



Schweizerische Eidgenossenschaft  
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Federal Department of the Environment, Transport,  
Energy and Communications DETEC

**Swiss Federal Office of Energy SFOE**  
Energy Research and Cleantech Division

Interim report dated 01 October 2024

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## **FINDIT**

Leveraging the Swiss financial sector to finance  
direct investments in the energy transition

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# **ETH** zürich

**Date:** 01.10.2024

**Location:** Bern

**Publisher:**

Swiss Federal Office of Energy SFOE  
Energy Research and Cleantech  
CH-3003 Bern  
[www.bfe.admin.ch](http://www.bfe.admin.ch)

**Subsidy recipients:**

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**SFOE contract number:** SI/502527-01

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



## Zusammenfassung

Heute ist nur wenig über Investitionen in Erneuerbare Energien in die Schweiz (Zuflüsse), aus der Schweiz (Abflüsse) und innerhalb des Landes sowie deren Treiber bekannt. FINDIT wird diese Lücke schliessen, indem es die umfassendste Datenbank für Energieinvestitionen in Verbindung mit Investoreninterviews und Analysen politischer Rahmenbedingungen nutzt. Die Projektergebnisse werden zum ersten Mal eine Übersicht über die Energieinvestitionsmuster in der Schweiz und von Schweizer Investoren im Ausland liefern. Kombiniert mit qualitativen Erkenntnissen über die Einflussfaktoren dieser Muster wird FINDIT Empfehlungen für die Gestaltung der Energie- und Finanzpolitik geben, um Schweizer Kapital optimal für die Energiewende zu nutzen. In den ersten zwei Jahren des Projekts haben wir die erste deskriptive Analyse der Gesamtinvestitionsströme aller OECD-Länder abgeschlossen und die Datenerhebung und -analyse für die Case Study zu den internationalen Investitionen von Energieversorgungsunternehmen in den Fallstudienländern Schweiz, Deutschland und Österreich gestartet. Die Erkenntnisse aus der internationalen Investment-Flow-Landschaft wurden auf zwei internationalen Konferenzen vorgestellt. Dazu wurde auch ein Paper verfasst, welches sich aktuell im peer-review Prozess eines wissenschaftlichen Journals befindet.

## Résumé

Aujourd'hui, nous savons peu de choses sur les investissements dans l'économie réelle des énergies renouvelables de l'étranger vers la Suisse (flux entrants), de la Suisse vers les pays étrangers (flux sortants), et aussi à l'intérieur du pays, ainsi que sur les moteurs de ces investissements. FINDIT vise à combler ces lacunes en exploitant la base de données la plus complète sur les actifs énergétiques réels à ce jour, en synergie avec des entretiens avec des investisseurs ainsi que des analyses politiques. Les résultats du projet fourniront un aperçu des schémas d'investissement dans le domaine de l'énergie en Suisse et à l'étranger. Combiné à des analyses qualitatives sur les moteurs et les obstacles de ces tendances, FINDIT fournira des recommandations pour la mise en place d'une politique énergétique et financière permettant d'exploiter le capital suisse pour la transition énergétique. Au cours des deux premières années du projet, nous avons achevé l'analyse descriptive initiale de l'ensemble des flux d'investissement de tous les pays de l'OCDE, et commencé la collecte et l'analyse de données pour un examen approfondi des moteurs des investissements internationaux des services publics dans les pays étudiés, à savoir la Suisse, l'Allemagne et l'Autriche. Les enseignements tirés de l'analyse de l'évolution des flux d'investissement internationaux ont été présentés lors de deux conférences internationales, et intégrés à un article scientifique qui fait actuellement l'objet d'un examen dans une revue à comité de lecture.

## Summary

Today, little is known about the renewable energy real economy investments from abroad into Switzerland (inflow), from Switzerland to countries abroad (outflow) and within Switzerland and the drivers thereof. FINDIT will address this gap by leveraging the most comprehensive real energy asset database in conjunction with investor interviews and policy analyses. The project results will provide a landscape of energy investment patterns in Switzerland and abroad. Combined with qualitative insights about the drivers and barriers of these patterns, FINDIT will provide recommendations for the design of energy and financial policy to leverage the Swiss capital for the energy transition. In the first two years of the project, we finalized the initial descriptive analysis of overall investment flows of all OECD countries and initiated the data collection and analysis for the deep dive into the drives for international investments of utilities in the case study countries: Switzerland, Germany and Austria. The insights generated from the international investment flow landscape have been presented at two international conferences and incorporated into a scientific paper that is currently under review at a peer-reviewed journal.



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## Abbreviations

BNEF                Bloomberg New Energy Finance

EE                    Energy Efficiency

RE                    Renewable Energy



# 1 Introduction

## 1.1 Background information and current situation

Transitioning towards a net-zero energy system requires a fundamental redirection of finance flows. Accordingly, the financial system must play an important role in this transition (Steffen & Schmidt, 2021). Financial investments are becoming more sustainable, with year-to-year growth rates of sustainable investments around 30% (Swiss Sustainable Finance and CSP University of Zurich, 2021). Yet, we know little about the asset-level structure of these investments because most academic analyses of sustainable finance focus on securities, such as stocks and bonds (Friede et al., 2015).

The net-zero target by the Federal Council will require up to 2.1 billion CHF investments annually until 2035 into new renewable electricity and battery storage in Switzerland alone. (Trutnevyte et al., 2024). Anecdotal evidence points to an important role of Swiss investments in the development of such real assets, however, largely outside of Switzerland. For example, Swiss utilities have invested heavily in RE across Europe. Two of the largest Swiss utilities, Axpo and BKW, have invested in an estimated 1.3 GW of wind and solar PV capacity abroad as of 2019 (SRF, 2019). Compared to these figures, their installed capacity in wind and PV within Switzerland pales, totaling about 5% of the foreign capacity (Axpo, 2022; BKW, 2021). Similarly, Swiss investment managers are among the largest investors in the European energy transition. However, we lack a structured assessment of such investments in and out of Switzerland by technology and investor type and an understanding of the drivers for such investment decisions (e.g., where abroad does Switzerland invest and why). And thus, the impact of Swiss investments on the energy transition - both domestically and internationally - remains unclear.

## 1.2 Purpose of the project

The FINDIT project aims to support Swiss policymakers in designing a regulatory financial framework conducive to the energy transition. While it is undisputed that the capital managed and invested out of Switzerland can contribute greatly to meeting low-carbon energy investment needs globally, it is unclear, which regulatory conditions work best to achieve this goal. FINDIT will generate novel insights into the investor landscape and possible levers of change along two dimensions: First, it will provide a granular landscape of Swiss domestic and international energy investments and, second, it will link these flows to investor types to create a detailed overview of energy investments by investors based in Switzerland. This overview, combined with a comparison to other developed economies will provide the basis for a sound analysis of policy levers to redirect financial flows in accordance with the energy transition and allow us to develop recommendations for energy and financial policy designs in Switzerland to leverage the cross-border investments out of Switzerland for the global energy transition.

## 1.3 Objectives

The project addresses three research questions:

1. How do energy investment patterns of Swiss actors develop by technology and over time?
2. What underlying drivers, including sustainable finance commitments as well as financial and energy policy, explain the patterns observed in the landscape?
3. How can Swiss policymakers leverage domestic investors and their capital to accelerate the transition towards RE and EE in Switzerland and internationally?



Each research question will be addressed in one of three individual work packages. Anticipated outcomes of each work package are the following:

**WP1 Investment patterns:** A landscape of energy investment patterns will, providing the first every overview of energy asset investments in Switzerland and abroad by Swiss investors.

**WP2 Underlying drivers:** Detailed understanding of the drivers of and barriers to low-carbon real asset investments by utilities into different technologies domestically and abroad.

**WP3 Policy levers:** Overview of current policy as well as insights and recommendations as to which current industry and policy initiatives are likely efficient and effective. Based on this, areas where Swiss policymakers could act to leverage the Swiss capital optimally for the global energy transition are identified.

## 2 Description of facility

Not applicable

## 3 Procedures and methodology

Throughout the entire project we use a mixed method approach. The first work package was based solely on quantitative data analysis and focused on the collection, preparation, and descriptive overview of the data. In the second work package, the descriptive analysis will be extended by diving deeper into the drivers for the observed investment behavior based on a case study approach. Qualitative methods, including interviews, will be used to develop a detailed understanding of investment drivers and their relative importance. Work package three will then bring the quantitative and qualitative insights from the first two work packages together and add an additional dimension via desktop research and further interviews with key stakeholders in Switzerland. This will allow the project to provide insights and recommendations as to how Swiss policymakers could leverage the Swiss financial sector more optimally to support the global energy transition.

The core contribution of work package has been finalized and several descriptive analyzes of the investment behavior of Switzerland and other OECD country has been conducted. The results have been captured in a scientific paper that is currently being reviewed in a peer-reviewed journal. Based on the insights from this newly established investment landscape, the direction of the subsequent case study (that to analyze drivers for the observed investment decisions) was decided: the investment behavior of utilities investing abroad. For this case study we will more closely deep-dive the energy investments of (state-owned) utilities in Switzerland, Germany and Austria. To do so, the following methodological approach is taken:

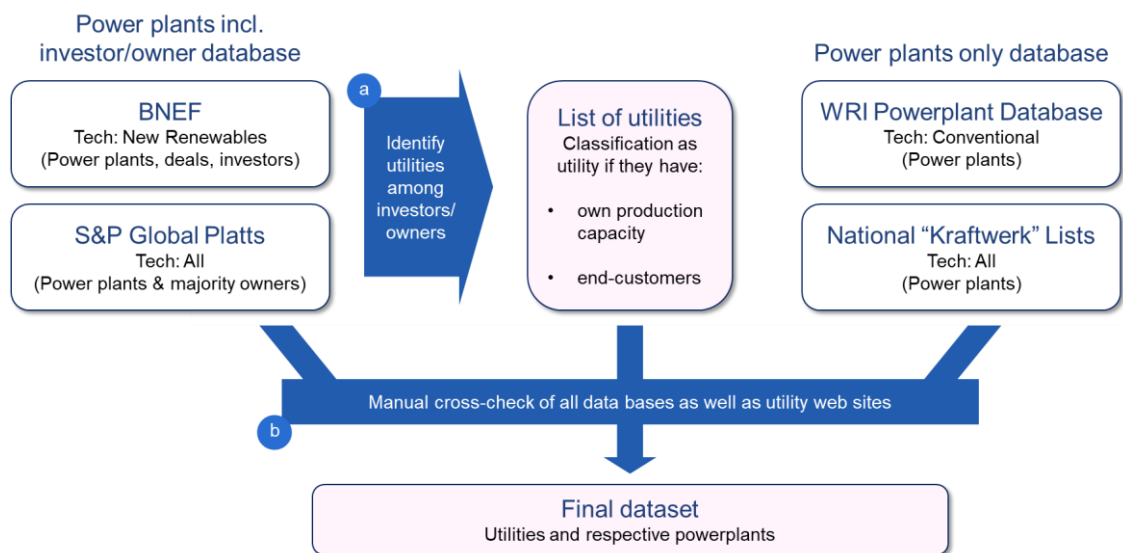
### 1. Quantitative analysis

The quantitative analysis offers an overview of how individual utilities have invested into energy production projects – both domestically as well as internationally. To conduct this analysis, a detailed dataset covering all energy technologies for the relevant utilities is required. Since this is not readily available, we are developing our own dataset using the following methodology:

- a. Identification of utilities: Based on the BNEF data from work package 1 as well as the S&P Global Platts database (covers a large share of global power plants with the respective majority owner) we identified a list of utilities (i.e., provide energy to end-customers) that have production capacity. These utilities are then classified according to their ownership structure (state-owned vs. other types of ownership) including detailed information on type of control (e.g., independent



- or part of a government entity). This was done with the help of the Orbis database as well as manual web search. In the case of Switzerland, 84 utilities have initially been identified .
- b. Power plant data: For each utility relevant to our analysis, we then identified the powerplants that are or have been under their ownership. For this purpose, we manually compared the investment details from our BNEF database, S&P Global Platts, WRI Powerplant Database as well as national “Kraftwerks-Listen” if available. In addition, any available information from a utility’s website (including annual reports) have been sourced. In this way we established a full list of power plants owned (incl. share of ownership) by the respective utilities. This includes the classification of the technology type (includes both new renewables as well as conventional energy), installed capacity in MW, year when the power plant was built or acquired and if relevant the date it was sold or discontinued. If available, the exact location as well as ownership type (directly owned or via an SPV or investment company) is also included. In the case of Switzerland 629 power plants (domestic and abroad) have been identified.
  - c. Investment amounts: To account for the differences in technologies we will calculate the investment amounts using average costs estimates for a given technology at the respective point in time in a final step.



**Figure 1: Schematic model of data collection methodology**

## 2. Qualitative analysis

The qualitative insights into what the main drivers of investments into capacity abroad are and how the decisions of such investments are formed will be collected both via text search in (annual) reports as well as elicited via interviews. For this purpose, we will talk to the key decision makers working for the most relevant utilities investing abroad – as established in the quantitative analysis. These insights will then be evaluated in the context of the organizational ownership structure of these utilities and compared to purely financial investors.

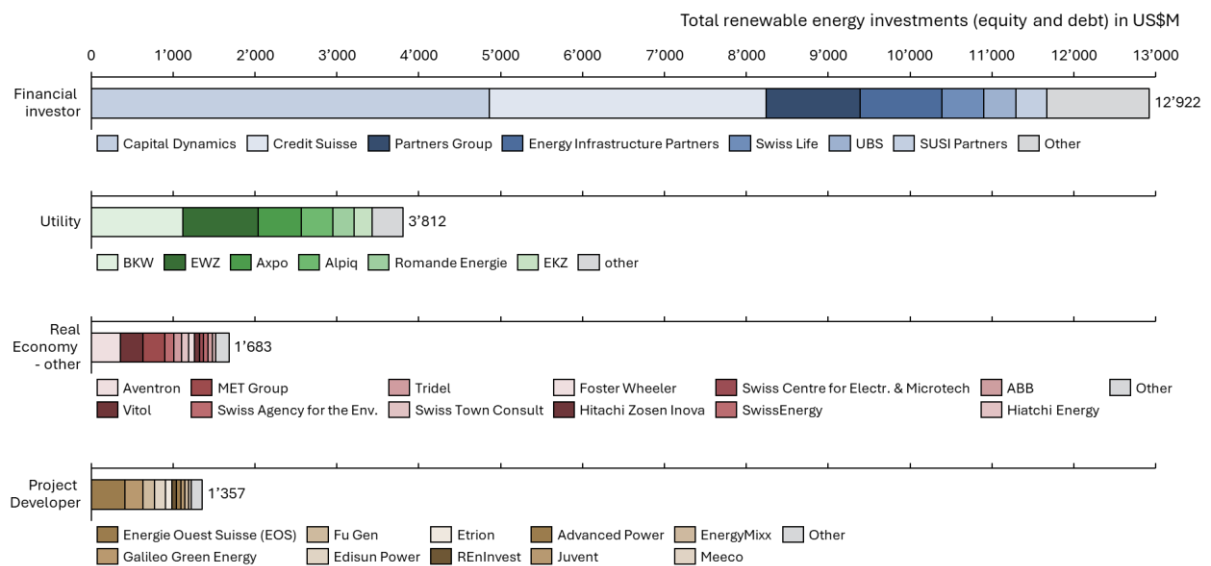


## 4 Activities and results

Core activities in the past years included: i. Finalization of the overall investment landscape, which required additional fine-tuning and verification of the imputation methodology for missing investment data in the BNEF dataset; ii. Submission of paper with key findings to scientific journal; iii. Additional analyses and deep-dives of the available BNEF data; iv. Data collection and initial analyses for utilities deep-dive.

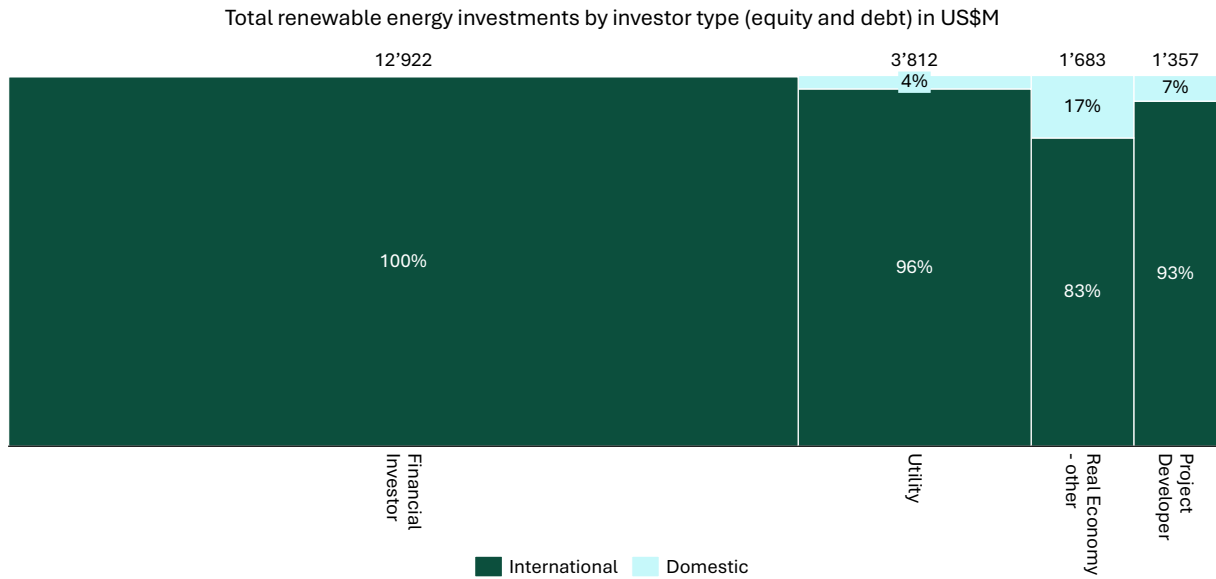
### iii. Additional analyses of BNEF data

While the majority of analyses used in our paper describing overall international investment patterns in OECD countries were done on a country-aggregation level, we conducted some deep-dives into the investment behavior of individual investors and investor types specifically for Switzerland (see for example Figure 2). These in-depth analyses were specifically used to inform the direction of the research (i.e., case study selection) in work package 2.



**Figure 2: Total RE investments by investor per investor type for Swiss investors.** Data is aggregated across all RE technologies (onshore and offshore wind, solar photovoltaics (PV), solar thermal, biomass and waste, small-scale hydroelectric, and marine energy) from 2004 to 2022 and shown in 2020 US\$. Note that this is purely based on the data available in the BNEF dataset, which is not exhaustive for Swiss investments (This is why we are in the process of manually collecting relevant missing data for Switzerland for the utility case study).

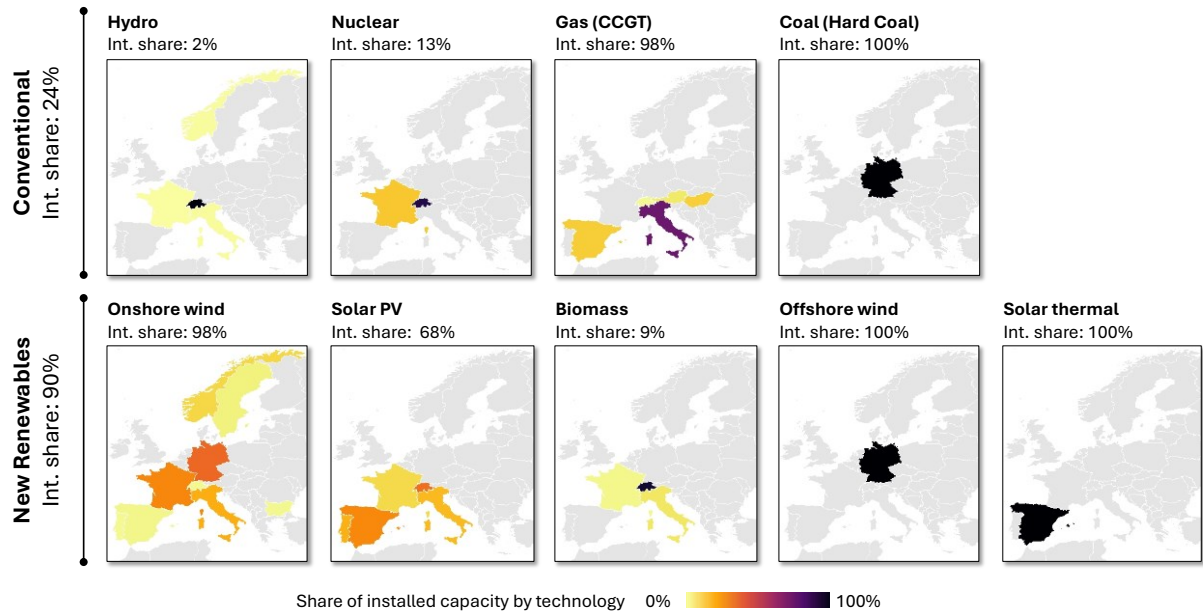
A striking finding of these BNEF data analyses for Switzerland is the immense share of international investments specifically by Swiss utilities (see Figure 3). 96% of the investments by that investor type captured by BNEF data were done internationally. This is substantially higher than the average international investment share of utilities across all OECD countries, which stands at only 31%. To better understand this observation, we are further investigating this investor type through a case study setup.



**Figure 3: Domestic and international investments by investor types for Swiss investors.** Data is aggregated across all RE technologies (onshore and offshore wind, solar photovoltaics (PV), solar thermal, biomass and waste, small-scale hydroelectric, and marine energy) from 2004 to 2022 and absolute investment numbers are shown in 2020 US\$. The area of the chart reflects the relative distribution of domestic versus international investments and the relative share invested by type of investor. The shares of domestic and international investments per investor type are indicated by the percentage numbers within the areas. The absolute annualized investment amounts per investor type is indicated at the top of each column.

#### *iv. Data collection and analyses utilities deep-dive*

As described in the procedures and methodologies section, we are generating a novel dataset containing detailed information of the investments of Swiss, Austrian and German utilities in both conventional and new renewable energy projects. Accordingly, a substantial share of time in the past year has been invested in generating this dataset. Initial results for Switzerland show large differences in the patterns and strategies of Swiss utilities when it comes to international investments for different technology types. While conventional energy is on average much more likely to be installed domestically, this is mostly the case for Hydro and Nuclear only. More carbon-intensive technologies such as gas and coal have been mostly purchased abroad. On the new renewable energy side on the other hand all technologies are predominantly invested abroad, with the exception of biomass.



**Figure 4: Share of installed capacities domestically and internationally by technology.** Data shows all current holdings of installed capacity of Swiss utilities. Note that for this view we excluded investments that have been sold again (as was for example the case with several conventional power plants in the past years).

## 5 Evaluation of results to date

In addition to the results and contributions that have already been achieved in the first year of the project (methodology for the imputation of missing investment data in the BNEF dataset) we summarized our findings of work package 1 in a scientific paper. Once this paper is published, we expect that several key insights, such as a differentiation of internationalization levels between technologies as well as mainstreaming trends in renewable energy financing can be helpful for international policymakers.

Further, we have spent a large share of time and effort on compiling the comprehensive dataset of utilities and the respective holdings of power plants. As part of the dissemination of the findings in this project we expect to also make this novel dataset publicly available. Since no database of the same magnitude and granularity exists so far, we expect this to be a valuable resource for other researchers as well as practitioners and policymakers working in the field of energy in Switzerland, Germany, and Austria.



## 6 Next steps

In the upcoming year, we will focus on finalizing our study of key investment drivers and reasons for the observed investment behavior of the utilities in our case study countries. We will combine these insights with an overview of the current policy landscape both in Switzerland and abroad to develop key policy recommendations as to how Switzerland can best support the energy transition. Key next steps will thus include:

- 1) Finalize data collection for all case study countries (Nov 2024)
- 2) Conduct interviews with most important utilities in case study countries (based on collected data) to understand investment decisions and reasoning (Dec 2024)
- 3) Analyze interview data as well as information in past (annual) reports to develop descriptive overview of key drivers for domestic vs. international investments as well as reasonings for the choice of the respective locations of investments (Jan 2025)
- 4) Gather additional information including relevant policy data (Feb 2025)
- 5) Identify and cross-reference key policies and investor characteristics (e.g., in terms of ownership structure) with the investment behavior. (Apr 2025)

## 7 National and international cooperation

Not applicable

## 8 Communication

The first findings of the project have been presented at the internal International Sustainability Transitions Conference 2023 in Utrecht as well as the International Association for Energy Economics Conference 2024 in Istanbul.

## 9 Publications

Not applicable

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## 11 Appendix

Not applicable