

Transitions to low-carbon energy: Perceptions, attitudes, and decision analyses

Habilitation Thesis in Innovation and Sustainability Research

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Abstract

One major challenge that must be faced to achieve sustainable societies is to transform the existing energy systems into low-carbon and environmentally friendly systems. The 14 papers included in this cumulative habilitation thesis broaden our understanding of the factors that drive or hinder the transition to low-carbon, socio-technical systems. The focus of the research work is on the situation in Austria. We conducted multi-criteria decision analyses of different technological and social innovations and empirically surveyed the perceptions, attitudes and decisions of citizens regarding these innovations. In two studies on Bangladesh, we acknowledged the radically different circumstances in emerging economies in the global south.

The studies reveal a rather positive sentiment for low-carbon energy; however, this does not translate into a rapid decarbonization of energy systems. The phase-out of fossil energy is slow, and carbon-intensive energy sources will remain significant parts of the mix in industrialized countries for at least two more decades. The change process remains sluggish despite the high level of public acceptance for renewables and the financial competitiveness of technologies like solar and wind. On the other hand, energy security concerns are being assigned a higher priority than emissions in countries like Bangladesh. This ultimately will lead to extensions of the fossil-fuel infrastructure in developing countries in Asia and Africa. The slow process of de-carbonization in developed countries and the carbon-intensive development of emerging economies thus jeopardize the ambitious climate change mitigation targets.

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Published studies

Part A: Multi-criteria decision analyses of relevant technologies and their adoption

1. Reinsberger K*, **Brudermann T** & Posch A (2015). The Role of Photovoltaics in Energy Transition – Assessing the Prospects for a Regime Shift. *GAIA* 24 (1):49-55.
2. Reinsberger K*, **Brudermann T**, Hatzl S, Fleiss E & Posch A (2015). Photovoltaic diffusion from the bottom-up: Analytical investigation of critical factors. *Applied Energy* 159:178-187.
3. Koinegg J, **Brudermann T***, Posch A & Mrotzek M (2013). "It Would Be a Shame if We Did Not Take Advantage of the Spirit of the Times ..." - An Analysis of Prospects and Barriers of Building Integrated Photovoltaic. *GAIA* 22(1):39-45.
4. **Brudermann T***, Mitterhuber C & Posch A (2015). Agricultural biogas plants - a systematic analysis of strengths, weaknesses, opportunities and threats. *Energy Policy* 76:107-111.
5. Posch A, **Brudermann T***, Braschel N & Gabriel M. (2015). Strategic energy management in energy-intensive enterprises – a quantitative analysis of relevant factors in the Austrian paper and pulp industry. *Journal of Cleaner Production* 90:291-299
6. **Brudermann T** & Sangkakool T* (2017). Green roofs in temperate climate cities in Europe – an analysis of key decision factors. *Urban Forestry and Urban Greening* 21:224-234.
7. Zaman R, **Brudermann T***, Kumar S & Islam N (2018). A Multi-Criteria Analysis of Coal-based Power Generation in Bangladesh. *Energy Policy* 116:182-192.
8. Zaman R & **Brudermann T*** (2018). Energy Governance in the Context of Energy Service Security: A Qualitative Assessment of the Electricity System in Bangladesh. *Applied Energy* 223:443-456.

Part B: Citizens and their perceptions, attitudes and decisions

9. **Brudermann T***, Reinsberger K, Orthofer A, Kislinger M, & Posch A (2013). Photovoltaics in Agriculture: A Case Study on Decision Making of Farmers. *Energy Policy* 61:96-103.
10. Hatzl S, **Brudermann T***, Reinsberger K & Posch A (2014). Do public programs in 'energy regions' affect citizen attitudes and behavior? *Energy Policy* 69:425-429.
11. **Brudermann T***, Bartel G, Fenzl T & Seebauer S (2015). Eyes on social norms: A field study on an honor system for newspaper sale. *Theory and Decision* 79(2):285-30.
12. **Brudermann T***, Zaman R & Posch A. Not in my hiking trail? Acceptance of wind farms in the Austrian Alps. *Clean Technology and Environmental Policy* 21(8):1603–1616.
13. Thaller A* & **Brudermann T** (2020). "You know nothing, John Doe" – Judgmental overconfidence in lay climate knowledge. *Journal of Environmental Psychology* 69:101427.
14. Thaller A, Fleiß E & **Brudermann T** (2020). No glory without sacrifice — drivers of climate (in)action in the general population. *Environmental Science & Policy*, 114, 7–13.