COMMENTARY

Key findings from the study on Lifestyle Carbon Footprints: *Long-term targets and case studies of the carbon footprints of household consumption*

This commentary summarises the key findings and implications of the study on lifestyle carbon footprints: Long-term targets and case studies of the carbon footprints of household consumption. More detailed contents are scheduled to be published as a technical report in December 2018.

Key messages

Early action and changes in consumption and lifestyles are inevitable complementary approaches towards achieving the **1.5-degree aspirational target of the Paris Agreement on climate change.**

This study introduces the concept of **lifestyle carbon footprint** (LCF), and establishes **globally unified LCF targets as 2.5 tCO2e/cap/year by 2030 and 0.7 tCO2e/cap/year** by 2050.

Early action leading to over **90% reduction of lifestyle carbon footprints by 2050 and approximately 70% reduction by 2030 is necessary** – given estimated current lifestyle carbon footprints of 10.4 tonnes in Finland and 7.6 tonnes in Japan.

Hot spots of lifestyle carbon footprints are **meat and dairy consumption** in the nutrition domain, **private car driving and airplane flights** in the mobility domain, and **fossil-fuel based energy consumption** in the housing domain. Over 50 relevant options for reducing lifestyle carbon footprints have been highlighted in this study, including impactful options that can contribute to over 0.25 tCO_2/cap/year of footprint reduction.

Lifestyle carbon footprints are not only the result of individual consumption decisions but are largely **influenced by provision systems,** including infrastructures, institutional mechanisms, political decisions, and business operations.

The following parts summarise the approaches and results of the study.

Lifestyle Carbon Footprints: a consumption-based approach

This study introduces and develops an approach to establishing **lifestyle carbon footprints: greenhouse gases directly emitted during and indirectly induced by household consumption, excluding those induced by government consumption and capital formation.** These footprints can be considered household versions of the organizational carbon footprints or household demand aspects of the footprints of countries or cities.

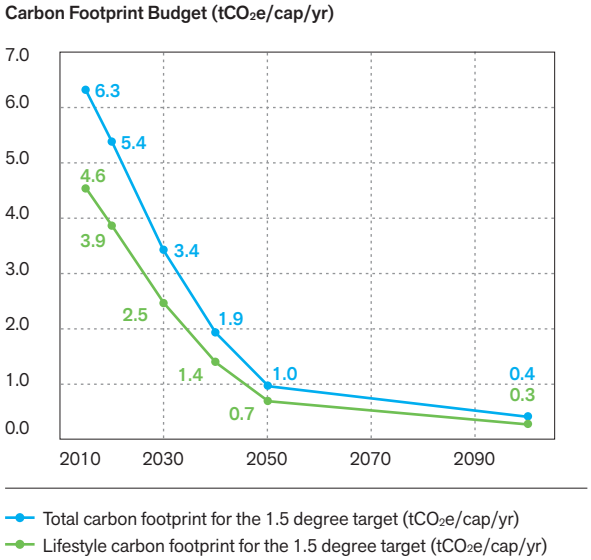
Targets towards 1.5-degree lifestyles

Based on a review of existing emission scenarios, this study proposes globally unified targets for the lifestyle carbon footprint of **2.5 t by 2030, 1.4 t by 2040, and 0.7 tCO2e/cap/year by 2050.** These targets are based on 1.5-degree scenarios with limited or no use of negative emission technologies to consider the uncertainty in the availability of these technologies. Alternative targets assuming the future application of negative emission technologies are *3.2 t by 2030, 2.2 t by 2040, 1.5 t by 2050, which still require ambitious reductions and early action.*

Gaps of Lifestyle Carbon Footprints

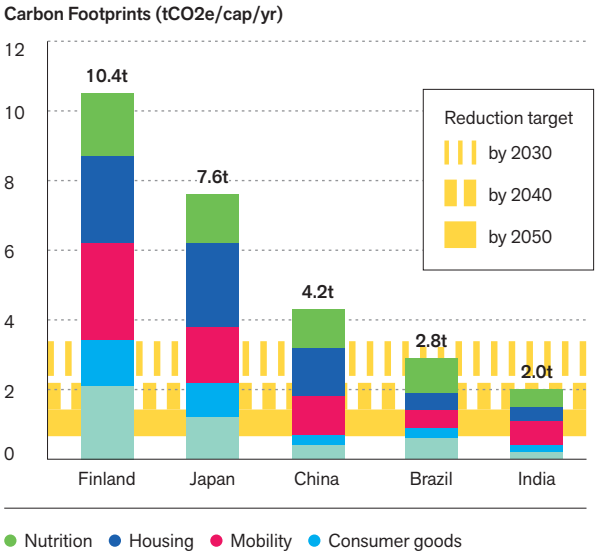
The estimated total average lifestyle carbon footprints vary considerably among countries. Comparing current levels with GHG emission targets set for 2030 (2.5 tCO2e) shows that current average lifestyle carbon footprints considerably exceed the targets for Finland and Japan, and slightly exceed those for China and Brazil. These gaps suggest that lifestyle GHG emissions need to decrease in order to achieve the lifestyle carbon footprint set emission target.

Lifestyles carbon footprint targets



Source: IGES, Aalto University, and D-mat based on emission scenarios from Ranger et al. (2012) and Van Vuuren et al. (2018), population projection from United Nations (2017), and household footprint share are assumed as 72% from Hertwich and Peters (2009).

Estimated lifestyle carbon footprints



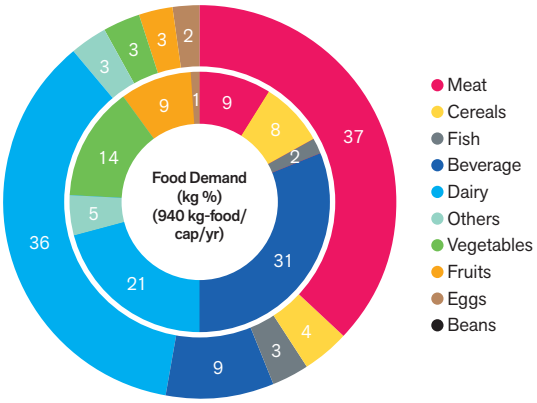
Source: IGES, Aalto University, and D-mat

Estimation of the Lifestyle Carbon Footprints

Out of the consumption domains considered, food, housing, and mobility tend to have the largest impact on the total lifestyle carbon footprints. Even small shares of meat and dairy consumption cause remarkable shares in footprints of the **nutrition** domain. The consumption of beans, vegetables, and fruits is relatively small. In the **housing** domain, fossil-fuel based electricity such as coal and LNG and non-electricity fossil fuel use are major contributors to footprints. The share of renewables is limited except for wood in Finland. In the **mobility** domain, the high share and intensity of private car use is the largest contributor to footprints together with airplane flights. Limited use of public transport and bicycles was observed.

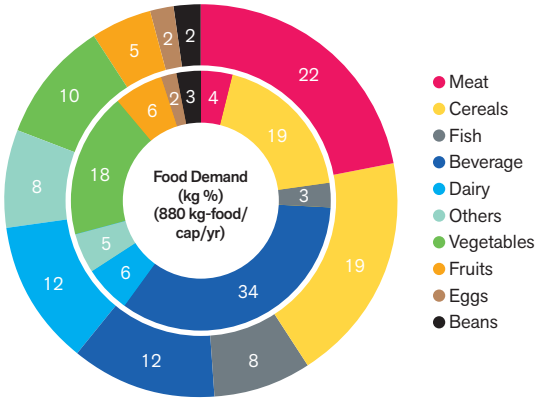
Average Finnish Carbon Footprint: Nutrition (%)

Carbon Footprint (kgCO_2e%): 1.8 tCO_2e/cap/yr



Average Japanese Carbon Footprint: Nutrition (%)

Carbon Footprint (kgCO_2e%): 1.4 tCO_2e/cap/yr

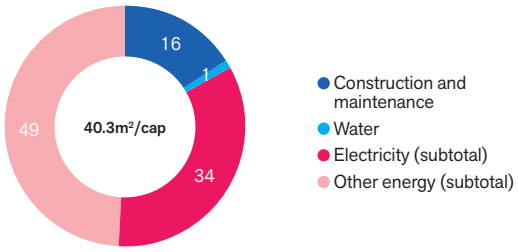


The inner circle represents the amount of food consumed. The outer circle indicates carbon footprints.

Source: IGES, Aalto University, and D-mat.

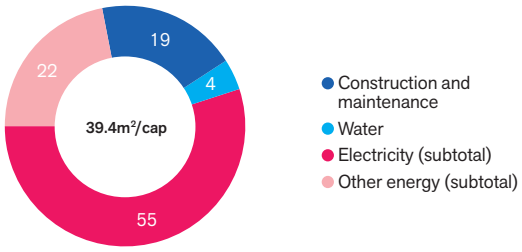
Average Finnish Carbon Footprint: Housing (%)

Carbon Footprint (kgCO_2e%): 2.5 tCO_2e/cap/yr

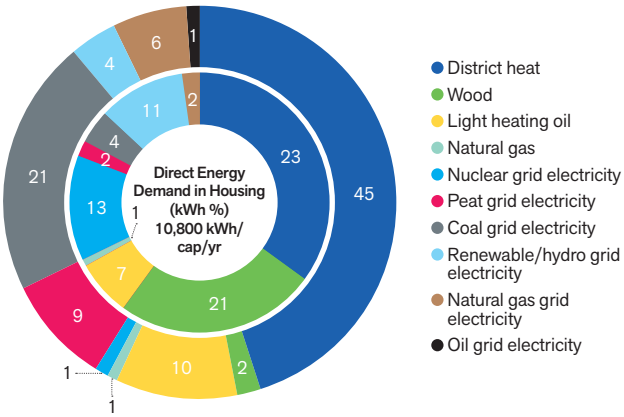


Average Japanese Carbon Footprint: Housing (%)

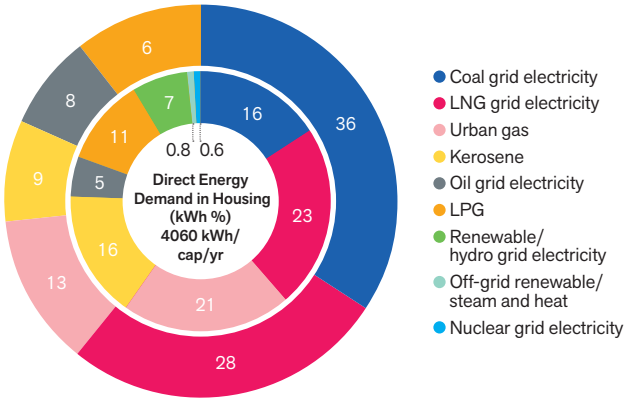
Carbon Footprint (kgCO_2e%): 2.4 tCO_2e/cap/yr



Energy-related Carbon Footprints (kgCO_2e %)



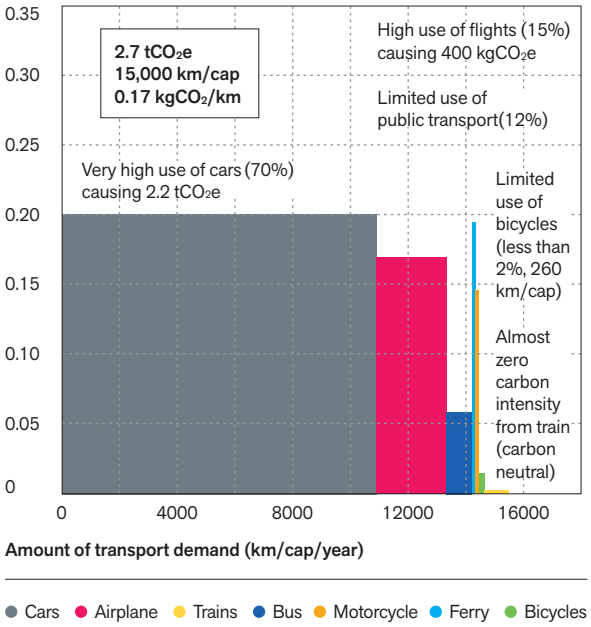
Energy-related Carbon Footprints (kgCO_2e %)



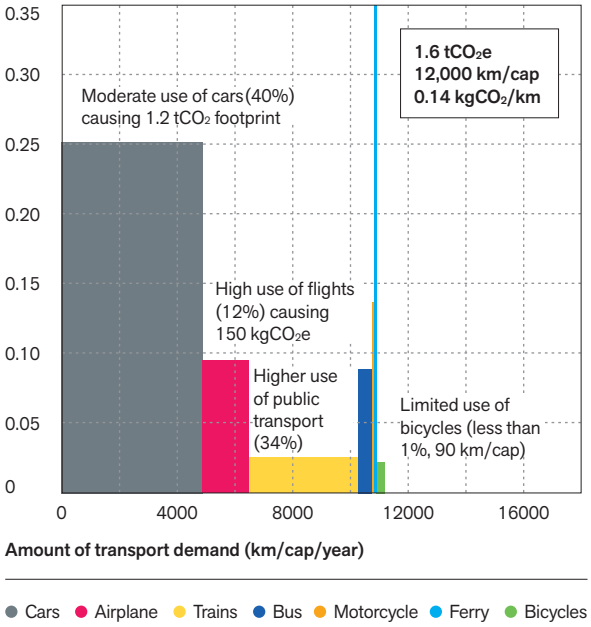
In the donut chart, the inner circle represents the amount of direct energy consumption while the outer circle indicates carbon footprints from home energy use. The donut chart above represents overall footprints from the housing domain.

Source: IGES, Aalto University, and D-mat.

Current Footprint: Mobility (average) Finland



Current Footprint: Mobility (average) Japan



Source: IGES, Aalto University, and D-mat. Width, height, and size of the area represent the amount of distance, carbon intensity per km-passenger, and carbon footprints.

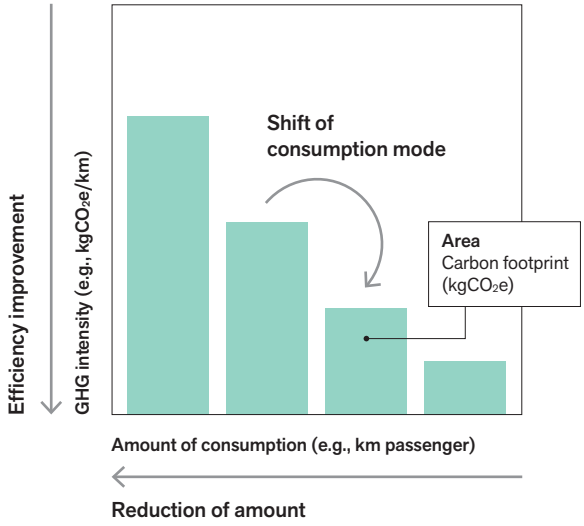
Low-carbon lifestyle options

The reduction of lifestyle carbon footprints as part of efforts towards achieving the 1.5 degrees target requires that various stakeholders take action and carry out both demand- and supply-side changes. Such measures require not only efficiency improvements in the supply chain and provision systems but also shifts to low-carbon modes of consumption and absolute reductions in some physical consumption demands. This study suggests three basic approaches to the reduction of lifestyle carbon footprints and estimates the potential impacts from options for two countries.

Demand-side Reduction: Absolute reduction in the amount of utilities, goods, or services consumed.

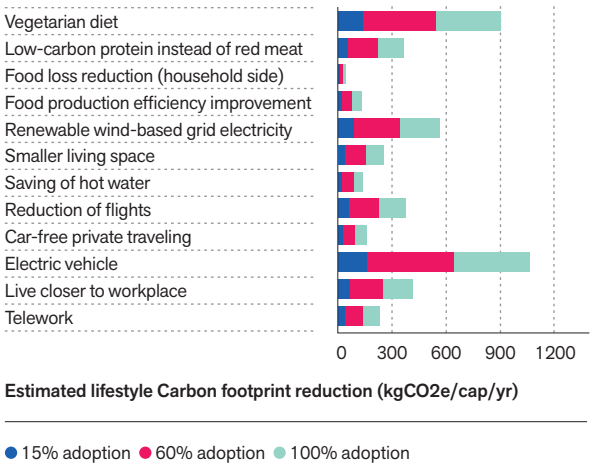
Modal shift: A shift from one consumption mode to another that is low-carbon, while keeping the amount of utility consumed same.

Efficiency improvement: Replacing technologies with ones that emit less carbon but within the same mode of consumption.

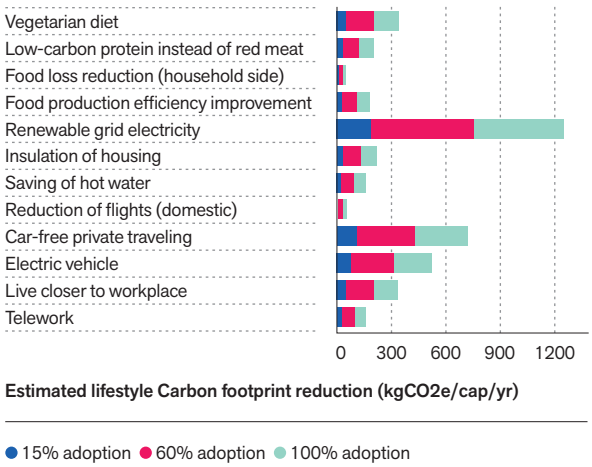


Source: IGES, Aalto University, and D-mat.

Finland: Reduction potentials



Japan: Reduction potentials



Source: IGES, Aalto University, and D-mat.

The Way Forward

Based on the findings from the quantitative analysis, the following parts introduce implications for different stakeholders and the potential future development of the project.

Systemic actions led by stakeholders

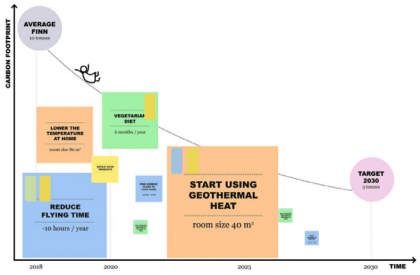
The transition of lifestyles can only be achieved through a combination of system-wide changes and a groundswell of action from individuals and households. Thus, while citizen and consumer choices are important, it is critical that pro-sustainability choices are enabled by ensuring that infrastructure and institutions facilitate viable and accessible options compatible with 1.5-degree lifestyles. Such a transition needs to be done fast in order to meet the 2030, 2040 and 2050 lifestyle carbon footprint targets if we are to contain global temperature rise to below 1.5 degrees. This study incorporates this perspective in a number of low-carbon options it identifies, highlighting the roles of all major stakeholders that must be engaged in a system-wide transition.

Example of actions that different stakeholder groups can take include:

Governments – National and local governments can promote city planning for improved public transport, bicycling, and service accessibility, and transform energy supply system to renewables. Shifting the taxation, subsidies, and other policy instruments towards incentivizing low-carbon lifestyles would also be beneficial.

Private sector – Businesses can provide options for telework, platforms for sharing and food loss reduction, alternatives to meat and dairy products, and decarbonized product options. It is also crucial to incorporate 1.5-degree business models into their strategic planning and investment decisions.

Individuals and households – Citizens can decide themselves to shift their consumption modes to public transport, bicycle, and plant-based nutrition. They can also start reducing the number of flights they take, private car driving, excess consumption of meat and dairy, and food loss. Wherever available, choosing or investing in renewables and decarbonized products and services is also crucial.



Conceptual drawing of the prototype household pathway building tool

Source: IGES, Aalto University, and D-mat

Expert review of the prototype society pathway building tool

Source: IGES, Aalto University, and D-mat

Prototype pathway building tools

As part of the project, two prototype tools for building a pathway for lifestyle carbon footprint reduction – a household version and an expert version – are being developed. Households can use the paper-based "puzzles" to modify their own behavior and build a roadmap for action until 2030. Decision-makers can try out different assumptions and combination of low-carbon options using an Excel-based tool. The tool has not yet been published, but for more details please contact *1.5_lifestyles@iges.or.jp*.

References

Hertwich, Edgar G., and Glen P. Peters. 2009. "Carbon Footprint of Nations: A Global, Trade-Linked Analysis." Environmental Science and Technology 43 (16): 6414–20.

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Acknowledgment

This commentary is a summary of key findings and implications of the study on Lifestyle Carbon Footprints: Exploration of long-term targets and case studies of carbon footprints from household consumption conceived as part of the Absolute REDUCTIONS project ("Reducing Environmental Degradation & Unsustainable Consumption Trends & Impacts On Nature & Society: Research, Policy and Practice") in collaboration with the Hot or Cool network of scientists and practitioners. The commentary was prepared by the Institute for Global Environmental Strategies (IGES), Aalto University, and D-mat ltd. with support from the Finnish innovation fund, Sitra, and KR Foundation.

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We would appreciate any comments and suggestions regarding the commentary. To provide your feedback, please send an email to: *1.5_lifestyles@iges.or.jp*