

### **Profitability striving or environmental protection – what drives the adoption intention of residential low-carbon technologies?**

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Residential uptake of low-carbon technologies (LCT) is crucial to reaching a net-zero economy. Whilst many studies dealing with the motivations and barriers to adopting specific LCTs exist, achieving net-zero means that we must understand the motivations and barriers to multiple LCTs across households. Using the Theory of Planned Behaviour, we study the determinants of adoption intention for three different LCTs in Germany. For each LCT, the samples consist of German home owners, responsible for their household investment decisions and who are aware of, but still without the LCT in question. The LCTs differed in their product traits: rooftop photovoltaic systems (PV) are high-investment products which are not necessary for a household; energy-efficient fridges or appliances (EEA) are relatively low-investment but necessary household technologies; while green tariffs (GT) are non-investment but provide a necessary household service.

Partial least squares structural equation modelling (SEM) found that the adoption intentions of the three selected residential LCTs were generally driven by similar determinants. Social norms and personal attitude toward PV, EEA, and GT were always significant predictors of adoption intention independent of the LCT. Personal attitude towards PV systems was mainly based on evaluative aspirations of product-specific benefits (environmental and financial evaluations) rather than affective attitudes. The associations between environmental concern and attitude towards PV, EEA, and GT were insignificant. Noted differences in determinants for each LCT arose for perceived behavioural control, with only barriers related to PV having a significant negative association with adoption intention.

Regarding the evaluation constructs, financial evaluation had a significant and greater association with adoption intention than environmental evaluations, with environmental evaluation only having a negligible association for each of the three LCTs. However, following the Theory of Planned Behaviour and using personal attitudes as a mediating pathway for financial and environmental evaluation, the relationship switches with environmental evaluation having a higher, significant association for all three LCTs. An explanation for these findings could be related to the product traits of the LCTs. While EEA and GT are household necessities, PV is an additional 'nice to have' product which is unnecessary for the everyday functioning of the household. In line with existing literature, home owners might accept an 'environmental premium' to protect the environment on necessary goods and services such as EEA and GT. However, home owners only intend to purchase a non-essential LCT if the product is financially attractive. This finding is further supported given that the relationship between attitude and intention in the EEA survey was smaller than that for the PV survey.