



Envisioning
1.5-Degree Lifestyles:
**Policies for Low-Carbon
Cities in 2030**

Policy Brief



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Table of Contents

Introduction	4
Key Findings	5
Policy insights for enabling 1.5-Degree lifestyles	6
Envisioning and Enabling 1.5-Degree Lifestyles in Cape Town – South Africa	9
Envisioning and Enabling 1.5-Degree Lifestyles in Kyoto – Japan	10
Envisioning and Enabling 1.5-Degree Lifestyles in New Delhi – India	11
Envisioning and Enabling 1.5-Degree Lifestyles in Nonthaburi – Thailand	12
Envisioning and Enabling 1.5-Degree Lifestyles in São Paulo – Brazil	13
Envisioning and Enabling 1.5-Degree Lifestyles in Yokohama – Japan	14
Conclusion	15
References	16



Policy Brief Envisioning 1.5-Degree Lifestyles: Policies for Low-Carbon Cities in 2030

Introduction

The concept of 1.5-degree lifestyles involves changes in household consumption for achieving levels of per person carbon footprint compatible with the 1.5°C target of the Paris Agreement (IPCC, 2018). This requires, on average, emitting the equivalent of 2.5 tons of CO₂ per person per year by 2030, and 0.7 tons of CO₂ per person per year by 2050 (Akenji et al., 2021), which implies substantial emission reductions, especially in industrial countries.

Besides how we consume, lifestyles are also how we relate to one another, what kind of neighbours, friends, citizens and parents we are, what kinds of values we nurture, and how we let those values drive our choices.

Cities present the context and infrastructures that shape lifestyles and provide citizens with options for food, housing, transport, and leisure. By 2030, cities will host over 60% of the global population (UN, 2019).

Local governments and cities thus play a fundamental role in leveraging the transition to sustainable lifestyles.

The project *'Envisioning Future Low-Carbon Lifestyles and Transitioning Instruments,'* funded under the United Nations One Planet Network, was launched to explore the 1.5-degree lifestyles concept at the city level. The project is led by IGES in collaboration with Hot or Cool Institute, D-mat, ICLEI Japan, the National Institute for Environmental Studies, Japan (NIES) and the local partners: Akatu Institute (Brazil); Swechha (India); ICLEI Africa (South Africa); and Chulalongkorn University (Thailand). The project aims at co-developing low-carbon lifestyle pathways through engaging citizens in workshops, household experiments, and scenario-building in six cities around the world (Cape Town, South Africa; Kyoto and Yokohama, Japan; New Delhi, India; Nonthaburi, Thailand; and São Paulo, Brazil).

This brief shares findings from the project implementation in the six cities involved, including policy recommendations for enabling 1.5-degree lifestyles.

Key Findings

The 1.5-degree lifestyles approach is a fundamental contribution to the Paris Agreement: The 1.5-degree lifestyles approach shows the potential impact that changes in lifestyles could make in keeping global warming within the limit of 1.5°C. It provides important indications for designing effective policies at the level of cities for achieving the 1.5°C target.

Participatory planning is crucial for enabling the adoption of 1.5-degree lifestyles: Individual choices and established consumption behaviours call for citizens' engagement with the aim of identifying the most effective options and increasing public and political acceptance and implementation of these options. A participatory approach to local climate governance, involving diverse groups of citizens in priority-setting can help make policies more effective.

Adopting 1.5-degree lifestyles will improve people's wellbeing: While mitigating the impacts and reducing the costs of climate change, a transition to low-carbon lifestyles can also bring co-benefits such as improvements in quality of life, better physical and mental health, better quality of social relationships, increased interpersonal trust, better work-life balance, empowerment, and community engagement, among others.

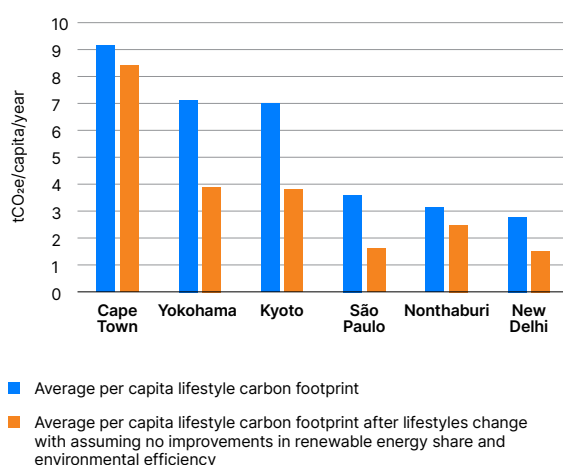
Food, mobility, and housing are priority areas for transitioning to 1.5-degree lifestyles: While specificities exist in different cities, food, mobility, and housing tend to be the consumption categories responsible for most of the carbon emissions from households.

Supporting public policies are essential for lifestyle changes but need to reflect local circumstances: Cities have different starting points in terms of current consumption patterns, availability of public and private infrastructure, and social structure. To be effective in shifting lifestyles towards the 1.5°C target, public policies need to be tailored to local conditions.

Policy Insights for Enabling 1.5-Degree Lifestyles

The lifestyle carbon footprint widely varies across the 6 cities considered in this project (Figure 1). The project includes insights for local governments (including city governments), national governments, and insights on networking and exchange, and coordination and collaboration between local governments.

Figure 1. Average lifestyle carbon footprint (2030)



Local Governments' Role:

- Engaging citizens in a participatory approach for discussing viable lifestyle options, barriers to their adoption, and for co-developing future low-carbon scenarios is essential for implementing 1.5-degree lifestyles in different urban contexts. City governments should establish participatory processes to convey citizens' voices to policymakers with regards to the needs and demanded supporting actions for lifestyle change.

The engagement and participatory process developed in the six cities involved in this project could be replicated by and adapted to other cities.

Other examples of citizens' engagement at the city level are the City Labs in place in Athens, Buenos Aires, Boston, Copenhagen, and Rio de Janeiro

(Arup & C40, 2015). These are spaces and working groups set up explicitly to make decision-making processes more responsive to citizen needs. The Labs aim at advancing the political conversations and challenging established norms within government and society. In many cases, they make use of digital engagement platforms and social media. Another example is the city of Turku's '*1.5 Degree campaign*' that has given voice to its residents to express what does 1.5-degree life mean for them.

- The consumption categories responsible for most emissions from households are different from city to city and across countries. However, food was the consumption category responsible for the most of carbon emissions in four of the six cities included in the project. At the same time, food consumption is where the highest potential for reduction lies.

Successful examples of policies and actions led by city governments for improving access to low-carbon food lifestyles include: increasing school food funding (case of Belo Horizonte, Brazil); funding urban agriculture (case of Toronto, Canada); sustainable procurement contracts for public canteens (case of Malmö, Sweden), public land use designation for urban agriculture (case of Rosario, Argentina); and investment in food market infrastructures (case of Barcelona, Spain) (Halliday, 2019).

Successful examples of policies and actions led by city governments for reducing food waste—one key means of reducing food lifestyle impacts—include: incorporating food waste reduction criteria in public procurement programs (case of São Paulo, Brazil); applying tax reduction measures for businesses that engage in food waste reduction activities and/or donate surplus food (case of Cremona, Italy), partnering with universities and research institutes to pilot food waste prevention guidelines in specific sectors (case of Bruges, Belgium); allocating city-owned buildings and space to community initiatives on food waste (case of Milan, Italy); and pay-as-you-throw schemes (case of Seoul, South Korea).

National Governments' Role:

- Lifestyle changes are only possible with changes in production systems, innovative business models, and appropriate enabling policies. This includes developing and supporting country-wide networks of low-carbon food producers and retailers, nation-wide low-carbon mobility infrastructures, and renewable grid energy supplies.

In this context, one example of a fast and effective country-scale transition for enabling sustainable lifestyles in terms of energy use is the case of Uruguay, which increased its share of renewable sourced electricity from 40% to about 94% over the course of 10 years. This was delivered by clear decision-making, a supportive regulatory environment, and a strong partnership between the public and private sector (WWF, 2014).

Changes in food, mobility, housing, and other consumption choices at the city scale would be only viable if adapted and made available outside of the urban context as well. National strategies for climate mitigation and adaptation should include actions and tools for enabling 1.5-degree lifestyles in urban, peri-urban, and rural areas.

One example in this vein is Germany's National Programme on Sustainable Consumption (BMUB, 2018), which expressly addresses lack of infrastructure for sustainable mobility, and aims at supporting local authorities in expanding, developing, and implementing measures to publicise shared and on-demand public transport in rural areas.

Networking and Exchange:

- Many opportunities exist for networking and peer-to-peer exchange between local governments for enabling the adoption of 1.5-degree lifestyles. Cooperation networks and joint initiatives focused on lifestyle change should be created for addressing common barriers, sharing successful implementation strategies, and learning from each other.

Cooperation between cities are promoted by networks such as the *Covenant of Mayors for Climate and Energy*, or the *Resilient Cities Network*, and organizations such as ICLEI-Local Governments for Sustainability. For example, the Urban Transition Alliance connects industrial legacy cities from across the globe to share transition achievements, support collective identification of challenges and solutions. Another recently established global

network is the ICLEI Circulars that offers capacity building and implementation support on circular development actions and policies, shares inspiring stories from the leading cities and facilitates peer-to-peer exchange.

Coordination and Collaboration:

- Multi-level governance is needed for an effective shift to 1.5-degree lifestyles so the national and local governments need to act in harmony with a long term vision and clear targets. Coordinated actions among policymakers, businesses, and civil society organizations can improve access to low-carbon goods, services, and modes of consumption.
- Businesses could direct efforts to develop low-carbon products and services and improving their supply chains, also ensuring transparency and traceability for better informing consumer choices.

Good examples for supporting business for enabling 1.5-degree lifestyles are city initiatives that support companies that provide green solutions such as *We Build Green Cities*, which provides recruitment and site location assistance, strategic partnerships with local and state officials, as well as investment and financial resources. Other examples are entrepreneurship and SME support initiatives by cities that encourage shift in value chains and supply chains, such as for example the *London Business Hub*.

The following section shares key insights on 1.5-degree lifestyles in Cape Town, Kyoto, New Delhi, Nonthaburi, São Paulo and Yokohama, drawn from workshops, household experiments, and scenario building exercises. Lifestyle change preferences are drawn from participants in these various engagements. Adoption rates indicate how widely and fully the low-carbon options will be implemented. For example: if the adoption rate is 100%, it means that all the population of a city can implement that low-carbon lifestyle option. Hence, higher adoption rates indicate the most feasible options, whereas lower adoption rates indicate options which require further supporting measures from government and businesses.

Box 1: Future Lifestyles Multimedia Contest

To achieve a more widespread understanding of the main challenges, priority areas, and solutions for implementing low-carbon lifestyle options in each city, a multimedia contest was launched, inviting citizens, artists, and multimedia creators to contribute their visions for the future. These visions, presented in different formats, including videos, images, drawings, and other media, serve as an enriching complement to the visions from household experiments and workshops. Together, this mosaic of community visions is not only helpful in creating a new narrative for 1.5-degree lifestyles, but also serves to open community dialogue and help inform policy recommendations. From a total 30 entries, 9 winners were awarded micro-grants to support 1.5-degree lifestyle initiatives. A list and details of the awarded entries are available [here](#).



Envisioning and Enabling 1.5-Degree Lifestyles in *Cape Town – South Africa*

In the city of Cape Town, household consumption is responsible for the annual emission of about 9.2 tons of CO₂ equivalent (CO₂e) per person. This calls for a reduction of average household consumption emissions by 73% for achieving the target of 2.5 tons of CO₂ equivalent by 2030 and implementing lifestyles in line with the 1.5°C target of the Paris Agreement.

The consumption category that generates the most carbon emissions is food (45% of total emissions from household consumption), followed by housing (22%) and mobility (12%). A large share of the high carbon footprint of food derives from consumption of meat (43%), with consumption of beef responsible for over 10% of the total carbon footprint in Cape Town. Carbon footprint related to housing derives from the use of electricity (mostly coal-based), in particular for heating and cooking. Regarding mobility, car use is responsible for 67% of the carbon footprint, followed by flying (21%).

1.5-degree lifestyle options

A total of 37 low-carbon lifestyle options were identified as specific for the city of Cape Town.

A full adoption of these options would lead to a 70% reduction of lifestyle carbon footprints, which corresponds to a total of 2.8 tons of CO₂e emitted per person per year. However, considering the adoption rates expressed by Capetonians, the reduction amounts to a much more modest 8% of emissions, leading to emissions levels of 8.4 tons of CO₂e per person per year.

Among the available options for mitigating emissions from food consumption, composting domestic food waste was the one with the highest adoption rate (64%), followed by growing vegetables at home (57%) and completely cutting consumption of soda and juices (50%). Regarding low-carbon housing, task lighting was the option with the highest adoption rate (86%), followed by switching to gas cooking (57%), and installing a solar water heater and water-saving shower heads and taps (50%). Regarding mobility, halving local and international flights was the behaviour change with the highest adoption rate (38%), followed by cycling or walking to work (36%), and carpooling (29%).

Policy recommendations for a low-carbon Cape Town in 2030

Citizens expressed their need for changes in the supporting system, including infrastructures, education, and economic incentives for further adopting low-carbon lifestyle options and bridging the gap between the calculated possible reduction and levels of emissions in line with the 1.5°C target of the Paris Agreement.

Considering the main barriers experienced adopting low-carbon lifestyle options, the citizens of Cape Town identified the following enabling actions needed from policymakers:

Couple infrastructure development and educational programs: Infrastructures should be developed for enabling 1.5-degree lifestyles. Citizens of Cape Town ask for further developments of sustainable public transport options, further recycling centres, and spaces (and incentives) for starting community gardens. New infrastructures should be coupled with public programs and campaigns for educating on the social and environmental benefits of adopting low-carbon lifestyle options.

Implement sustainable public procurement: Sustainable public procurement should be used for mitigating climate change and other environmental impacts and for stimulating local markets for low-carbon solutions and infrastructures. Citizens of Cape Town are asking for public authorities to choose goods and services with lower carbon emissions, and to be transparent on the environmental impacts of their purchases and operations.

Invest in the renewable energy transition: Citizens of Cape Town are asking the national government to support renewable energies through investments and the use of incentives. At the same time, the national government should divest from non-renewables and cut incentives to coal and other carbon intensive energy sources. Citizens are asking for supporting independent renewable energy producers with guaranteed purchasing agreements and for promoting the transformation of vehicle fleets to electric vehicles.

Envisioning and Enabling 1.5-Degree Lifestyles in *Kyoto–Japan*

Household consumption in Kyoto is responsible for the annual emission of about 7 tons of CO₂e per person. This calls for a reduction of household consumption emissions by 64% to achieve the target of 2.5 tons of CO₂e by 2030 and implementing lifestyles in line with the 1.5°C target of the Paris Agreement.

Housing is the consumption category that generates most of the carbon emissions (31% of total emissions from household consumption), followed by food (20%) and goods consumption (15%). The high footprint of housing is largely due to the high carbon intensity of electricity generation. The footprint of food depends for the most part on the high import-dependency of Kyoto for cereals and vegetables, as well as on high levels of consumption of packaged beverages. The main source of carbon emissions when it comes to goods consumption is clothing, with high levels of consumption per capita and high rates of garment disposal.

1.5-degree lifestyle options

For the city of Kyoto, 65 low-carbon lifestyle options were identified as relevant and feasible.

By adopting these options, the average carbon footprint of Kyoto can be reduced to 3.8 tons of CO₂e by 2030. By implementing further changes in the production systems, and by switching to renewables as a source of electricity generation, it will be possible to further reduce carbon emissions by a further 1.6 tons of CO₂e and achieve the Paris Agreement 2030 target of 2.5 tons of CO₂e.

During the citizen engagement workshops and the household experiments, the following options were selected as the most feasible for each of the most effective consumption changes:

Housing. The installation of LED lights and adapting clothes to outdoor temperatures to reduce artificial cooling and heating were the most feasible options.

Food. Citizens showed high preference for reducing food waste at home and restaurants, reducing red meat consumption, and practicing a more balanced diet.

Goods consumption. Citizens selected options for reducing the carbon footprint of clothing by using clothes for longer and recycling garments and textiles.

Policy recommendations for a low-carbon Kyoto by 2030

The points raised in the discussions during the engagement workshops, the results and feedback from household experiments, and the results of the scenario-building highlighted several actions requested by citizens to policymakers and businesses. These actions are instrumental for enabling lifestyle changes in the city of Kyoto in line with the 1.5°C target of the Paris Agreement.

Review of regulations for the installation of renewable energy equipment in houses and buildings: Actions are needed for turning the installation of rooftop solar PVs into a more viable option, including through subsidies, better infrastructures, and clear information.

Improve access to local and low-carbon food options: Access to low-carbon food options should be improved by optimising distribution systems, facilitating the use of abandoned farmland, promoting local markets, and investing in food education.

Enable longer use and recycling of garments: Citizens demand the definition of durability standards for garments and other products and increased availability of recycling and repairing services. More flexible regulations are needed for organizing local second-hand markets in public spaces.

Envisioning and Enabling 1.5-Degree Lifestyles in *New Delhi – India*

In New Delhi, household consumption is responsible for the annual emission of about 1.4 tons of CO₂e per person. This is below the 2030 target of 2.5 tons but requires further emissions reduction to achieve the 0.7 tons target by 2050.

Food is the consumption category that generates most of the carbon emissions (32% of total emissions from household consumption), followed by mobility (35%) and housing (28%).

1.5-degree lifestyle options

A total of 30 low-carbon lifestyle options were identified as specific for the city of New Delhi.

Regarding food choices, eating organic food is the option with the highest reduction potential (avoiding about 300 kg of CO₂e per person to be emitted per year). For mobility, teleworking is the most effective option (avoiding about 300 kg of CO₂e per person per year). Installing solar panels is the option with the highest mitigation potential regarding housing (avoiding over 350 kg of CO₂e per person per year).

Amongst all food options, switching to a vegetarian diet, reducing food waste, growing one's own food, and food composting were the options with the highest adoption rates (80 to 100%). Amongst mobility options, using public transport and CNG vehicles, as well as teleworking, were the options with the highest adoption rates (80 to 100%). Regarding housing, switching off the lights when leaving a room and installing energy saving appliances were the options with the highest adoption rates (80 to 100%).

Policy recommendations for a low-carbon New Delhi by 2030

The points raised in the discussions during the engagement workshops, the results and feedback from household experiments, and the results of the scenario-building highlighted several actions for policymakers and businesses that are instrumental for enabling lifestyle changes in the city of New Delhi in line with the 1.5°C target of the Paris Agreement.

Incentivise organic local farming: Incentives to local and organic farming are needed for increasing their viability and making low-carbon alternatives to meat and dairy products more widely available. The lack of access to these alternatives by a large fraction of New Delhi's population needs to be addressed by providing subsidies to growers, retailers, and consumers.

Invest in sustainable mobility infrastructures: Dependency on private cars and motorcycles for mobility needs should be tackled by expanding public investments in sustainable mobility infrastructures. In particular, public and private investments in electric transport and cycling infrastructures are needed.

Implement sustainable housing: Sustainable housing needs to be scaled-up and implemented by putting in place a series of complementary measures. This includes developing infrastructures and value chains for sustainable construction materials (e.g. wood, bamboo), incentives for the installation and maintenance of solar panels and other renewable energy equipment, creating knowledge-hubs for sustainable architecture, and implementing effective policies against illegal construction activities.

Enable circular business models: Second-hand retail and other circular business models should be enabled by creating the conditions for their viability. This includes incentives and providing dedicated spaces in central malls and markets to second-hand and circular businesses.

Envisioning and Enabling 1.5-Degree Lifestyles in *Nonthaburi– Thailand*

In the city of Nonthaburi, household consumption is responsible for the annual emission of about 3.1 tons of CO₂e per person. This calls for a reduction of household consumption emissions by 23% or more for achieving the target of 2.5 tons of CO₂e by 2030 and implementing lifestyles in line with the 1.5°C target of the Paris Agreement.

Food is the consumption category that generates most of the carbon emissions (23% of total emissions from household consumption), followed by leisure and services (19%) and mobility (18%). The implementation of 1.5-degree lifestyles in Nonthaburi requires a reduction of the carbon footprint of food consumption by at least 39%, of leisure and services by at least 23%, and of mobility by at least 34% by 2030.

1.5-degree lifestyle options

For the city of Nonthaburi, 54 low-carbon lifestyle options were identified as relevant and feasible, with a 41% adoption rate required to achieve the 1.5°C target.

During the citizen engagement workshops and the household experiments, the following options were selected as the ones with the highest and lowest adoption rates for each of the consumption categories that could have the most impact:

Food. Reduction of food waste and shifting from beef to pork were the options with the highest adoption rates (about 50%). Switching to a vegan diet was the option with the lowest (9%).

Leisure and services. Taking good care of one's health was the option with the highest adoption rate (55%). Reducing the use of telephone and fax machines was the one with the lowest (6%).

Mobility. Use of ethanol fuelled vehicles instead of gasoline vehicles was the option with the highest adoption rate (78%). Use of electric vehicles and travelling by bus or train instead of flying were the ones with the lowest (3 and 5%, respectively).

By considering the average adoption rates of all options for each of the six consumption categories included, consumption goods and housing options were the categories with highest adoption rates (68

and 66%, respectively), followed by food, leisure and services, and mobility (all with average adoption rates of about 30%).

The implementation of low-carbon lifestyle options would lead to a reduction of the carbon footprint of consumption of the citizens of Nonthaburi between 650 and 775 kg CO₂e per person per year, which would allow for achieving the targets of the Paris Agreement.

Policy recommendations for a low-carbon Nonthaburi by 2030

The points raised in the discussions during the engagement workshops, the results and feedback from household experiments, and the results of the scenario-building highlighted several actions for policymakers and businesses that are instrumental for enabling lifestyle changes in the city of Nonthaburi in line with the 1.5°C target of the Paris Agreement.

Mainstream 1.5-degree lifestyles: There is a need for improving education, public awareness, public participation, and public access to information with regards to low-carbon lifestyles. Public awareness campaigns and programs have a strong potential for contributing to enabling lifestyle change at a wide scale.

Improve equal access to low-carbon mobility options: The role of transportation for people's wellbeing has to be recognised by policymakers and reflected into ambitious policies and actions. Access to low-carbon mobility options have to be improved for all, including across genders, age groups, income groups, and others. An integrated approach to low-carbon mobility is needed, as combinations of solutions ensure that all needs are met and provide broader business opportunities and higher emission reductions.

Envisioning and Enabling 1.5-Degree Lifestyles in *São Paulo – Brazil*

In the city of São Paulo, household consumption is responsible for the annual emission of about 3.6 tons of CO₂e per person. This calls for a reduction of household consumption emissions by 30% or more for achieving the target of 2.5 tons of CO₂e by 2030 and implementing lifestyles in line with the 1.5°C target of the Paris Agreement.

Food is the consumption category that generates most of the carbon emissions (38% of total emissions from household consumption), followed by mobility (27%) and housing (23%). The implementation of 1.5-degree lifestyles in São Paulo requires a reduction of the carbon footprint of food consumption by at least 63%, of mobility by at least 38%, and of housing by at least 65% by 2030.

1.5-degree lifestyle options

Through a dedicated research (Akatu, 2018) and literature review, 32 low-carbon lifestyle options were identified, considering ease of implementation and likelihood of being adopted in the context of Brazil.

Regarding food choices, switching to a low-carbon protein or vegetarian diet are the options with the highest reduction potential (each avoiding over 500 kg of CO₂e per person to be emitted per year). For mobility, cycling and teleworking are the most effective options (each avoiding over 200 kg of CO₂e per person per year). House sharing is the option with the highest mitigation potential regarding housing (avoiding over 300 kg of CO₂e per person per year).

By implementing the whole set of 32 options in their daily lives, the annual carbon footprint of consumption of the citizens of São Paulo can be reduced by 56% to about 1.6 tons of CO₂e per person per year, achieving the goal of 2.5 tons of CO₂e set for 2030.

During the citizen engagement workshops and the household experiments, the following options were selected as the ones with the highest and lowest potential adoption rates for each of the most impacting consumption categories:

Food. Reuse of food leftovers and better planning food shopping for avoiding waste were the options with the highest adoption rate (88%), and purchase food that would otherwise be thrown away the one with the lowest (38%).

Mobility. Teleworking and use of public transport were the options with highest adoption rates (63%). Cycling and switching to fuel efficient vehicles were the ones with the lowest (13%).

Housing. Shared housing and reduced home electricity use were the options with the highest adoption rates (100 and 88%, respectively). The installation of solar panels and other renewable energy solutions, smaller living spaces, and reduction of air conditioning were the options with the lowest (0%).

Policy recommendations for a low-carbon São Paulo by 2030

The points raised in the discussions during the engagement workshops, the results and feedback from household experiments, and the results of the scenario-building highlighted several actions for policymakers and businesses, which are instrumental for enabling lifestyle changes in the city of São Paulo in line with the 1.5°C target of the Paris Agreement.

Broadening access to sustainable food alternatives: Information on carbon emissions embodied in food products should be made more available by designing and implementing clear label schemes and campaigning for low-carbon diets. Access to food with reduced climate impacts should be enhanced with incentives for alternatives to meat and dairy products.

Enable sustainable business models for reducing food waste: Policymakers should enable sustainable business models based on collecting and preparing meals from food otherwise destined to become waste. This includes providing incentives to food banks and services for donating or selling at discounted prices over-produced food from restaurants and food from supermarkets which are close to the expiry date.

Investments in low-carbon mobility: Cycling infrastructures should be expanded in the city of São Paulo for enabling more citizens to reduce their mobility carbon footprint. This should be accompanied by policies regulating urban planning and mobility rules.

Implement grid integration of renewable energy: There is a need for incentives to make more affordable the installation and maintenance of renewable energy equipment in private houses and public buildings. A dedicated campaign is needed to communicate to households the comparative benefits of renewables.

Envisioning and Enabling 1.5-Degree Lifestyles in *Yokohama – Japan*

In Yokohama, household consumption is responsible for the annual emission of about 7.1 tons of CO₂e per person. This calls for a reduction of the household consumption footprint by 64% or more for achieving the target of 2.5 tons of CO₂e by 2030 and implementing lifestyles in line with the 1.5°C target of the Paris Agreement.

Housing is the consumption category that generates most of the carbon emissions (28% of total emissions), followed by food (18%) and goods consumption (16%). Electricity use, with both high carbon intensity and high levels of consumption, is responsible for most of the emissions from housing (58%). Regarding food, non-local sourcing of cereals and vegetables, as well as the high consumption of beverages and ready meals and snacks, are the main contributions to the carbon footprint. For mobility, a large share of emissions (59%) comes from the use of private cars.

1.5-degree lifestyle options

For the city of Yokohama, 65 low-carbon lifestyle options were identified as relevant and with potential to be adopted.

For housing, switching to LED lighting, installing heating systems powered by renewable energy, and reducing indoor heating or cooling by wearing more suitable clothes were the options with the highest adoption rates (between 87 and 93%). Notably, low-carbon housing options with much higher reduction potentials had lower adoption rates, such as the installation of solar panels. Regarding food, reducing domestic food loss and eating seasonal food, and buying less-processed food were the options with highest adoption rates (between 68 and 81%), while choices with higher reduction potential such as adopting a vegetarian or vegan diet were the ones with the lowest (10 and 13% respectively). Longer use and recycling of clothes as well as electronics were the goods consumption options with the highest adoption rates (75 and 68% respectively).

Assuming no changes in the underlying enabling conditions (including for example no policy action and no new infrastructure development), adopting low-carbon lifestyle options in Yokohama could lead to a reduction from current levels to 3.9 tons of CO₂e per person per year, not reaching the levels required to meet the 1.5°C target of the Paris Agreement. If changes in en-

abling conditions occur, including raising the share of renewable sources in the national energy grid from the current 16% to 45%, as well as improvements in energy efficiency, then it will be possible to reduce consumption emissions to the target level of 2.5 tons of CO₂e per person per year.

Policy recommendations for a low-carbon Yokohama by 2030

Citizens expressed their need for changes in the supporting system, including a range of supporting measures and improvements in energy efficiency and transitioning to renewable energy at the national scale.

Considering the main barriers experienced adopting low-carbon lifestyle options, the citizens of Yokohama identified the following enabling actions needed from policymakers.

Review existing regulations for teleworking and zero energy housing: Supporting measures are needed for enabling teleworking and reducing the costs that citizens have to sustain for transitioning towards net zero energy housing options. Regulations and other mechanisms have to be put in place for encouraging housing developers to include in their collection of model homes net zero homes with high quality design and construction standards.

Develop infrastructures and incentivise the transition to renewable energy: Developing infrastructures is essential for enabling 1.5-degree lifestyle options such as electric mobility and connecting to renewable energy grids. Incentives and other measures have to be put in place as part of national and local strategies for improving citizens' access and business opportunities for renewables.

Conclusions

The findings of the project reveal the willingness of citizens to adopt 1.5-degree lifestyles. Co-developing city scenarios and being informed on the climate mitigation impacts and other co-benefits of low-carbon lifestyles gives citizens a sense of agency and can facilitate the acceptance of radical solutions.

However, the findings remark how lifestyle changes need to be enabled by appropriate policies and changes in the systems of provision.

Engaging with citizens and learning from their experiences have provided essential inputs to municipalities and businesses on supporting measures for fostering the needed transitions in society and the economy.

Citizen engagement revealed low-carbon lifestyle options with higher adoption rates and reduction potentials, as well as barriers and solutions to their implementation. Citizens can co-create and own a vision for the future of their cities, inspiring initiatives and steering policy action towards achieving the 1.5°C target.

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