste reduction would lead to **more effective waste management practices** including that individuals would reuse **waste for composting purposes at their homes.** Participants also expect **people to become more mindful when shopping**, not just choosing products because they look good. This change could mean **less waste** in supermarkets.

Regarding the reduction of animal-based products, participants foresaw the **elimination of large-scale farms** as a positive change. This shift is expected to **reduce the environmental impact of livestock production and transportation**, leading to **increased consumption of vegetables** which would create **financial benefits** to households. They also highlighted potential positive **physical health impacts by reducing the consumption of meat.**

*Comments from Swedish participants:*
Participants from Sweden highlighted a collective effort aimed at minimising food waste by 2030, **involving not just individuals but also grocery stores**. This approach is seen as **potentially beneficial financially**, allowing for the purchase of products nearing expiration dates or with damaged packaging to **limit waste**.

Moreover, many participants envisioned a potential decrease in their consumption of animal products, highlighting potential **positive impacts on their physical health**. This transition could also present an **opportunity for individuals to learn more about cooking vegetarian meals**.

*Conclusion*:
Results from the Swedish and German Citizen Thinking Labs highlighted health benefits and a collective approach to reducing food waste. Participants from these countries showed a willingness to adopt vegetarian alternatives, while German participants considered cultural factors, and Swedish participants highlighted the opportunity to improve their cooking skills. Participants from Hungary and Latvia shared a vision of supporting local farming and reducing large-scale meat production (this last point was also highlighted by participants in Spain). They anticipated societal changes and emphasised environmental and community benefits.
Spanish and Swedish participants focused on reducing environmental impacts and improving waste management and shared a vision of collective action involving individuals and businesses. Overall, while each country had a unique perspective, common themes included the health benefits of reducing animal-based products and a collective effort towards minimising food waste.

**Mobility:**

*Table 18: Perceived benefits in the consumption domain Mobility,*
*that were mentioned by participants in at least three case countries.*

| Lifestyle Option(s) | Perceived benefits/life improvements |
|---|---|
| • **When moving house, I will move closer to my workplace (50% closer)**<br>• **I will carpool**<br>• **I will switch from using a conventional car to an electric car** | • *Improved wellbeing (air quality, noise levels)*<br>• *Increase in available leisure time*<br>• *Improved safety*<br>• *Increased social cohesion* |

*Comments from German participants:*

Moving houses to live closer to the workplace was not commented on positively by the German lab participants. However, participants highlighted **financial savings** as a significant potential benefit of carpooling. Meanwhile, those viewing the switch to electric cars positively noted that it could help **reduce noise levels, promoting better mental health, as well as decrease emissions for improved physical health**. Additionally, the transition to electric cars could lead to **reduced risk of oil spills, contributing to a positive sense of security,** as participants pointed out.

*Comments from Hungarian participants:*

Hungarian participants envisioned a future where carpooling, especially with self-driving cars, could significantly **impact personal safety and leisure time**. They expressed trust in self-driving cars and anticipated punctuality, which could **save time for more leisure activities.**
Moreover, they foresaw a reduction in car usage, **improving personal comfort** through new routes, timetables, and car-sharing services like the already-existing Hungarian platform, "Oszkár".
Transitioning to electric cars is anticipated to **enhance air quality,** while moving closer to work holds potential for a **better quality of life**. This includes the possibility of working from home, **reducing commuting time and offering more flexibility**. Participants also envisioned workplaces being relocated closer to residential areas, potentially motivating companies through tax cuts to hire people living nearby and reducing the need for commuting. They also foresaw **a shift in mentality towards self-employment** and reduced working hours for **more engagement in green activities.**

*Comments from Latvian participants:*

In the context of mobility Latvian participants emphasised the positive impact of reducing private car ownership. The prospect of **smoother traffic**, achieved through fewer cars on the roads, resonated positively. Participants associated this change with a **heightened sense of personal comfort,** citing benefits such as a **more relaxed commuting experience**, enhanced **safety**, and **time efficiency**. The overarching sentiment was that the reduction of traffic congestion **contributes significantly to overall well-being.**

*Comments from Spanish participants:*

Spanish participants reported carpooling would offer **new ways of travelling** for work and leisure. Specifically, they consider the **social cohesion** as a positive impact of carpooling since it allows **interactions between fellow passengers** while commuting to work. However, participants highlighted that it is important to have a more positive attitude when individuals deal with more passengers.

Similarly, moving closer to their workplace was associated with positive impacts on **personal comfort** as well as to **the society and community** since individuals would not be **spending too much time commuting to work**. On the one hand, the participants highlighted that this would **increase remote working**, on the other hand, this can lead to **concentrations in certain areas of the city or town that are close to workplaces.**
Last but not least, Spanish participants envisioned a future in which switching electric cars would **reduce the conventional fueled vehicles**; however, participants highlighted the changes would occur only by a certain part of the society.

*Comments from Swedish participants:*
When discussing the switch to electric cars Sweden's participants highlighted the financial advantage of driving a good electric car compared to a diesel one and the notable developments in car battery technology that would be fostered through electric cars.
Regarding carpooling, they pointed out its positive aspects, emphasising its potential as a **comfortable, money-saving and socially engaging option**.

*Conclusion*:
The Swedish and German Thinking Labs highlighted the benefits of electric cars, focusing on environmental and financial advantages. The German participants appreciated the potential for noise reduction and the Swedish participants appreciated the technological progress.
Hungarian and Spanish participants recognised the potential of carpooling to improve social interaction and personal convenience. They also saw moving closer to work as a means of improving quality of life, although Spain noted possible problems with urban concentration. Participants in Hungary, Latvia and Sweden emphasised the benefits of reducing private car ownership for smoother traffic and improved personal comfort.

**Housing:**

*Table 19: Perceived benefits in the consumption domain Housing,
that were mentioned by participants in at least three case countries.*

| Lifestyle Option(s) | Perceived benefits/life improvements |
|---|---|
| ● *I will lower the room temperature of my home (2 degrees)*<br>● *I will choose shared housing (ie. live smaller)*<br>● *I will insulate my house*<br>● *I will install my own solar panels* | ● *Financial savings*<br>● *Fostering social cohesion*<br>● *Improved personal comfort at home* |

*Comments from German participants:*
Participants pondering changes in the housing domain anticipate various potential positive impacts. Those contemplating insulating their homes or constructing well-isolated residences foresee **reduced heating costs, which could potentially free up funds for leisure activities such as visiting cinemas** or cafes. The installation of solar panels is viewed as a potential **enhancement to personal comfort**, with expectations of seamless functioning and no reported issues.

Furthermore, reducing living space by subletting rooms or residing in apartments with shared spaces was anticipated to bring about various positive effects. This could potentially enhance the certainty to have a roof over one's head by **reducing market tension** and making **more living space available**. Some envisioned an **improved quality of life** through **increased flexibility in apartment adjustments**, **fostering social cohesion by expanding social circles and community interactions.** Moreover, individuals considering reducing their living space through room subletting anticipate **potential financial benefits**, leading to reduced expenses in general.

Overall, these anticipated changes reflect a variety of potential positive outcomes in terms of **financial savings, potential improvements in personal comfort, security, quality of life, and community engagement** within the housing domain.

*Comments from Hungarian participants:*
Hungarian participants envisioned that reducing living spaces could lead to positive changes like communal areas for various purposes. This includes shared laundry spaces, joint areas for the elderly, and apartment buildings near train tracks, **allowing financial savings and improved living conditions.** Smaller living spaces could **encourage energy efficiency** and a shift towards a **more shared and efficient lifestyle**, impacting personal habits positively.
As for the options related to improving the energy efficiency of homes (insulation, solar panels, etc.), participants highlighted the **improved quality of life** (e.g. increased thermal comfort, less health issues) and the **positive feeling** of having contributed to reducing the overall carbon footprint as important benefits.

*Comments from Latvian participants:*

In the pursuit of sustainability and modern technologies, the participants expressed a positive response to the installation of solar panels. This change was associated with **higher energy independence** and a sense of accomplishment, **contributing positively to the quality of life**. The installation of solar panels was perceived as a tangible step toward making a **positive impact on the environment** and ensuring a sustainable future for generations to come.

The positives seen in **reducing living space** were **reduced utility costs** and **less time spent on household chores** leading to **improvements in personal comfort and time and money that can be spent elsewhere**. Some participants also welcomed the potential change in people's willingness to build smaller houses as an improvement in people's ability to live happy lives with less.

The proposal for **additional public space**, designed as places of encounter, was met with positivity. Participants saw this change as contributing to an **enhanced quality of life**. The envisioned expansion of public spaces for interaction and socialising was regarded as a positive transformation that could significantly **improve the overall urban living experience** and **broader social cohesion**.

*Comments from Spanish participants:*
Participants from Spain anticipate several positive impacts regarding the low-carbon lifestyle options in the housing consumption domain. First and foremost, reducing room temperature by 2°C would increase energy **savings.** The participants highlighted that most of the time the homes are **overheated,** and they find it quite uncomfortable so reducing room temperature would **improve personal comfort at home**. Secondly, energy savings would lead to **financial savings** due to using a blanket instead of turning on the heating.
Reducing living space by sharing with others, for example with family members, was associated with **reduction in housing prices (economic)** and, therefore, **better access to accommodation**. However, the participants highlighted that reducing living space to 30m2 would be **challenging** for individuals who **do not share and live alone**. Another benefit was indicated by the participants that sharing a home with family would **reduce the number of solar panels and heating pumps**.
Last but not least, the Spanish participants predicted positive impacts of installing solar panels due to **better access to sustainable energy**. For instance, using and/or producing clean energy would **reduce pollution** i.e. positive impact on the environment and society. Furthermore, it would **tackle energy poverty** because households would consume their very own energy (e.g. prosumers) and therefore would have a positive impact on **personal safety**.

*Comments from Swedish participants:*
For the participants from Sweden, home improvements like better insulation or installing solar panels meant lowering indoor temperatures and **enjoying financial benefits.** For instance, having solar panels reduces fees and allows for the selling of electricity. Living in smaller spaces also means cheaper rent.

*Conclusion*:
German, Latvian and Spanish participants showed a strong interest in solar panels. While German participants emphasised the improvement of personal comfort, Latvian and Spanish participants emphasised the environmental benefits and energy independence.

Participants in the Hungarian and Latvian Citizen Thinking Labs highlighted the benefits of community living and shared spaces, focusing on the social and economic benefits of reduced living space. Results from the Swedish and German Thinking Labs showed that participants emphasised financial savings and personal comfort from home improvements such as insulation and solar panels. Overall, while each country has its own unique perspective, there are common themes such as the importance of energy efficiency, financial savings and community benefits.

**Leisure:**

*Table 20: Perceived benefits in the consumption domain Leisure,*
*that were mentioned by participants in at least three case countries.*

| Lifestyle Option(s) | Perceived benefits/life improvements |
|---|---|
| • *I will go on vacation by train instead of plane* <br> • *I will drive less for my hobbies and leisure* | • *Health benefits & ease of stress* <br> • *Increase in available leisure time* <br> • *Financial savings* |

*Comments from German participants:*
Individuals consider driving less for leisure and hobbies in combination with carpooling as a means to **gaining additional free time**. For example, this change would enable parents to share driving responsibilities for activities, ultimately granting them extra leisure time.

Similarly, individuals reflecting on train travel for vacations over planes foresaw potential **positive financial benefits**. They anticipated that if planes were no longer the most economical choice, opting for the train could potentially save them money, posing a more cost-effective travel option by 2030.

Furthermore, vacationers considering trains instead of planes anticipate **potential improvements in physical health**. They expect spending less time indoors in front of their computers and more time outdoors in public spaces while choosing more local vacations near home, enjoying the health advantages of **increased exposure to sunlight** and engaging in outdoor activities.

In summary, these potential changes in transportation habits—such as reducing leisure driving, considering carpooling, and preferring train travel over planes—could lead to **increased free time, potential financial savings through alternative travel choices, and potentially enhanced physical well-being by encouraging more outdoor activities.**

*Comments from Hungarian participants:*
Hungarian participants saw benefits in driving less for leisure. This could give them **extra time for meaningful activities like DIY projects.** They also believed having fewer leisure options can **ease stress, especially for kids** who would spend less time travelling and doing after-school activities.

Regarding the reduction of air travel, participants emphasised the advantages of slower modes of transportation. By travelling to more distant locations by train instead of flying, they would have **more time** to spend there and thus gain a **better understanding and experience** of the places. Furthermore, if combined with a reduction in working hours resulting in more vacation time, they would have the opportunity to spend even longer periods of time travelling.

Furthermore, participants reflected on the Leisure and Housing domains and proposed housing exchange programmes to encourage local holidays. For instance, city dwellers could stay in the country by exchanging homes with rural residents.

*Comments from Latvian participants:*

Participants in Latvia saw travelling locally as **economic investment in the country** and **improvement of place attachment**. Choosing a train instead of plane for leisure travel was especially acknowledged by families as it is **more affordable**. Improvement of public transport connections and opportunities to travel by train were seen as **bettering of travel accessibility**. Driving less for hobbies was not only seen as **improving the quality of urban air** and, thus - **better health**, but as related to people thinking more about their own impact on urban air and leading to **higher involvement of urban residents in proposing improvements in public space**. Some participants stated that reducing the time spent driving for leisure or their hobbies would **improve mental as well as physical health** as they would be spending more time in nature.

*Comments from Spanish participants:*

The Spanish participants predicted **pollution reduction** and **price increases in flight tickets** as a change that would be led by going on vacation by train instead of plane. Specifically, price increases in flight tickets would entail positive **environmental impacts** because a handful of individuals would be able to afford the flight tickets which would reduce the air travel. Besides, the participants highlighted that due to **travelling by train or bus** they would have **more time and opportunity** to see the surroundings until they arrive at their final destination which is associated with **improvements in the availability of leisure time**.

Driving less for leisure and hobbies was associated with diverse positive impacts on **mental health, environment and society**. For instance, participants stated that there would be **less traffic jams and delays** which would **reduce the stress** in your daily life because private car use for commuting would reduce. Furthermore, less private car use would reduce the private car demand and its production, therefore, it would have **positive environmental and societal impacts** in a way that there would be **less need for roads and more green spaces** for leisure. Lastly, the use of **public transport, car sharing and cycling would be increasing** due to less private car use which would also **reduce emissions**.

*Comments from Swedish participants:*

Participants in Sweden acknowledged that opting for train travel instead of flights could provide an **intriguing adventure story to share with others.**

*Conclusion*:

A common theme among participants from Latvia and Spain is the emphasis on the health and

environmental benefits of reducing car use and increasing train use. These countries see local travel as a way to improve well-being and environmental quality. German participants emphasised mainly personal benefits, such as financial advantages and extra leisure time, when considering the changes brought about by this lifestyle change.

Hungarian and Latvian participants share a focus on the cultural and economic benefits of local travel, with both emphasising deeper connections to places and communities through slower travel and local engagement. While the unique cultural and social context of each country influences their views, there is a common recognition of the benefits of reducing reliance on cars and planes for leisure, with potential positive impacts on health, the environment and community engagement.

## Results CTL2: Conflicts and solutions

Achieving the 1.5°C climate goal requires both lifestyle changes at scale and an increasing adoption rate of lifestyle options with high carbon reduction potential. As highlighted in the results from the CTLs, options mostly implying **financial investment** (e.g. install efficient lighting) tend to be more preferred than options implying **actual changes in daily practices and choices** (e.g. switching to a vegan diet). However, the latter set of options generally show a much higher reduction potential, thus their implementation becomes crucial for achieving the societal transformation we need.

Low-carbon reduction options that emerged as widely preferred present opportunities to be adopted horizontally throughout society, thus maximising their impact and substantially contributing to the achievement of climate targets in the short/medium term, with a possibly limited effort. High carbon reduction options with low preference need to be the focus of **ambitious policy measures** and other structural change drivers as they are required to fill the large gaps between current carbon footprints and the available carbon budget by 2030.

For envisioning the transition to sustainable lifestyles, it is useful to discuss conflicts faced by citizens adopting **high carbon reduction options**. Furthermore, options that imply **actual changes to lifestyle**, as opposed to mostly a financial investment, offer opportunities for a broader and richer discussion on conflicts and solutions to their adoption.

Conflicts have been identified by participants at CTL2 and are described in this section with regards to **the most impactful option to reduce emissions** for each consumption domain and **considering only options that imply actual lifestyle changes**. While high impact and lifestyle change largely go together, there is one notable exception considering housing. For housing, the two most impactful options are "I will replace my heating system with a biomass boiler" and "I will insulate my house" (and related options). These options imply a financial investment more than changes in lifestyles and their impact tend to be more **variable across countries**. For this reason, with regards to housing we will focus in this section on the third highest option **"I will give up excess square metres".**

After identifying conflict, the CTL2 participants were asked to propose solutions to these on the personal level and signal required changes at the structural/policy level. These two different sets of solutions reflect the dual need for changes individuals can adopt today, without having to wait for system-level action, and the structural level changes needed at scale (Akenji et al., 2021; Cap et al.,

2024).

Below, a subset of conflicts and solutions identified by citizens are discussed per consumption domain. These conflicts and solutions have been selected excluding the ones presented by only one citizen, and grouping together similar ones. More in detail, the following methodological steps were followed: 1) the reporting documents from CTL2 for each country were grouped together in a single document, 2) this document was filtered for selecting conflicts and solutions for the most impactful option to reduce emissions for each consumption domain (i.e. excluding all less impactful options), 3) conflicts and solutions, either reported as a short description or a more descriptive text, were grouped into categories such as "economic", "health", "skills" -based conflicts and solutions, to give some examples, 4) the categories populated by more than one entry are highlighted below.

**Nutrition**

From the CTLs emerged that the most impactful nutrition action - reduce animal-based products - generates numerous conflicts in terms of understanding what constitutes a healthy diet, changing personal tastes, lacking of cooking skills (and time for acquiring those skills), negative economic effects on food systems, resistance from farmers and meat eaters, balancing climate impacts of meat and other environmental impacts of meat alternatives, and high cost of meat alternatives. Some of these conflicts suggest a lack of clear information as to what constitutes a healthy diet and the fact that it does not require large amounts of meat, but instead a variety of foods from different food groups in appropriate proportions. The conflicts also signal uncertainty on what are the environmental and socio-economic impacts of mainstreaming low meat and dairy diets. This calls for improving access to truthful information on nutrition and food sustainability, while managing misinformation spread by meat-industry, reinforced by advocacy programs and influencers, as increasingly documented in the media (Fassler 2023). The list of conflicts also suggests some lack of access to attractive and affordable meat and dairy alternatives, which calls for an expansion of vegetarian and vegan produce and food services.

*Table 21: Conflicts for the most impactful options in the consumption domain Nutrition, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Conflicts |
|---|---|
| • *I will reduce animal-based products in my diet (80%)* | • *Lack of information on what constitutes a healthy diet*<br>• *Personal taste (i.e. I love meat)*<br>• *Lack of cooking skills (and time for acquiring skills)*<br>• *Perceived negative economic impacts on food systems*<br>• *Resistance from farmers and meat eaters*<br>• *Meat alternatives also have environmental impacts*<br>• *Meat alternatives are too expensive* |

Solutions discussed at the personal level include to get informed and engaged in activities to better understand what actually constitutes a healthy diet and learn to prepare more delicious vegetarian

and vegan recipes, to grow your own vegetables in your garden, and to use similar seasoning to meat dishes to cook vegetarian dishes. These solutions point to available information to those who have sufficient knowledge to sift through reputable/inaccurate sources, and available initiatives and actions that one could undertake if motivated and if time and skills allow.

System-level solutions proposed by participants were focussed on education and editing in/out more sustainable/meat-based food options, including by means of economic incentives/disincentives. On education, some solutions discussed were to include the topic of vegetarian diets in formal education, informing on nutritional values, health benefits, and how to prepare delicious vegetarian food. In the same vein, participants proposed to include visiting programs to local farms and vegetable gardens for students, and teaching respect for animals. Participants proposed public investment in development of tasty meat alternatives, public programs to lend for free land for vegetable gardens, tax deductions for vegan food, increase in prices of meat and quotas for meat products in supermarkets and grocery stores, economic support to family farms. Overall, participants recognised the need for deeper policy intervention to more actively promote vegetarian and vegan food and regulate a market seen as favouring the meat industry. Participants highlighted the role of education in shaping values and preference around food choices, as well as the need for incentives to both producers and consumers of meat-alternatives.

*Table 22: Individual and system-level solutions for adopting the most impactful options in the consumption domain Nutrition, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Solutions (individual) | Solutions (system) |
|---|---|---|
| • *I will reduce animal-based products in my diet (80%)* | • *Learn about healthy diets*<br>• *Acquire vegetarian/vegan cooking skills*<br>• *Grow your own vegetables* | • *Promote "food literacy" in schools (nutritional/health benefits, reduced climate impact, animal rights, cooking classes, visits to local farms)*<br>• *Investments in meat alternatives*<br>• *Lend free land for vegetable gardens*<br>• *Reduce taxes on vegan food*<br>• *Increase meat prices (e.g. carbon tax)*<br>• *Set quotas for meat products in supermarkets*<br>• *Economic support to family farms* |

**Mobility**

On mobility, the most impactful actions referred to carpooling, give up your car, drive less and use more public transport - all entailing less or not driving at all. Another high-impact mobility option discussed was switching from a conventional to an electric car. For options entailing less driving, CTL2 participants highlighted conflicts due to the low reliability of carpooling and public transport (especially from cities), and loss of independence to fulfil mobility needs. Other conflicts highlighted regard the use of public spaces for cars instead of green/playing areas, and an intergenerational conflict with current generations not being able to afford what previous generations could (e.g. driving a car). Switching to an electric car was discussed as too expensive, and electric cars are seen as less reliable due to the more limited range and lack of charging stations. Fewer participants highlighted battery disposal as an issue, others noted that emission reductions from switching to electric cars depend on the fossil fuel share in the national energy mix.

*Table 23: Conflicts for the most impactful options in the consumption domain Mobility, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Conflicts |
|---|---|
| • *I will carpool*<br>• *I will give up my car and walk or cycle instead*<br>• *I will drive less and use more public transport*<br>• *I will switch from using a conventional car to an electric car* | • *Carpooling, public transport, and electric cars are less reliable (delays, shared vehicles not available, lack of charging stations, limited range)*<br>• *Loss of independence*<br>• *Electric cars are too expensive* |

At the individual level, solutions proposed largely focussed on better planning of daily activities, including more detailed planning of public transport routes, or keeping a change of clothes at work if you switch to cycling. In terms of structural solutions, participants provided more varied feedback including improved infrastructure and more financial incentives to public transport and electric cars. Participants expressed that improving infrastructure and expanding the use of digital tools for public mobility make public transport more accessible and dependable, contributing to changing perceptions and values around owning a car versus using public transport. On electric cars, participants suggested new regulation for new and renovated buildings to include charging stations, and the implementation of parking policies that prioritise electric vehicles. Overall, on mobility, participants seemed to be more limited when it comes to individual action, mostly because of inaccessible (too expensive) and non-dependable alternatives to conventional cars. A major structural change was then flagged in the labs with regards to sustainable mobility, or in other words, participants signalled there is little they can do within current structures to reduce their mobility carbon footprint.

*Table 24: Individual and system-level solutions for adopting the most impactful options in the consumption domain Mobility, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Solutions (individual) | Solutions (system) |
|---|---|---|
| • *I will carpool*<br>• *I will give up my car and walk or cycle instead*<br>• *I will drive less and use more public transport*<br>• *I will switch from using a conventional car to an electric car* | • *Better planning for daily activities*<br>• *Keep a change of clothes at work* | • *Improve infrastructures*<br>• *Expand the use of digital tools for public mobility*<br>• *Change aspirations and values on owning a car*<br>• *Equip new buildings with e-cars charging stations*<br>• *Prioritize parking spaces for e-cars* |

**Housing**

On housing, the most impactful actions implying actual changes in lifestyle is reducing per-capita living space, either by house sharing or moving to a smaller flat/house. Most participants across the CTL2 expressed they are not willing to move to a smaller place mostly as a matter of personal want, and because finding accommodation is too difficult. Considering house sharing, participants expressed they will feel uncomfortable with reduced privacy. Considering moving to a smaller place, some participants expressed they are not willing to move as they will lose established connections with local communities and neighbours. Some participants see housing as a form of investment, thus a living space that exceeds one´s living needs is justified by possible returns if rented or sold and can be passed over to children and grandchildren in the future.

*Table 25: Conflicts for the most impactful options in the consumption domain Housing, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Conflicts |
|---|---|
| • *I will choose shared housing (ie. live smaller)*<br>• *I will move to a smaller place* | • *Finding accommodation is too difficult*<br>• *Personal wants and needs*<br>• *Less privacy*<br>• *Loose connections and community*<br>• *Larger houses are a good investment for the future* |

At the individual level, some participants suggested using local housing exchange platforms, by which households can exchange with flats or houses to match their living needs. They also noted they will more likely consider house sharing or reduced living space if attractive suitable alternatives are provided. At the structural level, people feel the need for better house planning, with smaller but nicer accommodation in neighbourhoods with green areas and plenty of spaces for community activities. Many participants flagged the need for simplified rules and incentives to find accommodation and renting, in particular with regards to new and newly renovated buildings. Economic disincentives for excessive living spaces were also proposed as a solution for reducing housing carbon footprint. Overall, the negative aspects of reduced living space would have to be counteracted by positives, including greener neighbourhoods, infrastructures and activities that encourage stronger social ties and cohesion, reduced rents, and access to quality public spaces (sport facilities, playing areas, and so on).

*Table 26: Individual and system-level solutions for adopting the most impactful options in the consumption domain Housing, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Solutions (individual) | Solutions (system) |
|---|---|---|
| • *I will choose shared housing (ie. live smaller)*<br>• *I will move to a smaller place* | • *Use house exchange platforms* | • *Better planning of green neighbourhoods with quality public spaces*<br>• *Simplify rules for finding accommodation and renting*<br>• *Economic disincentives for excess living space* |

**Leisure**

On leisure, flying less is the option with the highest reduction potential. This option would lead to numerous conflicts, including a feeling of limited possibilities for exploring the world and enrich oneself culturally, possible negative effects on the global tourism sector, and having to endure trips that are longer and more difficult to plan. Participants noted they lack the knowledge to find in some instances alternative-to-fly transportation modes and routes, that they do not have enough time to reach far away destinations by train or other alternatives, that the rail infrastructure is sometimes unreliable and may be difficult to plan cross-country transfers.

*Table 27: Conflicts for the most impactful options in the consumption domain Leisure, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Conflicts |
|---|---|
| • *I will fly less*<br>• *I will go on vacation by train instead of plane* | • *Limited opportunities for exploring places and cultures*<br>• *Negative impact on tourism sector*<br>• *Longer trips to get to destination (tiring and difficult to plan)*<br>• *Lack of knowledge for finding alternatives*<br>• *Lack of time*<br>• *Alternatives are often unreliable (e.g. train delays)* |

Coming to the solutions, at the individual level participants mostly discussed the choice of travelling less often but staying for longer periods at destinations. This was then tied to the structural and system changes needed for allowing longer holiday periods, including reduced working hours and allowing more vacation days. Other structural solutions included economic disincentives to plane tickets and incentives to reduce the price of train tickets, reduce, regulate or even ban short-haul flights, setting up yearly flying quotas per person, and improve train infrastructures including smarter tools for efficiently planning longer train trips.

*Table 28: Individual and system-level solutions for adopting the most impactful options in the consumption domain Mobility, that were mentioned by participants in at least two case countries.*

| Lifestyle Option(s) | Solutions (individual) | Solutions (system) |
|---|---|---|
| ● *I will fly less* | ● *Travel less often but stay longer* | ● *Reduce working hours and allow more vacation days (longer holidays)*<br>● *Economic disincentives to plane tickets*<br>● *Economic incentives to train tickets*<br>● *Ban short-haul flights*<br>● *Set yearly flying quotas per person*<br>● *Improve train infrastructures and integrated tools to plan long train trips* |

## Limitations

While the discussions provided valuable insights, there are several limitations to consider. Firstly, the sample did not represent the wider population fully in terms of socio-demographic characteristics and was generally too small to provide representative results. It can, however, provide some insights into tendencies which we can use in our project results and communication. In addition, participants commented on options presented in the vision, to a different extent, which introduces variability into the results. For example, while some participants did not express an opinion on certain options, others expressed multiple opinions on a single option. In addition, certain aspects of the vision may have been neglected, especially in the case of solution discussions, as participants chose topics based on their preferences.

Finally, the time constraints of such intensive discussions may have limited the depth and breadth of the discussions, potentially affecting the comprehensiveness of the findings. These limitations should be carefully considered when interpreting the results of the discussions.

## Interlinkages with other workpackages

The findings from Work Package 2 (WP2) and the two rounds of CTLs reconfirm outcomes from other work packages (WPs) and from tasks undertaken in WP2 earlier, including expert interviews that yielded obstacles to adopting specific lifestyle options and suggested specific structural changes.

With regards to Work Package 4 (WP4) and the workshops on rebound effects, the second round of our CTL confirmed positive aspects that people see in living 1.5° Lifestyles, which are called "desirable spillover effects" in WP4 and D4.2. Mutual confirmation of these positive spillover effects from WP4 and WP2, the latter also included citizens that did not qualify as spearheads or pioneers of sustainable lifestyles, leads to a bigger sample of people "proving" that 1.5° Lifestyles have or are perceived as having positive side "ripple effect" that go beyond environmental benefits and include health, social cohesion, social networks, knowledge gain, etc.

In our second round of CTL we used some workshop methods and approaches that had proven

useful in WP4 including individual reflection time and recording of discussions as backup. Vice versa WP4 workshops have used learnings from CTL1 with regards to engagement with recruiting agencies, pre-lab surveys or designing of rules for the day.

WP3 inspired the CTL 2 by providing a draft of the vision of a 2030 world that was further adjusted and modified to fit our CTLs. Specifically, within the framework of Work Package 3 (WP3), Stakeholder Thinking Labs put forward vital political strategies as contributions to CTL2, aimed at application in the key consumption areas. In addition, WP3 and WP4 provided examples of potential conflicts that could arise from a specific lifestyle option that catered as prompts for the facilitators of our CTLs.

# CONCLUSION

In our project, we identified more than 50 lifestyle options across four consumption domains (see chapter Selecting 50 impactful Lifestyle options for the project). Implementing these options requires behavioral changes or necessitates investment. We tested the acceptance and rejection rates of 44 lifestyle options in our citizen thinking labs (see chapter: Results CTL1: Acceptance and barriers) and found mixed acceptance rates. The acceptability varied significantly, ranging from 100% acceptance to only 14.4%.

Overall, participants showed a preference for options related to housing and leisure over those related to mobility and nutrition. They favored options that did not require significant lifestyle changes and were more willing to adopt those primarily requiring financial investment. Citizens identified diverse reasons (i.e. barriers) for finding options difficult to implement, including health concerns, finances, cultural aspects, convenience, or lack of infrastructure (see chapter: Results CTL1: Acceptance and barriers). However, they also provided feedback on "conditions of acceptance" even for unpopular options, such as financial incentives or structural improvement (see chapter: Results CTL1: Conditions for acceptance).

During the course of the project and in CTL2, we focused on 12 impactful options needed to reach the 2.5t target for 2030. Some of these options initially received very low acceptance rates in CTL1, prompting us to explore how they might become more acceptable. We engaged citizens in developing solutions to overcome the associated challenges (see chapter Results CTL2: Conflicts and solutions). Solutions were identified at both personal and structural levels. In addition to addressing conflicts, we also gathered data on the benefits of these options, which include physical and mental health improvements, financial savings, enhanced safety, increased social cohesion, and more leisure time (see chapter Results CTL2: Perceived benefits).

In conclusion, our findings underscore the importance of addressing both the barriers and benefits of lifestyle changes to enhance acceptance and facilitate the transition towards sustainable living.

# POLICY EXAMPLES FROM THE CTLS

The discussion on conflicts and solutions in the CTLs highlighted the multiple needs to:

o Adopt ambitious regulation in line with the scale and urgency of the climate crisis (see for example discussions on bans and caps to flights);

o Navigate increasing social tensions by changing values and narratives and mainstreaming solutions tailored to different socio-economic groups (see for example discussions on car ownership and reduced living space);

o Better inform citizens on the benefits of implementing low-carbon lifestyles in terms of the overall wellbeing of individuals, society, and the planet (see for example discussions around reducing meat consumption).

In the CTLs, many solutions were proposed by participants in terms of structural changes to facilitate the adoption of low-carbon lifestyles.

These range from adjusting prices and orienting consumer choices by increasing acceptance, availability and access to low-carbon lifestyle options, to regulating or limiting unsustainable lifestyles by setting up carbon or consumption quotas. Focusing on the most impactful lifestyle options per consumption domain, most of CTLs participants suggested the adoption of the following policies (in bold below), which are described with examples of existing implementation:

Reduction in meat and dairy consumption

**Mainstream sustainable diets in schools and institutions:** evidence shows how reducing the amount of meat and fish, while increasing the amount of plants, in dishes served in restaurants and public canteens do not generate any preference bias nor less satisfaction to the diner (e.g. Reinders et al., 2020). Introducing vegetarian days and increasing the share of plants in student canteens also shows no dissatisfaction in the medium- long-term, with students selecting more vegetables even in non-vegetarian days (Kwasny et al., 2022). Policy interventions to facilitate such actions include the institution of mandatory vegetarian or vegan days, and develop national food system roadmaps with minimum requirements for food production and retail (E.g the World Health Organisation (WHO) Action Framework for Developing Public Food Procurement and Service Policies for a Healthy Diet.). Permissions to operate in central/premium locations could be restricted to plant-based restaurants, canteens, and catering services.

Actions for increasing the availability and access to low-carbon food are more effective if complemented by educating students and professionals on the environmental and health impacts of animal products (Tippmann, 2020; Eugenio-Gozalbo et al., 2022). Sustainable food and healthy diets can be introduced into curricula by establishing a minimum number of hours per year to teach about such topics and integrating sustainable diets into school activities such as field trips to local farms, or school gardens. Examples of policies and initiatives in this regard are the introduction of 33 hours-a-year lessons on climate change for Italy´s students, and the Joint Action for Healthy and Sustainable School Nutrition in Germany.

**Regulate advertising, remove subsidies and restrict licences on high-carbon food:** bans on advertising of high-carbon and unhealthy food options in particular when targeted to vulnerable groups and children are a way for editing out unsustainable food choices, as already implemented in Spain and other countries. The FAO, UNDP and UNEP published recommendations that countries can refer to for removing subsidies and other incentives to production and consumption of high-carbon food (FAO, UNDP & UNEP, 2021). Licence restriction and maximum quotas for sale of meat and dairy products have been proposed in EU countries, for example in the Netherlands.

Reduction in private car use

**Promote the health benefits of car alternatives:** public campaigns can be designed by engaging with health professionals to communicate on health and safety benefits of alternatives to private cars. A requirement for car advertising to inform about the benefits of active travel and public transport can be implemented, as done for example in France, where car manufacturers have to feature in their advertising a message encouraging people to consider greener modes of transport, such as cycling or public transport.

**Divest from private car infrastructure and invest in public and active transport:** private car use can be discouraged by divesting from private car infrastructures and investing funds to public transport infrastructure and subsidies. This could allow mobilising resources to subsidise or provide free public transport (as in Luxembourg or Estonia), implement schemes of public transport credits for no-car households, or finance the implementation of a flat rate ticket valid for multiple means of public transport and across regions. Further development of private cars infrastructures could be halted, following for example the model of Wales, and parking lots and multiple driving lanes converted to green and community areas.

Limit excess living space

**Incentivise shared facilities and spaces:** Quotas and incentives can be set for planning and building permits to advance multipurpose buildings, shared facilities such as laundry rooms in building blocks, and access to coworking spaces in residential areas to enhance shared and more efficient use of building infrastructure. Energy efficiency improvements can be incentivised by providing low-interest loan guarantees to banks. Social housing stocks can be refurbished with subsidised loans.

**Disincentivise excessive and multiple housing and unsustainable consumption levels:** progressive taxation can be used to discourage multiple home ownership and owning excessive living space. Per capita quotas can be set on the amount of energy consumed per capita or per household.

Reduction in air travel

**Discouraging flying as a means of travelling for tourism:** a carbon tax to flights can be defined and introduced together with bans on short-haul flights (see the example of France, Bonilla & Ivaldi, 2023). Customer loyalty programs such as frequent flyer miles can be abolished, as suggested in the

UK (Walawalkar, 2019). Train use, including for tourism, can be effectively incentivised by tailored investments in infrastructures and connections.

**Reduce working hours for allowing longer holidays:** work time reduction policies could allow longer staying for vacation thus enabling slower travelling modes and reducing the need to fly for leisure. Such policies could also lead to additional reductions of carbon footprint by reducing commute on a daily basis and proportionally reducing income (with higher reductions for high income groups).

In summary, CTLs participants suggested the adoption of policies that favour sustainable lifestyle options and products and discourage less sustainable ones. This signals that participants feel that sustainable lifestyles are not easy to access, and that unsustainable choices are often the easier choices in terms of availability and convenience (making them the "normal" choices within society). From this, it emerges that participants identify policymakers as primarily responsible for overcoming barriers to access, and that they see equitable access achievable if appropriate policies are in place. Participants also suggested interventions that touch on advertising and marketing, recognizing their role in shaping collective aspirations and measures of success, and how these influence consumption and lifestyle choices.

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# ANNEX

## ANNEX 1: QUOTA PLAN

In the following you will find the quota plan for the CTL1 in Berlin. This has been used by the German recruiting agency based on the actual statistical distribution of socio-demographic characteristics in the German population. It was adjusted by the case country partners to the situation in the respective countries.

| | Germany | | Quotas CTL | | Absolute Numbers CTL | |
|---|---|---|---|---|---|---|
| | Absolute | Relatively | Participants | Reserves | Participants | Reserves |
| **Gender** | | | | | | |
| female | 33.447.963 | 51,1% | 11,2 | 5,1 | ≥ 10 | ≥ 4 |
| male | 33.963.124 | 48,9% | 10,8 | 4,9 | ≥ 10 | ≥ 4 |
| other | n.s. | | | | ≤ 1 | ≤ 1 |
| Total | 69.411.087 | 100,0% | 22,0 | 10,0 | 22 | 10 |
| **Age (years)** | | | | | | |
| 18 - 29 | 11.074.060 | 16,0% | 3,5 | 1,6 | 4 | 2 |
| 30 - 39 | 10.871.964 | 15,7% | 3,4 | 1,6 | 4 | 2 |
| 40 - 49 | 10.070.748 | 14,5% | 3,2 | 1,5 | 3 | 1 |
| 50 - 59 | 13.304.542 | 19,2% | 4,2 | 1,9 | 4 | 2 |
| 60 - 69 | 10.717.241 | 15,4% | 3,4 | 1,5 | 3 | 1 |
| 70 and older | 13.372.532 | 19,3% | 4,2 | 1,9 | 4 | 2 |
| **Urban/Rural (inhabitants)** | | | | | | |
| rural (<20.000) | 8.996.253 | 10,8% | 2,4 | 1,1 | 2 | 1 |
| Medium sized City (20.000 - < 100.000) | 18.191.578 | 21,9% | 4,8 | 2,2 | 5 | 2 |
| Big city (> 100.000) | 55.967.200 | 67,3% | 14,8 | 6,7 | 15 | 7 |
| **Education*** | | | | | | |
| still in school/without school-leaving qualification (>18yrs) | 5.623.000 | 8,0% | 1,8 | 0,8 | 2 | 1 |
| low secondary school diploma (Hauptschulabschluss) | 17.894.000 | 25,3% | 5,6 | 2,5 | 5 | 2 |
| good secondary school diploma (Realschulabschluss) | 21.863.000 | 31,0% | 6,8 | 3,1 | 7 | 3 |
| secondary school diploma qualifying for university admission (Abitur) | 25.245.000 | 35,7% | 7,9 | 3,6 | 8 | 4 |
| **Income (EUR)*²** | | | | | | |
| low income (< 1.500) | 46.023.000 | 56,0% | 10,4 | 2,7 | ≥ 10 | ≥ 2 |
| Medium income (1.500 - 3.000) | 26.998.000 | 32,8% | 6,1 | 4,8 | ≥ 6 | ≤ 5 |
| High income (> 3.000) | 9.182.000 | 11,2% | 5,5 | 2,5 | ≥ 5 | ≥ 2 |

Note: When composing the sample for the CTLs in the other case countries, partners adjusted the numbers according to the differences in the overall composition of the population (statistics provided

by the national institute for statistics).

# ANNEX 2: QUINTILES USED FOR HOUSEHOLD NET INCOME

The following table presents the income categories used in the survey for recruiting participants to the Citizen Thinking Labs. The quintiles values are available from Eurostat per capita and yearly. The latest available data was for the year 2021 at the time of the definition of the survey. These values have been converted into net household income per month considering the average household size in the respective countries (also available from Eurostat).

| Quintiles income | | GER | ESP | HUN | LAT | SWE |
|---|---|---|---|---|---|---|
| Quintile 1 | Less than X per month | 2,800 € | 2,300 € | 315100 HUF | 1,200 € | |
| Quintile 2 | Between X and Y per month | 2800 € - 3800 € | 2300 € - 3400 € | 315100 HUF - 413400 HUF | 1200 € - 1800 € | 33000 SEK - 44000 SEK |
| Quintile 3 | Between Y and Z per month | 3800 € - 4800 € | 3400 € - 4500 € | 413400 HUF - 528200 HUF | 1800 € - 2500 € | 44000 SEK - 55000 SEK |
| Quintile 4 | Between Z and A per month | 4800 € - 6300 € | 4500 € - 6100 € | 528200 HUF - 693200 HUF | 2500 € - 3500 € | 55000 SEK - 70000 SEK |
| Quintile 5 | More than A per month | 6,300 € | 6,100 € | 693200 HUF | 3,500 € | 70000 SEK |

# ANNEX 3: SCENARIO BY DAVID PFAU (ADJUSTED BY THE PROJECT TEAM)

In the following you will find the Vision 2030 used in our second round of Citizen Thinking Labs.

**Visioning and Scenario Exercise for 2030 / the 2030ies**

*Adapted from Sven-David Pfau using Lifestyle Options from our project as well as inputs from citizens (from CTL1)*
*Note: The following version of the vision is the one used in the German labs and served as a basis for the CTLs in other countries, which have been adjusted slightly, e.g. where <mark>yellow highlights</mark> are visible in the document.*

Preface: This is a vision, a scenario, a possible future. Such a vision can never be fully true, it is only one version of infinite possible and unforeseeable outcomes. It is a vision which includes lifestyle changes that were discussed in our first rounds of CTLs and which are necessary to lower the carbon footprint per capita to 2.5t by 2030 in order to reach the 1.5-degree climate goal. We also included conditions of acceptance for such lifestyles/lifestyles changes that were brought forward in our first CTLs by citizens. Not everybody here might share this vision, not everybody might be comfortable with it - and that's okay.

In the following exercise you are invited to dive into this vision and see which images and thoughts come up. Pay attention to your reactions and feelings that evolve. Stay open and allow yourself to dream and remember that it has happened a lot of times in recent history that what seems impossible today can become possible or even inevitable tomorrow.

[Read very slowly, with many pauses]

**Introduction:**
Find yourself a suitable, comfortable position. You can sit back in your chairs and relax.
Close your eyes. (PAUSE)
Now feel where your body connects to the ground. (PAUSE)
Release your weight to the ground, feel how the earth is carrying you. Take a few deep breaths and with every exhale release more weight to the floor, with every inhale, absorb fresh air into your whole body. (PAUSE)
Take your attention to your face and soften your face muscles, your eyes, your mouth, feel your face become soft. (PAUSE)
Let go of the last remaining bits of tension with every slow breath. (PAUSE)

**You feel calm and well. There is nothing to be achieved right now, nothing to be competed over. (LONGER PAUSE)**

We find ourselves in the year 2030. Today is the 23rd of September and this day is celebrated as the Global Fossil Free Day.
Global net emissions have been reduced significantly to not much more than 2.5 t of carbon equivalents per person per year.

Public and private investments are now mostly directed towards low-carbon infrastructures and products. More sustainable options are widely available for citizens, including low-carbon transport solutions, healthy and more sustainable food, and low-carbon housing. The main focus of policies has shifted from economic growth to increasing wellbeing for all and reducing inequalities.
In other words: Sustainability is made simpler for citizens through governmental measures of which some were initiated through citizens petitions and citizen councils or inspired through grassroots examples initiated by ordinary people.
Regional and communal governments now have a "sustainability and well-being minister/officer" who checks if former and future decisions are aligned with the health of the planet and the people.

All changes have happened without shifting tremendous negative costs to other regions, species, or generations, but in a process of global solidarity, redistribution and socially just consumption reduction in the Global North. The people most responsible for the climate crisis have been financing this just transition, with the big majority of the least responsible benefiting the most from it. (PAUSE)

On this day of global celebration, you wake up in your bed in Berlin/Brandenburg, and wonder: how will I celebrate this day?
Slowly, you leave your bed, and you open the window to take a breath of fresh air. You look out into this world, what do you see from your window? (PAUSE)
What do you hear, feel, or smell? (PAUSE)

**Housing** (do not read this word):

You go inside to have breakfast in your living arrangement, which is different from 10 years ago.

In the past years, lots of houses were renovated and insulated to increase energy efficiency and provide for better quality of living - so that no one needs to choose between heating and eating anymore. Most buildings now have solar panels on the roof or heat pumps in the cellar which makes people feel more independent from other sources of energy or from other countries. But we also needed to decrease our average room temperatures by 2 degrees in order to save energy. Politicians and consumer organisations have been setting good examples here, pioneering this change and providing tips to the public on how to best go about it.

To provide the basis for a good life for all while reducing emissions, we also adapted our ways of living. People had to reduce their living space by 30% on average, so that they live on 36 m2 per person now. New forms of co-living and sharing exist which help to reduce living space per person. Some people now live in a house that has a shared kitchen and offers a co-working space so that not everyone requires their own (home) office. The garden or nearby park offers a barbecue spot or a pizza oven and several large communal tables where people can share meals in the summer and discuss community life. You sit down at the kitchen table and look around. Who else is there, living with you? (PAUSE)

Platforms for swapping apartments unbureaucratically and without rent increase were set up making it easy to adapt one's living situation to changing needs, e.g. when the children move out. Moreover, it is strongly discouraged to live in luxury mansions, with massive energy consumption, while others can't afford to have a minimum comfort level at their homes or can't even afford to have a home. Social housing projects with flats in a "sustainable standard size" were implemented in different areas of the city, also in formerly called "good or exclusive locations".

How does your living arrangement look like? (PAUSE)

**Nutrition** (do not read this word)**:**

While preparing your breakfast, you are grateful for the food you are about to eat. You imagine the place where it comes from as well as the people involved in production. (PAUSE)

As a solution for moving towards sustainable, healthy and climate-neutral food systems, half of the Germans reduced their consumption of meat, dairy, and other animal products by 80% - and we know that this percentage of people doing it has to grow in the coming years. People have learned that an almost exclusively vegetarian or even vegan diet provides all the nutrients needed and can be tasty, adventurous, and nourishing. Simultaneously veggies and meat alternatives are less expensive than animal products and their (lower) carbon footprint is clearly visible on the packaging to help consumers to choose environmentally friendly products in the shopping process.

Whether we are vegetarians, vegans, or flexitarians, we all now eat much more plant-based food, which also leads to less cardiovascular diseases and diabetes, for example. Over-consumption and food waste in households were massively decreased, because it saves money and leaves people with a better feeling with regards to their behaviour. Universal Basic Services now provides meals for all of those who couldn't previously afford it.

Societies also banned the majority of pesticides and synthetic based fertilisers previously used and produced by fossil fuels, as they threatened the pollinating insects we needed to grow crops. After having lost 90% of insects in 2022, we have focused our attention on the biodiversity crisis and insect species are now in recovery. Regenerative food production, whether on large-scale farms or in your

neighbourhood, has increased significantly as it supports biodiversity and contributes to healthy soils which are valuable $CO_2$ reservoirs/natural carbon sinks. (PAUSE) Simultaneously, fair pay and trade is cultivated towards the people growing the food.

What does your breakfast look like? What is your favourite food? (PAUSE)

**Mobility** (do not read this word)**:**

You leave your home and go for a walk in your neighbourhood.

The ways of mobility and getting around changed completely during the last couple of years, in the bid to reduce emissions and allow for better public mobility for all.

New flat swapping platforms and reduced bureaucracy have made it easier for almost 50% of the working population to live closer to their place of work, eliminating long commutes in many cases. Car ownership and use has declined to a fraction of its size, with new forms of public mobility and cycling infrastructure allowing all citizens to get around. New carpooling platforms made sharing of rides easy, attractive, and widely common. Almost half of the car journeys that used to be made are now shared with others, greatly reducing the emissions from car journeys. And while big SUVs and luxury cars have disappeared more and more from the streets, dense networks of charging stations - also in rural areas - has led to the further spread of electric cars, which have replaced half of today's conventional cars. You take a deep breath of fresh air and enjoy the clean air.

Your neighbourhood has become a city of cycling or walking now. Instead of owning a car, the majority of people now rent one for the few occasions they need one, such as when they are moving to a different place. To get around for our daily needs, we can use the public transport, which is free, safe, clean and even more developed and frequent also in the rural areas. All trains and trams were already electrified in 2023; now all buses are electrified as well – running on electricity produced with renewables to 100%.

Today, in 2030, the streets look very different. So much public space has been freed up for other activities as the number of cars has fallen significantly. Some roads are now only for non-motorised mobility, safe for cycling and easy to walk. Some asphalt roads have been partially removed and turned into green natural paths. Overall, there is much more public space.

What is your neighbourhood looking like? What type of transport is your favourite nowadays? (PAUSE)

**Leisure** (do not read this word)**:**

While walking around, you bump into some friends on the streets. As public spaces have been increasingly transformed from places of consumption into places of social encounter, you sit down and start talking about the rest of the world out there and how you are planning your next holiday. We have managed to significantly reduce emissions caused from air travel by flying only half as much as we have in the past and we know that we have to decrease this even further. Essential air links to remote islands and outlying places had to be maintained, but we reduced the number of leisure and business flights.

While travel can be a bit slower these days, we also have more days off to reach our destinations, even if they are further away. Long-distance rail networks, high speed night trains, and low-carbon ocean-liners combining sails with solar energy and battery power were set in place ensuring a reliable system of connections to an affordable price.  What is your next holiday destination and

how do you get there? (PAUSE)

The way we spend our leisure time has also changed tremendously, with the new forms of mobility and new concepts of work. While we still drove more than 6000 km/person for our leisure time activities and hobbies with our own car in the past decades, this has now dropped by almost 50% in Germany and it will and must drop even further in the following years. The importance of shared experiences is nowadays much more valuable than owning or buying things. We now use the well working and affordable public transport system instead of the car to spend more time in nature, enjoy leisure time activities that are close by, and to see friends and family or enjoy intensive community-life. While you slowly make your way back home, your thoughts wander to the days ahead of you.

What will you do? Where will you go and how will you spend your leisure time? (PAUSE)

You get back home and make yourself comfortable. You take a last look at this 2030 world and enjoy what you can enjoy. How has your life improved today compared to 2023? What has become more difficult? What is missing in the vision? (PAUSE)

Then slowly, you feel your fingers, feel your toes, feel your arms and legs. (PAUSE) You start feeling your body on the chair in this room and your feets on the ground. (PAUSE) When you are ready to do so, slowly open your eyes.