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Interim report from 10 October 2024

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## WahrVel

# **Distributional Effects of Energy Policy Instruments: Perception and Preferences**

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# UNIVERSITÄT LUZERN

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



## Summary

The project examines how Swiss citizens perceive the fairness of regulatory taxes in the energy sector, with a focus on gasoline and heating fuel taxes. The project combines both quantitative and qualitative methods. In spring 2024, the first survey was conducted among a sample of the Swiss population. Respondents were presented with different conceptions of fairness regarding regulatory taxes and were asked to indicate their level of agreement. We then experimentally tested if and how respondents perceive the monetary distributional outcomes of regulatory taxes as fair. A second survey will be conducted in spring 2025. First, it will investigate whether people hold different perceptions regarding taxes on gasoline versus taxes on heating fuel. Second, an experiment will be used to explore the population's preferences for the allocation (earmarking) of revenue from both these tax sources. Both surveys aim to identify subgroups within the population that share similar preferences. After the second survey, workshops will be held to validate the quantitative results and draw conclusions for policymakers.

## Zusammenfassung

Das Projekt analysiert die wahrgenommene Fairness von Lenkungsabgaben im Energiebereich durch die Schweizer Stimmbevölkerung. Im Zentrum stehen Lenkungsabgaben auf Treib- und Brennstoff. Im Projekt werden sowohl quantitative als auch qualitative Methoden kombiniert. Im Frühjahr 2024 wurde die erste Befragung einer Stichprobe der Schweizer Stimmbevölkerung durchgeführt. In dieser Befragung wurden einerseits verschiedene Fairnessvorstellungen im Zusammenhang mit Lenkungsabgaben erhoben. Andererseits wurde experimentell untersucht, inwieweit die Bevölkerung monetäre Verteileffekte durch Lenkungsabgaben als fair beurteilt. Im Frühjahr 2025 wird eine zweite Befragung durchgeführt. In dieser wird erstens untersucht, ob Personen Abgaben auf Treibstoffen und Abgaben auf Brennstoffen grundsätzlich anders bewerten. Zweitens wird mittels eines Umfrageexperiments untersucht, welche Präferenzen die Bevölkerung bezüglich der Einnahmenverwendung (Zweckbindung) aufweist. Beide Befragungen zielen darauf ab, Subgruppen innerhalb der Bevölkerung zu identifizieren, welche ähnliche Präferenzen aufweisen. Nach der zweiten Befragung werden Workshops durchgeführt, um die quantitativen Ergebnisse zu validieren und Erkenntnisse für die Weiterentwicklung der Schweizer Energiepolitik abzuleiten.

## Résumé

Le projet analyse la perception de l'équité des taxes incitatives dans le domaine de l'énergie par la population électorale suisse. Il se concentre sur les taxes incitatives appliquées aux carburants et combustibles. Le projet combine des méthodes quantitatives et qualitatives. La première enquête a été menée au printemps 2024 auprès d'un échantillon de la population électorale suisse. Cette enquête a permis d'une part de recueillir différentes conceptions de l'équité en rapport avec les taxes incitatives. D'autre part, une étude expérimentale a été menée pour savoir dans quelle mesure la population jugeait équitables les effets de répartition monétaire dus aux taxes incitatives. Une deuxième enquête sera menée au printemps 2025. Premièrement, elle permettra d'une part d'examiner si les personnes évaluent les taxes sur les carburants et les taxes sur les combustibles de manière fondamentalement différente. Deuxièmement, une expérience par sondage est menée pour examiner quelles préférences la population a concernant l'utilisation des revenus (affectation). Les deux enquêtes visent à identifier des sous-groupes au sein de la population qui présentent des préférences similaires. Après la deuxième enquête, des ateliers seront organisés afin de valider les résultats quantitatifs et en tirer des enseignements pour le développement futur de la politique énergétique suisse.



# Contents

<b>Summary .....</b>	<b>3</b>
<b>Zusammenfassung.....</b>	<b>3</b>
<b>Résumé.....</b>	<b>3</b>
<b>List of abbreviations .....</b>	<b>5</b>
<b>1      Introduction.....</b>	<b>6</b>
1.1    Context and motivation .....	6
1.2    Project objectives .....	6
<b>2      Approach, method, results and discussion.....</b>	<b>7</b>
2.1    WP 1: Start phase and literature analysis .....	7
2.2    WP 2: Survey 1 .....	7
2.3    WP 3: Survey 2.....	7
2.4    WP 4: Validation of Results .....	7
2.5    WP 5: Monitoring .....	8
2.6    WP 6: Scientific Exchange .....	8
2.7    WP 7: Project End .....	9
<b>3      Conclusions and outlook.....</b>	<b>9</b>
3.1    Critical assessment of project progress .....	9
3.2    Next steps.....	10
<b>4      National and international cooperation.....</b>	<b>10</b>
<b>5      Publications and other communications .....</b>	<b>10</b>
<b>6      References .....</b>	<b>10</b>
<b>7      Appendix .....</b>	<b>12</b>



## List of abbreviations

DCE	Discrete Choice Experiment
FSE	Factorial Survey Experiment
FSO	Federal Statistical Office
SFOE	Swiss Federal Office of Energy
WP	Work package



# 1 Introduction

## 1.1 Context and motivation

In 2019, the Federal Council decided to aim for net-zero greenhouse gas emissions by 2050. Theoretically, a possible pathway to reducing emissions is through introducing carbon taxes on emitting behaviour (Landis 2019; Thalmann and Vielle 2019). While carbon taxes is said to be economically efficient (Stadelmann-Steffen and Dermont 2018) they exhibit low levels of political support (Levi 2021) and have only been applied to heating fuel in Switzerland (Thalmann and Vielle 2019). In 2021, the Swiss voting population rejected a law that would have introduced a carbon tax on transport fuel and a fee on air travel.<sup>1</sup>

There has been much empirical work done on the political acceptance of carbon tax (Carattini, Kallbeken, and Orlov 2019; Fremstad et al. 2022; Kaiser, Gerdes, and König 2023; Mildenberger et al. 2022; Stadelmann-Steffen and Dermont 2018; Thalmann 2004). More recently, researcher have analysed how fairness perceptions affect the acceptance of carbon taxes (Andor, Lange, and Sommer 2022; Bergquist et al. 2022; Maestre-Andrés, Drews, and van den Bergh 2019; Sommer, Mattauch, and Pahle 2022).

However, to our knowledge, how, when and why carbon taxes are perceived (un-)fair has to our knowledge not been extensively studied in the context of Switzerland. Moreover, no study has positioned the perceived fairness of distributional impacts of carbon taxes at the centre of their analyses.

## 1.2 Project objectives

Our project delves into this research gap, aiming to explore the ways in which the Swiss population perceives carbon taxes from a fairness perspective. We investigate how this perception varies based on the specific tax object, the monetary effects for individuals as well as on what kind of redistribution system is employed. Our approach is threefold:

Firstly, we posit that individuals hold different normative beliefs about the just distribution of monetary burdens and benefits should be distributed *justly* (Hülle, Liebig, and May 2018). We quantitatively analyse these normative concepts, drawing on the “triumvirate of tenets” framework in energy justice research (McCauley et al. 2013): In this framework, the justice perspectives of the population are categorized according to three justice tenets: distributional, procedural justice and justice in recognition (Bal et al. 2023; Heffron 2023; Jenkins et al. 2016; Sovacool et al. 2017; Sovacool and Dworkin 2015).

Secondly, we will examine the *effect of monetary distribution and inequality aversion* on the perception of fairness (Bellemare, Kröger, and Van Soest 2008; Engelmann and Strobel 2004; Fehr and Schmidt 1999; Fischbacher et al. 2023; Sommer, Mattauch, and Pahle 2022). Specifically, we present different hypothetical carbon taxes and their respective monetary outcomes on households to our survey respondents. We regress the perceived fairness on the inequality aversion between the respondents and the households (Fehr and Schmidt 1999).

Thirdly, we analyse sectoral differences. On the one hand, we examine whether people hold different values towards carbon taxation for heating or transport (Thalmann and Vielle 2019). On the other hand, we experimentally test the influence of different green earmarking possibilities (Baranzini and Carattini 2017) and fairness arguments (Bennett et al. 2019; Maestre-Andrés, Drews, and van den Bergh 2019) on the public’s perception of carbon taxes. This analysis deepens our understanding of how fairness considerations shape sector-specific preferences.

From an academic perspective, these three-pronged strategy will result in three journal articles on energy and environmental policy. For policymakers, the findings will clarify public perceptions of energy

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<sup>1</sup> The Federal Council (2021): CO2 Act, <https://www.admin.ch/gov/en/start/documenta-tion/votes/20210613/co2-act.html>, last accessed: 16.09.2024



policy, informing enhancements to existing or new measures to achieve the national goal of net-zero emissions by 2050.

## 2 Approach, method, results and discussion

In the last year, there has been progress in multiple work packages (WP):

### 2.1 WP 1: Start phase and literature analysis

WP 1 has already been successfully completed in 2023. In WP1 we assembled the steering group and collected and analysed the relevant literature. The literature was used to conceptualise the two population surveys.

### 2.2 WP 2: Survey 1

Survey 1 has been completed in the first quarter of 2024. The survey was conducted between January 8 and March 11, 2024, with one postal reminder sent in February to encourage participation. We contacted 5,634 Swiss citizens in total. We used the Swiss Federal Statistical Office's sampling frame, which includes a comprehensive list of all registered individuals in Switzerland. Each respondent in our sample received a letter detailing the study, along with a unique login token to access the online survey. A total of 1,415 individual initiated or completed the survey (25%), which is in line with similar studies contacting a random population sample (Epper et al. 2024). We can only provide preliminary results at this point, which will be explained further below (See 2.6).

### 2.3 WP 3: Survey 2

Survey 2 has been successfully designed. In a next step is to vet the survey using a think-aloud protocol. We will pre-test survey 2 in the fourth quarter of 2024 using a professional market researcher's panel. As with survey 1, we will contact a sample of the Swiss voting population through the FSO ( $n \sim 5,000$ ). Survey 2 will start in the first quarter of 2025. Each respondent in our sample will receive a letter detailing the study, along with a unique login token to access the survey. We will at least send one postal reminder will be sent to individuals who have not completed the survey.

Randomly, respondents are portioned in a survey version for carbon taxation on heating and a version for carbon taxation on transport. Next, the overall perception of a carbon tax in either of these sectors is elicited. We ask respondents how fair they find these taxes given a set of redistribution as well as their estimated monetary loss or benefit. Then, we conduct a Discrete-Choice-Experiment (DCE) (Hainmueller, Hopkins, and Yamamoto 2014), where we ask respondent's preferences regarding different combinations of earmarking and redistribution patterns. The aim to receive the following results with survey 2:

- Sectoral differences in the overall perception of carbon taxes
- Sectoral differences in the influence of perceived fairness and estimated monetary outcome on perception of carbon taxes
- Sectoral differences in the influence of earmarking and redistribution choices on respondent's preferences for carbon taxes

### 2.4 WP 4: Validation of Results

In survey 2 we will enlist interested individuals for the qualitative focus groups. The focus groups will be held in autumn of 2025.



## 2.5 WP 5: Monitoring

In April 2024, the steering group<sup>2</sup> met the project team for the second time. We discussed preliminary results from survey 1 and possible routes for survey 2. The next steering group meeting will be held after the results of survey 2 are recorded and preliminarily analysed (second quarter of 2025).

## 2.6 WP 6: Scientific Exchange

The PhD student presented the project's findings at the annual congress of the Swiss Political Science Association at the University of St. Gallen, Switzerland (February 2024), as well as at the 9<sup>th</sup> Workshop on Experimental Economics for the Environment at the Leibniz-Institute for Economic Research in Bochum, Germany (September 2024). At these occasions, the PhD was able to make relevant connections to the following people among others, which might lead to future collaborations:

- Prof. Sanchayan Banerjee, King's College London
- Prof. Jan Hausfeld, Amsterdam School of Economics
- Prof. Karin Ingold, University of Berne
- Dr. Alice Pizzo, Copenhagen Business School
- Dr. Raisa Sherif, Max-Planck Institute
- Prof. Frédéric Varone, University of Geneva

The PhD attended the 29<sup>th</sup> Summer School in Social Sciences Methods at the University of Lugano, Switzerland. He successfully passed the methodological course on Cluster Analysis and Latent Class Analysis held by Prof. Robin Samuel, University of Luxembourg.

The rectorate of the University of Lucerne has elected the project to be presented at the annual Dies Academicus on 7<sup>th</sup> November 2024.

Based on survey I, we are currently working on 2 academic papers (Prinzing, Balthasar, and Tschannen 2025b, 2025a).

### 1) Paper I: Normative fairness evaluations

This paper explores how people hold different fairness conceptions on carbon taxation (Prinzing, Balthasar, and Tschannen 2025b). In order to analyse the normative concepts of justice, we based our analysis on the triumvirate of tenets laid out by McCauley et al. (2013). The approach has been used widely in the energy justice literature (Heffron 2023; Jenkins et al. 2016; Sovacool and Dworkin 2015). The tenets include distributional justice, procedural justice, and recognition justice, each further distinguished by specific conceptions (Agusdinata et al. 2023; Bal et al. 2023; Bennett et al. 2019; Colquitt 2001; Demski et al. 2019; Hülle, Liebig, and May 2018).

We elicited several variables on socio-demography as well as political attitudes which might influence the normative fairness perceptions (Carattini, Kallbekken, and Orlov 2019; Levi 2021; Thalmann 2004). Using hierarchical and non-hierarchical cluster analysis on these variables, we identified multiple sub-groups within the population with distinct climate policy preferences. These groups differ according to their climate policy preferences. Next, we tested, if the group membership influences preferences on different carbon tax conceptions. We found that group classification can explain differences in what people might consider a fair carbon tax. Furthermore, we can characterize these two groups in terms of age, gender, income and living conditions.

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<sup>2</sup> The steering group contains of: Anne-Kathrin Faust, SFOE; Roger Ramer, FOEN; Isabelle Stadelmann-Steffen and Bettina Höchli, both University of Bern; Peter Felser, Felser Brand Leadership



## 2) Paper II: Inequality Aversion and Perception of Fairness

This paper examines how Swiss citizens perceive the fairness of carbon taxes on heating fuel, transport fuel, and air travel fees (Prinzing, Balthasar, and Tschanen 2025a). We conducted a factorial survey experiment (FSE) with 1'069 respondents. Utilizing the Fehr and Schmidt framework (1999), we analyze the effects of inequality aversion on these perceptions. Respondents were presented with hypothetical carbon taxes. Each carbon tax was explained in terms of monetary outcomes for two model households. By eliciting items, we estimated the monetary outcomes for each vignette and respondent. The fairness perception was then regressed on this monetary outcome and the differences relative to other households (Fehr and Schmidt 1999; Lü and Scheve 2016).

Preliminary regression analyses reveal a robust and significant negative effect of advantageous inequality aversion (when an individual's outcome is greater than that of others). Surprisingly, net benefit and disadvantageous inequality aversion do not impact respondents' fairness perceptions. This finding holds when interacted with different tax objects, partially contradicting existing literature on carbon tax perception and highlighting intriguing determinants of fairness perception regarding the distributional impacts of carbon taxation.

The two papers are currently being drafted. We will submit the papers to targeted journals (Energy Research and Social Sciences, Ecological Economics) throughout 2025.

## 2.7 WP 7: Project End

No activities recorded.

# 3 Conclusions and outlook

## 3.1 Critical assessment of project progress

Due to unforeseen delays in accessing to the addresses for the surveys, survey 1 was postponed to early 2024. Subsequently, survey 2 will be moved into early 2025, to avoid public holidays. We plan to hold the focus groups of WP 4 in late 2025. The white paper containing the most important scientific findings and policy recommendations, as well as the final report for the SFOE is still planned for the first quarter of 2026.

The response rate of survey 1 (25%) fell below the aimed threshold of 33% or 1,860 respondents. This threshold was set by the Federal Statistical Office (FSO) when using their sampling frame. Possible reasons for this shortcoming are:

- Timing: We conducted survey 1 between public holidays. Moreover, the duration of the survey was only 1 month. For the next survey, we will increase response time.
- Reminder: We sent only one postal reminder to minimize costs. For the next survey, we will potentially send another reminder, if response rates remain low.
- Mode: We only provided the option to fill out the survey electronically. Although technical assistance was available throughout, especially older individuals might have refrained from participating.
- Difficulty: The survey introduced a difficult concept (carbon taxation and subsequent redistribution in climate politics), which might have discouraged participation. In survey 2 we will make sure, that the subject is easy to understand.

Nonetheless, the number of responses obtained is sufficient to conduct the necessary statistical analyses.



### 3.2 Next steps

We are currently preparing survey 2 (feedback from monitoring group, think-aloud and pre-testing). Moreover, the PhD is working on the two academic papers mentioned above. We prepare the qualitative focus groups of work package 4.

## 4 National and international cooperation

Not applicable

## 5 Publications and other communications

Not applicable

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## 7 Appendix

Not applicable