

Learning by Buying: Changes in Energy Literacy over Technology Ownership Duration

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Extended Abstract

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Abstract Summary

Objective energy literacy, defined as proficiency in basic energy knowledge and its application to everyday decisions, has been studied as a strong predictor of household energy behaviours such as conservation and technology adoption. Recent research highlights that it is the synergy between objective and perceived energy literacy that provides a better understanding of the literacy-behaviour relationship. However, most existing studies examine this relationship at a single point in time, implicitly assuming that literacy precedes and drives adoption. This assumption remains largely untested, as it is equally plausible that adopting and using energy technologies generates new knowledge and revises self-assessments over time.

This paper examines how technology adoption, and crucially its duration, are associated with objective and perceived energy literacy and their calibration, defined as whether individuals tend to under- or overestimate their own knowledge. Using survey data from a pilot conducted in Germany (N = 194), we introduce an explicit time component to test whether literacy levels and calibration differ between adopters and non-adopters of electric vehicles (EVs), photovoltaic systems (PVs), and heat pumps (HPs), with special focus on ownership duration.

Our findings suggest that technology adoption is positively associated with both objective and perceived energy literacy, particularly the latter. However, these associations decrease over time, and their trajectories differ by literacy dimension and technology. Notably, PV adopters show a learning-by-buying pattern for objective knowledge, while perceived literacy tends to decline after an initial post-adoption increase. Calibrated individuals represent only around 10% of the sample, and the probability of being calibrated decreases with ownership duration across all technologies.

These results confirm that the relationship between energy literacy and technology adoption is bidirectional and time-dependent, with important implications for how future

studies should address causality and how policy should combine adoption incentives with sustained energy education.

Presenting Author Biography

Laura Andolfi is a Research Associate at the Interdisciplinary Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg.

She received her Bachelor's degree in Economics at the University of Padua, Italy, and her Master's degree in Development Economics at the University of Wageningen, The Netherlands. She completed her PhD in Computer Science at SnT.

Her research interests focus on consumer engagement in the energy transition, encompassing areas such as energy literacy, electricity tariffs and incentives, and energy communities. She also works on policy and market frameworks at both EU and national levels.