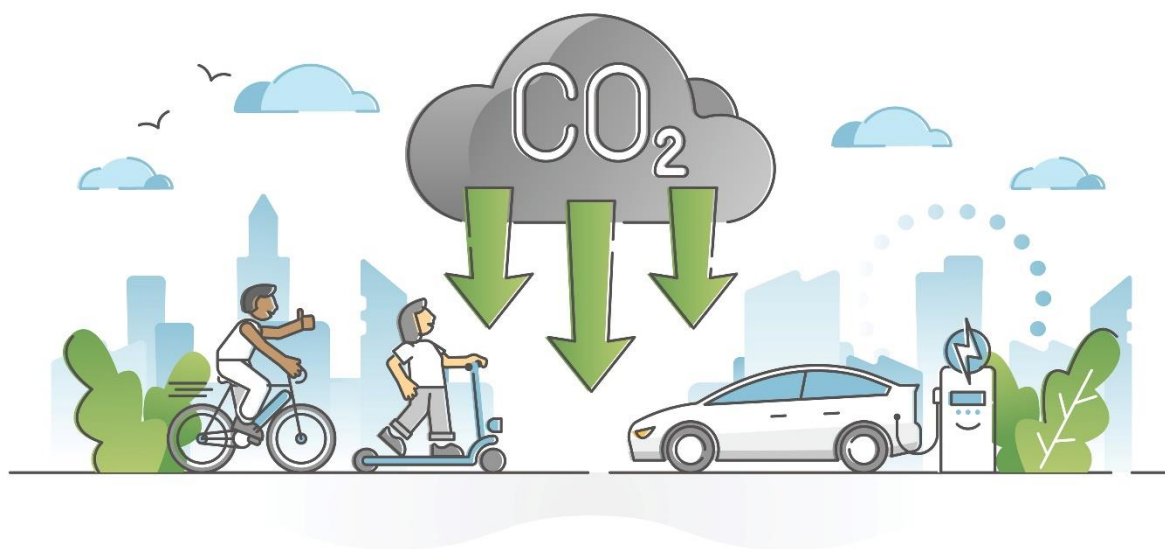




Interim report from 14 August 2025

Mobility Transition for Low-Income Households

Project Abbreviation: MWEH



Source: Shutterstock



INTERFACE

Schafft Wissen | Entre science et pratique

u^b

^b
UNIVERSITÄT
BERN

Publisher:

Swiss Federal Office of Energy SFOE
Energy Research and Cleantech
CH-3003 Berne
www.energy-research.ch

Co-financing: -

Subsidy recipients:

Interface Politikstudien Forschung Beratung AG
6002 Luzern
www.interface-pol.ch

University of Bern
3012 Bern
www.consumer.imu.unibe.ch

Authors:

Tobias, Arnold, Interface, arnold@interface-pol.ch
Claude, Messner, University of Bern, claudemessner@unibe.ch
Bettina, Höchli, University of Bern, Bettina.hoechli@unibe.ch
Jonas, Sivabalan, Interface & University of Bern, jonas.sivabalan@unibe.ch

SFOE project coordinators:

Wolfgang, Elsenbast, wolfgang.elsenbast@bfe.admin.ch
Anne-Kathrin Faust, anne-kathrin.faust@bfe.admin.ch

SFOE contract number: SI/502875-01

The authors bear the entire responsibility for the content of this report and for the conclusions drawn therefrom.



Summary

The project analyzes the mobility-related energy consumption of low-income households and develops co-beneficial measures that support the target group in reducing their mobility-related energy consumption. It examines the mobility-related norms, values, habits and needs of low-income people in order to develop sustainable energy policy measures tailored to them. Quantitative and qualitative methods are used. An online survey supplemented with mobility tracking serves as a basis for the development of measures. A cluster analysis shows different mobility types within the group of low-income people. The measures are qualitatively developed by means of interviews and workshops. In a second online survey, the acceptance of the measures is analyzed in a discrete choice experiment and differences by mobility type are examined. The project contributes to the development of sustainable energy policy measures in terms of energy justice and thus helps to achieve the goals of the Energy Strategy 2050.

Zusammenfassung

Das Projekt analysiert den mobilitätsbezogenen Energieverbrauch von einkommensschwachen Personen und entwickelt Massnahmen, die im Sinne von Co-Benefits die Zielgruppe bei der Senkung ihres mobilitäts-bezogenen Energieverbrauchs unterstützen. Es wird untersucht, welche Normen, Werte, Mobilitätsgewohnheiten und -Bedürfnisse einkommensschwache Personen haben, um tragfähige, auf sie ausgerichtete energiepolitische Massnahmen zu entwickeln. Es werden quantitative und qualitative Methoden angewendet. Eine mit Mobilitätsstacking ergänzte Online-Befragung dient als Grundlage für die Massnahmenentwicklung. Eine Clusteranalyse zeigt unterschiedliche Mobilitätstypen innerhalb der Gruppe einkommensschwacher Personen auf. Die Massnahmen werden mittels Interviews und Workshops qualitativ entwickelt. In einer zweiten Online-Befragung werden die Akzeptanz der Massnahmen in einem Discrete Choice Experiment analysiert und Unterschiede nach Mobilitätstypen untersucht. Das Projekt trägt zur Entwicklung von tragfähigen, energiepolitischen Massnahmen im Sinne der Energiegerechtigkeit bei und leistet damit einen Beitrag zur Erreichung der Ziele der Energiestrategie 2050.

Résumé

Le projet analyse la consommation d'énergie liée à la mobilité des personnes à faible revenu et développe des mesures qui aident le groupe cible à réduire sa consommation d'énergie liée à la mobilité, dans le sens d'un co-bénéfice. Les normes, les valeurs, les habitudes et les besoins en matière de mobilité des personnes à faible revenu sont étudiés afin de développer des mesures de politique énergétique viables et adaptées à ces personnes. Des méthodes quantitatives et qualitatives sont utilisées. Une enquête en ligne complétée par un échantillonnage de la mobilité sert de base à l'élaboration des mesures. Une analyse en grappes met en évidence les différents types de mobilité au sein du groupe des personnes à faible revenu. Les mesures sont développées de manière qualitative par le biais d'interviews et d'ateliers. Une deuxième enquête en ligne analyse l'acceptation des mesures dans le cadre d'une expérience de choix discret et examine les différences selon les types de mobilité. Le projet contribue au développement de mesures de politique énergétique viables dans le sens de l'équité énergétique et contribue ainsi à la réalisation des objectifs de la Stratégie énergétique 2050.



Contents

Summary	3
Zusammenfassung.....	3
Résumé.....	3
Contents	4
List of figures	4
List of abbreviations	5
1 Introduction.....	6
1.1 Context and motivation	6
1.2 Project objectives	6
2 Approach, method, results and discussion.....	7
3 Conclusions and outlook.....	12
4 National and international cooperation.....	12
5 Publications and other communications	12
6 References	12

List of figures

Figure 1: Number of households by income group (Source: Microcensus Mobility and Transport 2015)	8
Figure 2: Daily distances and modal split by income group (NMT = non-motorised transport, MPT = motorised private transport, PT = public transport)	9
Figure 3: Distance based modal split by transport purpose and income group.	10
Figure 4: Energy consumption by transport purpose and income group	11



List of abbreviations

SFOE	Swiss Federal Office of Energy
FSO	Swiss Federal Statistical Office



1 Introduction

1.1 Context and motivation

Transportation accounts for over a third of energy consumption in Switzerland, with a 36% share. Within the transport sector, it is motorised private transport (MIT) and air traffic in particular that are responsible for the high energy consumption and high CO₂ emissions (BFE 2022). A reduction in energy consumption is necessary in order to achieve the goals of the Energy Strategy 2050. Technical development in isolation will likely prove insufficient to achieve the necessary reduction. It is evident that behavioural changes in mobility will also be necessary. It has been demonstrated that the implementation of policy measures designed to modify mobility behaviour does not have a uniform impact across all income groups (Caulfield et al. 2022; Hardman et al. 2017). International (and few national) research has demonstrated that low-income groups have fewer options to adapt their behavior, are more likely to be left out from subventions and more likely to reside in neighborhoods with limited accessibility to public transportation (Allen et al. 2023; Allen and Farber 2019; Curl et al. 2018; Landis 2024; Lucas et al. 2018). The majority of research in this field concentrates exclusively on low-income groups, which are directly at risk of poverty, and leave out other low-income groups, which are less susceptible to the threat of poverty but still are affected by transport limitations. What is more, to our knowledge, the social norms, values and mobility habits and barriers of low-income households have not been extensively studied in the context of Switzerland.

1.2 Project objectives

The aim of this project is to bridge the gap in both the empirical and conceptual realms. Our strategy has three key elements: Firstly, by studying the social norms, mobility habits and structural barriers faced by low-income households in Switzerland (Moody and Zhao 2019; Zhao and Zhao 2020; Barri et al. 2021; Javaid et al. 2020), the project will generate a deeper understanding of their everyday travel behaviour and the limitations they encounter. It will also assess the feasibility of sustainable mobility transitions for this group. These factors will then be compared with those of the general Swiss population. Particular attention will be given to heterogeneity within low-income groups, including those just above the poverty line who may be structurally disadvantaged yet invisible to policy frameworks.

Secondly, we assume that different income groups face different mobility barriers and have different mobility needs. This suggests that low-income groups require specific measures to support and facilitate their mobility energy transition (Ekins and Dresner 2004). Based on the Behaviour Change Wheel, we aim to design policy measures after evaluating their behaviour, barriers and needs (Michie et al. 2011; 2005). These measures should be beneficial for both low-income households and the national goal of achieving net-zero emissions by 2050. Thirdly, this project is conceptually based on the three principles of justice according to the framework of (Jenkins et al. 2018): Distributional justice, justice as recognition and procedural justice (Jenkins et al. 2018). Low-income households are invited to participate in the process of generating mobility policies and their feedback is taken into consideration.

From an academic standpoint, this three-pronged strategy will result in three articles on energy policy and mobility behaviour being published in journals. From a policymaker's standpoint, the results will provide a better understanding of the needs and barriers faced by low-income households, thereby contributing to national energy goals.

The project addresses the following research questions:

1. What norms, values and habits relating to mobility do low-income households have compared to those in higher income brackets?
2. What mobility needs do low-income individuals have?
3. Which measures support low-income individuals in reducing energy consumption in mobility, and which measures are accepted, and how?



4. To what extent do the norms, values, mobility habits and mobility needs of low-income people differ between subgroups, and what conclusions can be drawn from this regarding the acceptance and impact of measures?

2 Approach, method, results and discussion

Approach and Methods

In this project measures to reduce energy consumption in mobility among low-income populations will be developed and evaluated through a multi-stage research process using a mixed-methods approach. Quantitative and qualitative methods will be combined strategically to ensure the analysis is both broad and in-depth.

The project begins by building a solid foundation through the analysis of existing literature and mobility data, which will inform subsequent steps. As mobility data, we refer to the Mobility and Transport Microcensus 2015, published by the Federal Office for Spatial Development (ARE) and the Federal Statistical Office (BFS). We are using data from the 2015 Microcensus as the 2021 data is significantly influenced by the Covid-19 pandemic. Due to restrictions such as mandatory home office, compulsory distance learning, and bans on public events, mobility behavior was greatly affected, leading to a notable decrease in the number of mobile individuals. Approximately one-fifth of those not mobile at the time indicated that the pandemic had at least partially contributed to their lack of mobility. Given this distortion, we are relying on the 2015 data. Once the 2025 Microcensus data becomes available, we will update the calculations accordingly.

A large-scale survey, complemented by mobility tracking data, will provide new insights into the travel behavior, attitudes, and needs of low-income individuals compared to the broader population. Particular attention will be given to identifying subgroups within low-income populations and their specific mobility patterns through cluster analysis.

Based on these insights, potential policy and behavioral measures will be developed using qualitative methods such as stakeholder interviews and expert workshops. These measures will then be tested for social acceptance using a quantitative experimental method to identify the most promising and widely accepted strategies.

The final phase of the project will synthesize the findings and engage key stakeholders from politics, administration, and the mobility sector to ensure the results are actionable and policy-relevant. The outcomes will be communicated through scientific publications and practical outputs such as white papers and guidelines.

This project is notable for its originality and innovation. For the first time in Switzerland, mobility behavior will be systematically compared across income groups, using comprehensive tracking data and covering both commuting and leisure travel. The staged process ensures that a wide range of potential measures is considered, before narrowing down to the most effective and feasible solutions. The approach aligns with the latest developments in mobility research and addresses a significant gap in understanding socially equitable pathways to reduce energy use in transport.

Project Advances and preliminary results

There has been progress in multiple working packages over the course of last year:

1) Working Package 1: Starting phase and basics

The first working package has successfully been completed. The PhD student has begun his work at the university. The relevant literature has been collected and analyzed. The project can build on literature in the fields of transportation research, sociology of mobility, social psychology and energy policy



and survey methodology. The data from microcensus mobility and transport has been requested and analyzed. The steering group has been assembled and met for the first time.

Preliminary results are as follows:

The literature review revealed a substantial body of research on the mobility of low-income households in the Anglo-American context (Allen and Farber 2019; 2019; Moody and Zhao 2019). Fewer studies have been conducted in the European context (Büchs and Mattioli 2024; Lucas 2006), and even fewer in the Swiss context (Axhausen et al. 2008; Landis 2024). In general, it was found that low-income households use less energy related to mobility and cover fewer daily distances than other household groups. Low-income households are more affected by poor public transport accessibility, although there can be significant local variation.

For the purposes of this project, the definition of a low-income household is based on that provided by the Swiss Federal Statistical Office (FSO), which defines a household as low-income if its income is below 70% of the median household equivalized income¹. This is the combined household income divided by the household weight according to the OECD scale². Figure 1 shows the number of low-income households based on this definition in the 2015 Microcensus. It reveals that low-income households make up about 30 percent of all households in Switzerland.

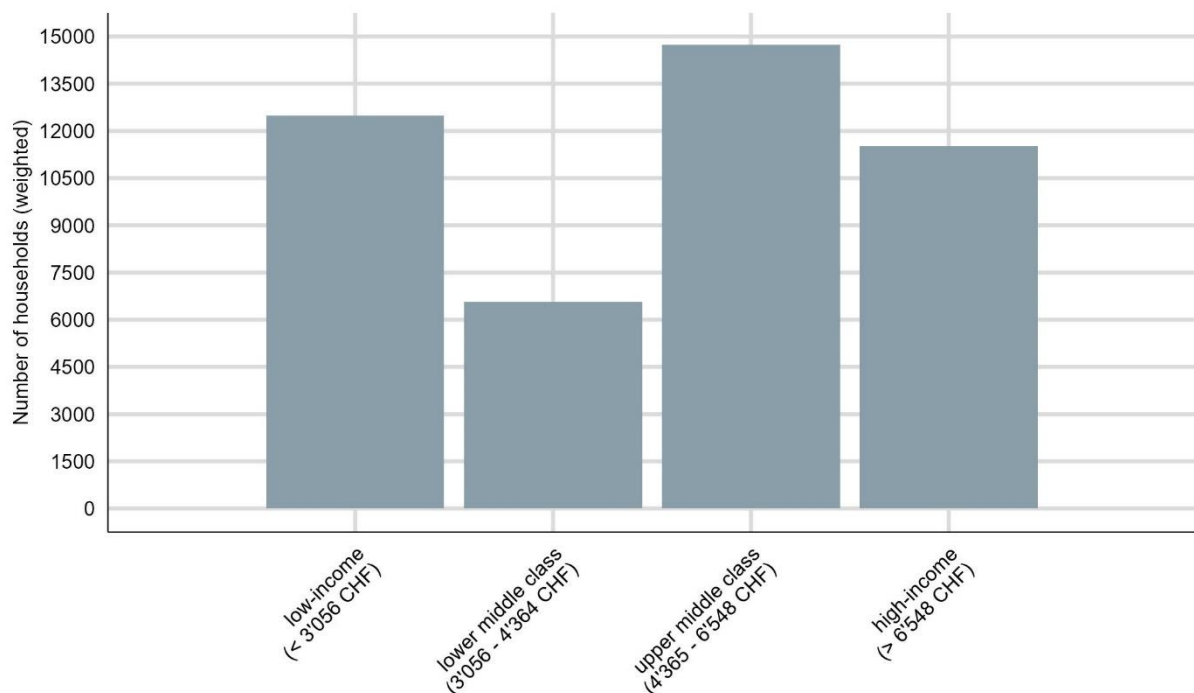


Figure 1: Number of households by income group (Source: Microcensus Mobility and Transport 2015)

Some interesting findings have emerged from the analysis of data from the Mobility and Transport Microcensus 2015, spatial data from the Federal Office for Spatial Development (ARE) and environmental factor data from Mobitool.

Low-income households have the lowest rates of car ownership (69%) and driving licenses (70%), while high-income households have the highest rates (87% and 94%, respectively). Additionally, public

¹ FSO, Einkommensmitte: <https://www.bfs.admin.ch/bfs/de/home/statistiken/wirtschaftliche-soziale-situation-bevoelkerung/soziale-situation-wohlbefinden-und-armut/einkommensmitte.html>

² EUROSTAT, equivalized income: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Equivalised_income



transportation usage is higher among wealthier groups, with 48% of high-income households holding a Half-Fare Card, compared to 28% in low-income households.

The daily distances increase with rising income (see Figure 2). The distance based modal split differs across the income groups and transport purposes. For example, low-income households use public transport more often for educational trips than other income groups but are more likely to drive to and from work (see Figure 3).

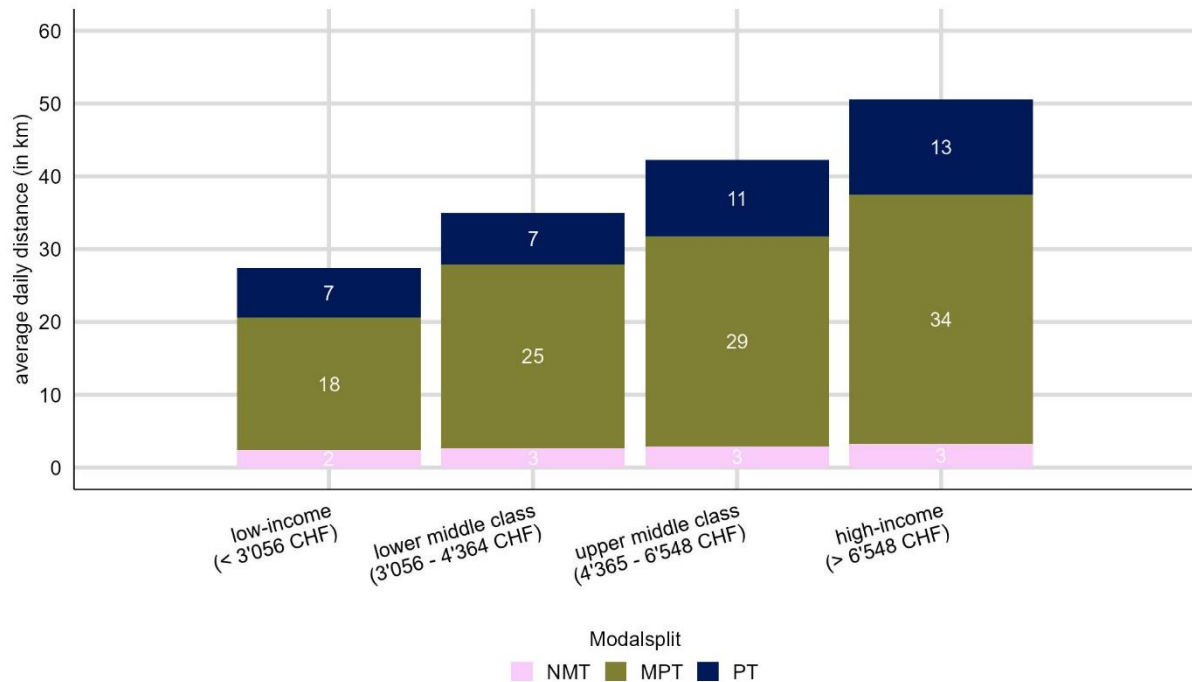


Figure 2: Daily distances and modal split by income group (NMT = non-motorised transport, MPT = motorised private transport, PT = public transport)

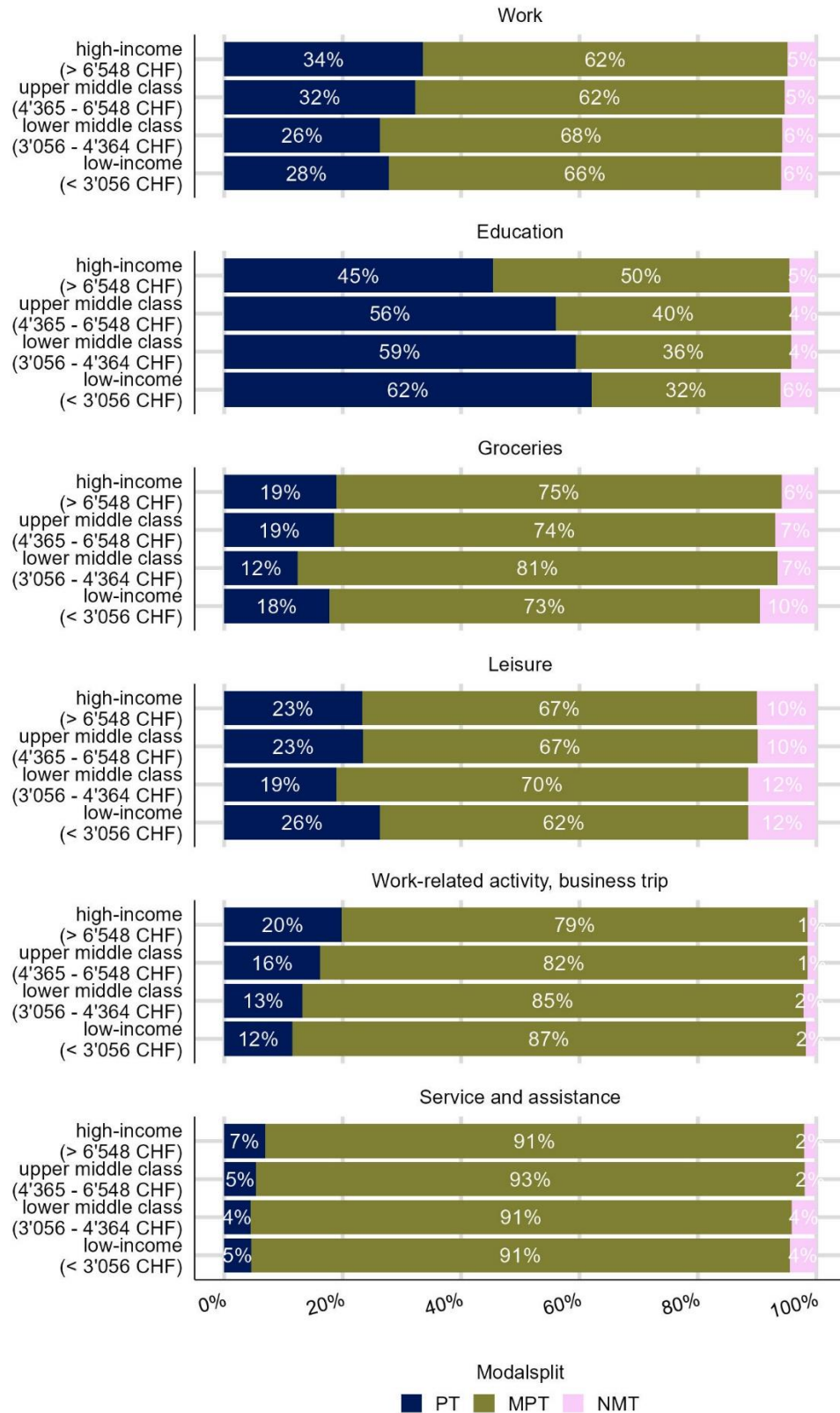


Figure 3: Distance based modal split by transport purpose and income group.



The amount of energy used related to mobility is highly correlated with the household income with low-income households using the least energy disregarding the transport purpose (see Figure 4).

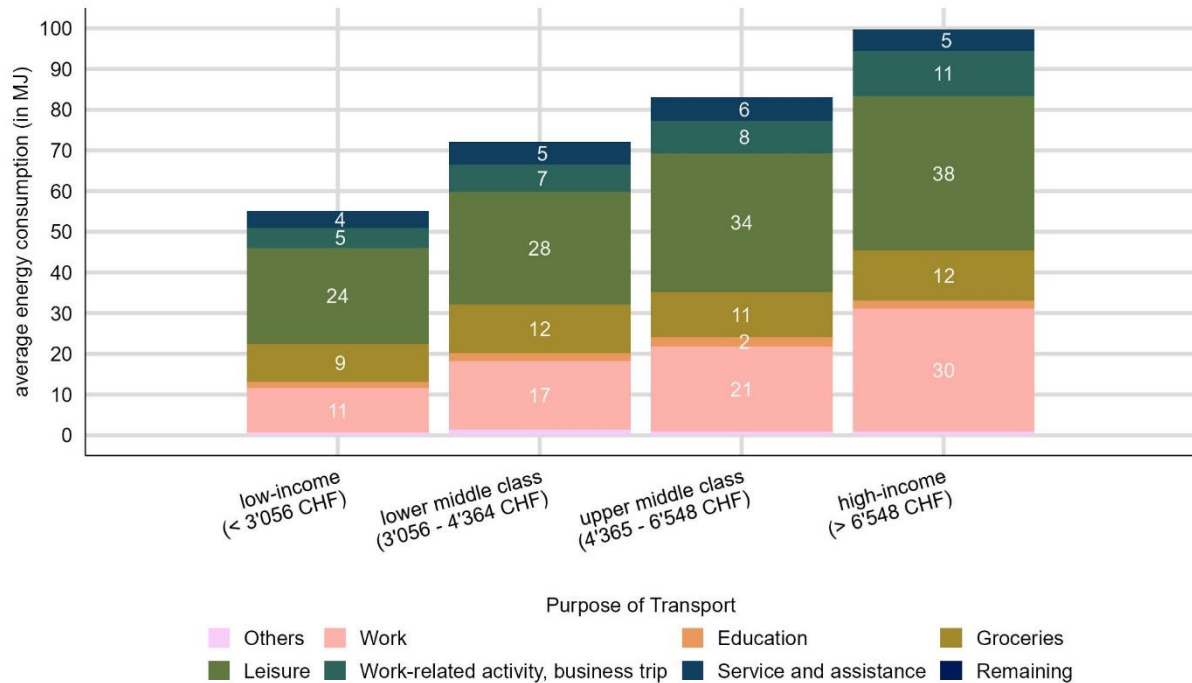


Figure 4: Energy consumption by transport purpose and income group

2) Working Package 2: First survey

The concept and implementation of the first survey has been successfully planned. The sample for the first survey is drawn from the professional mobility tracking panel at Intervista. The research team met with the people responsible from Intervista, who are conducting the field research. Based on the research questions, the first survey is designed to elicit social norms, attitudes towards different means of transport, car and public transport ticket ownership and the financial situation of the Swiss population in combination with mobility tracking data. The first survey has been revised by the research team and Intervista. The survey will be presented to the steering group at its second meeting in September and discussed with the group. Finally, it will be tested within a pretest. The first survey will start in autumn 2025.

3) Working Package 3: Development of measures

No activities recorded.

4) Working Package 4: Second Survey

No activities recorded. The second survey will start in the second quarter of 2027.

5) Working Package 5: Scientific dissemination and exchange

The PhD student attended the 12. Swiss Energy Conference in November 2024 and will attend the Swiss Mobility Conference in September 2025. Moreover by attending a Summer School in Small Area Analysis at GESIS – Leibniz Institute for the Social Sciences, he was able to improve his methodological skills.

6) Working Package 6: Monitoring



In March 2025, the steering group met the project team for the first time and discussed possible ventures of the project (see protocol in the appendix). The steering group will meet again in September 2025 and give their feedback to the questionnaire draft of the first survey.

3 Conclusions and outlook

Our conclusions from the analysis in Working Package 1 are so far as follows: Mobility behavior of low-income households differs from that of the general population. Low-income individuals travel shorter daily distances across all purposes, use public transport more frequently for shopping and education, but less for commuting. They are less likely to own a car or public transport subscriptions and tend to benefit from better public transport access, although the majority still rely on motorized individual transport. Low-income groups consume less energy and produce fewer CO₂ emissions in mobility compared to other income groups.

With the definition of low-income households, the target group can now be clearly defined. The planned survey and mobility tracking data in Working Package 2 will help us to deepen the results from the microcensus and, in particular, to gain insights into the norms and values of this target group. These will be important for the development of measures in Working Package 3.

4 National and international cooperation

Following a tip from the steering group, the project team met with the people responsible at 42 hacks to discuss their projects and possible cooperations.

In addition, the project team can benefit from the ongoing work within the SWICE project. Interface is involved in this research project as part of Working Package 6, where it is investigating issues relating to the connection between new work and mobility.

5 Publications and other communications

No activities recorded.

6 References

- Allen, Jeff, and Steven Farber. 2019. 'Sizing up Transport Poverty: A National Scale Accounting of Low-Income Households Suffering from Inaccessibility in Canada, and What to Do about It'. *Transport Policy* 74 (February): 214–23. <https://doi.org/10.1016/j.tranpol.2018.11.018>.
- Allen, Jeff, Christopher D. Higgins, Daniel Silver, and Steven Farber. 2023. 'Are Low-Income Residents Disproportionately Moving Away from Transit?' *Journal of Transport Geography* 110 (June): 103635. <https://doi.org/10.1016/j.jtrangeo.2023.103635>.
- Axhausen, Kay W., Stephane Hess, Arnd König, Georg Abay, John J. Bates, and Michel Bierlaire. 2008. 'Income and Distance Elasticities of Values of Travel Time Savings: New Swiss Results'. *Transport Policy* 15 (3): 173–85.



- Barri, Elnaz Yousefzadeh, Steven Farber, Anna Kramer, Hadi Jahanshahi, Jeff Allen, and Eda Beyazit. 2021. 'Can Transit Investments in Low-Income Neighbourhoods Increase Transit Use? Exploring the Nexus of Income, Car-Ownership, and Transit Accessibility in Toronto'. *Transportation Research Part D: Transport and Environment* 95 (June): 102849. <https://doi.org/10.1016/j.trd.2021.102849>.
- BFE, Bundesamt für Energie. 2022. *Schweizerische Gesamtenergiestatistik*.
- Büchs, Milena, and Giulio Mattioli. 2024. 'How Socially Just Are Taxes on Air Travel and "Frequent Flyer Levies"?' *Journal of Sustainable Tourism* 32 (1): 62–84. <https://doi.org/10.1080/09669582.2022.2115050>.
- Caulfield, Brian, Dylan Furszyfer, Agnieszka Stefaniec, and Aoife Foley. 2022. 'Measuring the Equity Impacts of Government Subsidies for Electric Vehicles'. *Energy* 248 (June): 123588. <https://doi.org/10.1016/j.energy.2022.123588>.
- Curl, Angela, Julie Clark, and Ade Kearns. 2018. 'Household Car Adoption and Financial Distress in Deprived Urban Communities: A Case of Forced Car Ownership?' *Transport Policy* 65 (July): 61–71. <https://doi.org/10.1016/j.tranpol.2017.01.002>.
- Ekins, Paul, and Simon Dresner. 2004. *Green Taxes and Charges: Reducing Their Impact on Low-Income Households*.
- Hardman, Scott, Amrit Chandan, Gil Tal, and Tom Turrentine. 2017. 'The Effectiveness of Financial Purchase Incentives for Battery Electric Vehicles – A Review of the Evidence'. *Renewable and Sustainable Energy Reviews* 80 (December): 1100–1111. <https://doi.org/10.1016/j.rser.2017.05.255>.
- Javaid, Aneeqe, Felix Creutzig, and Sebastian Bamberg. 2020. 'Determinants of Low-Carbon Transport Mode Adoption: Systematic Review of Reviews'. *Environmental Research Letters* 15 (10): 103002. <https://doi.org/10.1088/1748-9326/aba032>.
- Jenkins, Kirsten, Benjamin K. Sovacool, and Darren McCauley. 2018. 'Humanizing Sociotechnical Transitions through Energy Justice: An Ethical Framework for Global Transformative Change'. *Energy Policy* 117 (June): 66–74. <https://doi.org/10.1016/j.enpol.2018.02.036>.
- Landis, Florian. 2024. *Distributional Impacts of Swiss Climate Policy*. ZHAW Zürcher Hochschule für Angewandte Wissenschaften. <https://doi.org/10.21256/zhaw-30465>.
- Lucas, Karen. 2006. 'Providing Transport for Social Inclusion within a Framework for Environmental Justice in the UK'. *Transportation Research Part A: Policy and Practice* 40 (10): 801–9. <https://doi.org/10.1016/j.tra.2005.12.005>.
- Lucas, Karen, Ian Philips, Corinne Mulley, and Liang Ma. 2018. 'Is Transport Poverty Socially or Environmentally Driven? Comparing the Travel Behaviours of Two Low-Income Populations Living in Central and Peripheral Locations in the Same City'. *Transportation Research Part A: Policy and Practice* 116 (October): 622–34. <https://doi.org/10.1016/j.tra.2018.07.007>.
- Michie, S., M. Johnston, C. Abraham, R. Lawton, D. Parker, and A. Walker. 2005. 'Making Psychological Theory Useful for Implementing Evidence Based Practice: A Consensus Approach'. Original Article. *BMJ Quality & Safety* 14 (1): 26–33. <https://doi.org/10.1136/qshc.2004.011155>.
- Michie, Susan, Maartje M. van Stralen, and Robert West. 2011. 'The Behaviour Change Wheel: A New Method for Characterising and Designing Behaviour Change Interventions'. *Implementation Science* 6 (1): 42. <https://doi.org/10.1186/1748-5908-6-42>.



Moody, Joanna, and Jinhua Zhao. 2019. 'Car Pride and Its Bidirectional Relations with Car Ownership: Case Studies in New York City and Houston'. *TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE* (Oxford) 124 (June): 334–53. <https://doi.org/10.1016/j.tra.2019.04.005>.

Zhao, Zhan, and Jinhua Zhao. 2020. 'Car Pride and Its Behavioral Implications: An Exploration in Shanghai'. *Transportation* 47 (2): 793–810. <https://doi.org/10.1007/s11116-018-9917-0>.