



Laidlaw Scholars Undergraduate Leadership and Research Programme
Research Proposal

Rays of Equity: Overcoming Toronto's Solar Barriers

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Abstract

As global environmental crisis is intensifying, innovative approaches are crucial to mitigate its worst impacts and put the world on a path to net zero. Despite government programs to accelerate the global green transformation, a significant barrier remains: limited adoption of energy-efficient solutions, especially by the low-income households. Canada's low number of rooftop solar uptake highlights the importance and urgency to dive deep into exploring the challenges to adopting innovative, energy-efficient, and climate-friendly technologies such as rooftop solar panels. This research aims to investigate the reasons why low-income households in the Greater Toronto Area encounter obstacles in installing solar panels. Moreover, the project also seeks to conduct a comparative policy analysis between Toronto and Stuttgart, Germany, to explore transferable solutions and approaches for incentivizing rooftop solar panel adoption. The research would employ a multidisciplinary approach, uncovering complex and nuanced insights into the inherent barriers that many low-income households face through analyzing socio-economic factors, policy discourses and outcomes. The methodology behind the research would involve an initial literature review phase, in order to develop a theoretical framework, which will then be followed by comparative policy analysis, and a transferability test. Expected outcomes for this project include context-specific policy recommendations and insights, based on research findings and the transferability test. By contributing to the global academic discourse on sustainable, inclusive green transformation and energy justice, the findings of this research have the potential to inform evidence-based policy choices globally, with the possible impact extending way beyond the researched jurisdictions of Toronto and Stuttgart.

Introduction

As the world grapples with an escalating global environmental crisis, the need for innovative approaches increases day by day to mitigate its impacts. Adoption of energy-efficient solutions is poised to play an increasingly important role in achieving net zero,¹ yet as the governments across the world accelerate the green transformation, an often-overlooked challenge to successfully achieving carbon neutrality is a relative lack of adoption of energy-efficient solutions by low-income households.

Canada's rooftop solar uptake rate is lacking compared to other countries² and would need to be increased manyfold to meet its potential net-zero targets.³ Empirical data shows that rooftop solar uptake numbers are lowest among lower-income households as they often face barriers in

¹ 1. Susanna Berkouwer and Joshua Dean, "Barriers to Energy Efficiency Adoption in Low-Income Communities," December 2021

² International Energy Agency, "Canada 2022 Energy Policy Review," 2022.

³ Canadian Renewable Energy Association, "Dunsky report defines potential for onsite solar to help Canada achieve net-zero," 14 December 2023.

adopting sustainable technologies such as private solar panels,⁴ despite the existence of many government and private sector incentives. Thus, there is a growing need to research and analyze why low-income Canadians face inherent barriers to adopting energy-efficient solutions such as rooftop solar panels.

My research aims to delve into the reasons behind the barriers faced by lower-income households in adopting private-use solar panels as energy-efficient upgrades in the Greater Toronto Area (GTA). The study will also attempt to perform a nuanced comparative analysis of policies influencing household decisions in the GTA with Stuttgart, Germany. The region of Baden-Württemberg was chosen because of its similarity with Ontario when it comes to approximate population size, and how the two subdivisions approach climate action. While there are appropriate geographical differences between the two, the choice nonetheless relies on similarities in administrative structure and policy action towards the green transformation. Performing a comparative study of the policies employed by Baden-Württemberg and its capital Stuttgart to the ones utilized by Toronto has a potential to offer many insights, innovative solutions and examples of successful approaches that can shed light on the broader global applicability of certain policies and inform a more comprehensive and nuanced approach to promoting solar panel uptake. As a recognized European leader in climate action and incentivizing energy-efficient solutions, Stuttgart has enormous potential to share expertise and experience in shaping green transformation outcomes among households.

Research Question & Objectives

How do socio-economic factors and policy dynamics contribute to the limited adoption of private solar panels among low-income households in the Greater Toronto Area, and what transferable lessons can be learned from a comparative analysis with Stuttgart to inform effective strategies for promoting energy-efficient solutions?

The research aims to answer this question through three main objectives:

- 1) Delve into the socio-economic factors influencing the adoption of energy-efficient upgrades, specifically private solar panels, among low-income households in the Greater Toronto Area. Uncover the nuanced interplay of economic conditions, existing policy measures, intrinsic challenges, and lack of adequate governmental support that shape decision-making in these communities.
- 2) Compare the policy frameworks of Toronto and Stuttgart in relation to supporting solar panel uptake to understand how cultural and contextual factors influence the success of energy-efficient policies, especially within low-income populations. Through a comparative lens, dissect

⁴ Eric O'Shaughnessy et al., "The Impact of Policies and Business Models on Income Equity in Rooftop Solar Adoption," *Nature Energy* 6, no. 1 (November 9, 2020): 84–91, <https://doi.org/10.1038/s41560-020-00724-2>.

the nuances and cultural factors that influence the success of Stuttgart's policies to uncover the challenges of their transferability.

3) Analyze the impact of provincial incentives, specifically focusing on Ontario, and assess how they intersect with municipal policies in the GTA to promote solar panel adoption to understand the collective impact on energy efficiency improvements undertaken by low-income communities.

Methodology

Initial Literature Review and Database Search – Week 1: The initial phase involves a meticulous review of existing scholarship on energy poverty, energy justice, environmental economics, and policies fostering energy-efficient technologies. Apart from utilizing the existing database of research articles and publications, I will also reach out to relevant institutes, academic establishments, and public entities in Ontario and Baden-Württemberg to inquire for additional sources of information that might be relevant.

Creating the core theoretical framework – Week 2: After the initial literature review phase, I will use the collected information to create a theoretical framework that will further guide my research. This stage will deepen the understanding of current knowledge gaps and refine the scope of the research question, as well as better shape the direction of more detailed inquiry into municipal and provincial jurisdictions.

Policy Research and Discourse Analysis – Ontario and Greater Toronto Area – Week 3: After developing the theoretical framework, I would delve into the intricacies of municipal and provincial roles in Ontario that help shape current energy efficient solution adoption policies, considering historical trajectories and policy evolution, as well as their assessed effects on successful rooftop solar panel adoption.

Policy Research and Discourse Analysis – Baden-Württemberg and Stuttgart – Week 4: The research would then pivot to doing a similar policy, discourse, and outcome analysis in Baden-Württemberg.

Comparative Analysis and Transferability – Week 5: The research would now employ a critical lens to scrutinize and compare outcomes from the previous two weeks, adhering to the theoretical framework to correctly analyze and compare the findings from Germany and Canada. Based on the resulting comparative policy analysis, I would commence the policy transferability test between Stuttgart and Toronto.

Finalizing the Transferability Test and Conclusion (Weeks 5-6): At the concluding stage of my research, I will finalize the transferability test by assessing my own findings and consulting existing literature on

transferability studies. Using the outcomes from this test, as well as findings from the Week 5's policy analysis, I will develop conclusions and offer insights regarding the socio-economic factors influencing adoption rates, assess policy effectiveness based on theoretical framework and transferable insight from researched jurisdictions, and propose recommendations for policy improvement based on assessing transferability of international practices promoting solar panel installation program uptake.

- **Training/ Certifications Needed**

At this point, the project does not require any training or certifications.

- **Research Location**

The research will be fully conducted in Toronto, Canada.

- **Research Ethics Board**

As confirmed by the project's research advisor, it does not require Research Ethics Board approval.

- **Resources & Support Needed**

No additional resources or support are needed for this project, apart from the submitted budget and weekly check-ins with the research advisor.

International Focus:

The research is positioned to leverage international insight and experience to address an issue faced globally, thus extending beyond the immediate locales of the GTA and aligning with global efforts to address energy poverty and energy justice. By addressing the energy poverty gap and barriers that perpetuate it, the research aligns with global efforts to build a more sustainable future, making it relevant not only to the Canadian and German contexts but also to other regions facing similar challenges across the world.

Role of the Research Advisor

I am lucky to be joined by Dr. Laurel Besco in my research, with experience in analyzing innovative policy tools to tackle complex sustainability and energy efficiency challenges. Her extensive insight will equip my research with tools to apply the understanding of societal and economic dimensions of climate change. Dr. Besco would also provide advice on how to leverage theoretical frameworks and existing data in evaluating socio-economic effects of energy-efficiency policies between the GTA and Stuttgart. Dr. Besco and I have arranged to have recurring weekly meetings for most of the research timeframe, with the latter two weeks having a single bi-weekly meeting, subject to change based on the project's needs.

Expected Outcomes:

- 1) Uncover nuanced insights into the socio-economic factors intricately linked to the adoption of personal solar panels in low-income households and propose why existing programs are not sufficient to lead to increased uptake of solar panels as energy-efficient updates.
- 2) Offer context-specific policy recommendations based on a comparative analysis of the policies in the GTA and Stuttgart, shedding light on successful strategies employed by other jurisdictions, and areas for refinement, as well as an assessment of transferability of the research findings.

This research is expected to contribute to the global discourse on sustainable urban development by offering insights into overcoming barriers to energy-efficient technology adoption faced by the lower-income communities. By breaking down and analyzing the intrinsic causes of lagging rooftop solar uptake among low-income households in Toronto, the outcome of this project paves way for similar jurisdictions across the world to acknowledge the issues of energy poverty and energy justice within their communities and take reasonable actions to alleviate them through making energy-efficient solutions more affordable and available, all while tackling one of the greatest challenges of our lifetimes – climate change. The precedent of a transferability test between Baden-Württemberg and Ontario in the realm of public sector driven green transformation offers an opportunity to bridge the information and expertise gap between countless administrative regions and governments worldwide, making practical case study applications easier and more viable.

References

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