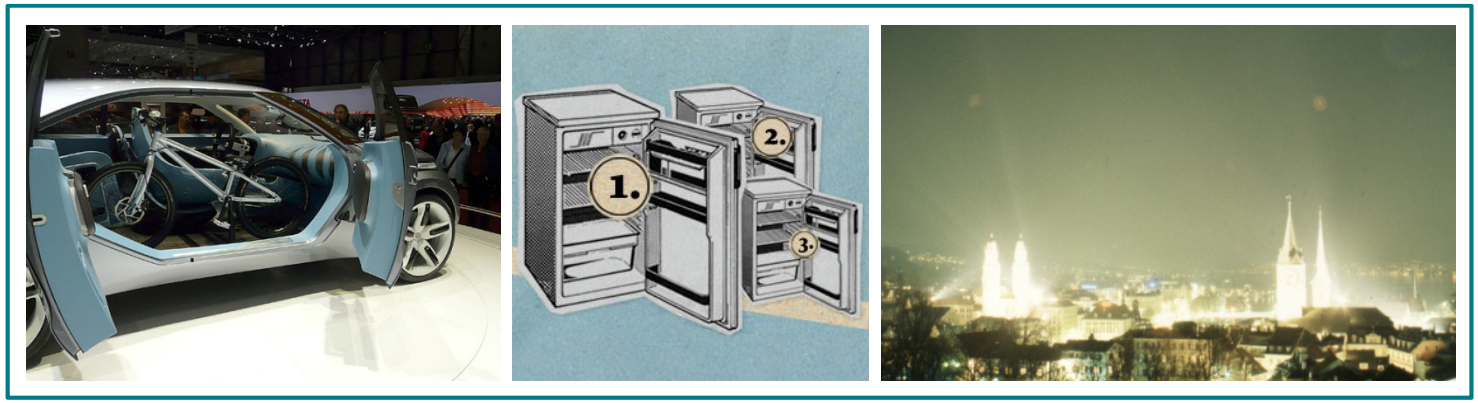
Exploring and analyzing relevance and psychological drivers of rebound effects

Anja Peters, Elisabeth Dütschke & Joachim Schleich
Fraunhofer ISI, Karlsruhe, Germany

Science for the Environment 2013,
Aarhus, Denmark, 3. – 4. October 2013



In cooperation with ZEW (Mannheim), ZIRIUS (Stuttgart), RWI (Essen)
Funded by the German Federal Ministry of Education and Research (BMBF)

Aim and research questions

Previous research concentrates to analyze rebound effects as price and income effects

Aim: Study factors inducing rebound effects from a psychological point of view

Research questions:

1. Does usage behavior of products or services change after an investment in energy-efficiency and how?
2. Which factors play a role for behavioural changes?
3. Which differences exist between different areas of behaviour ?
   a. mobility behaviour
   b. residential behaviour (lighting, heating, usage of appliances)

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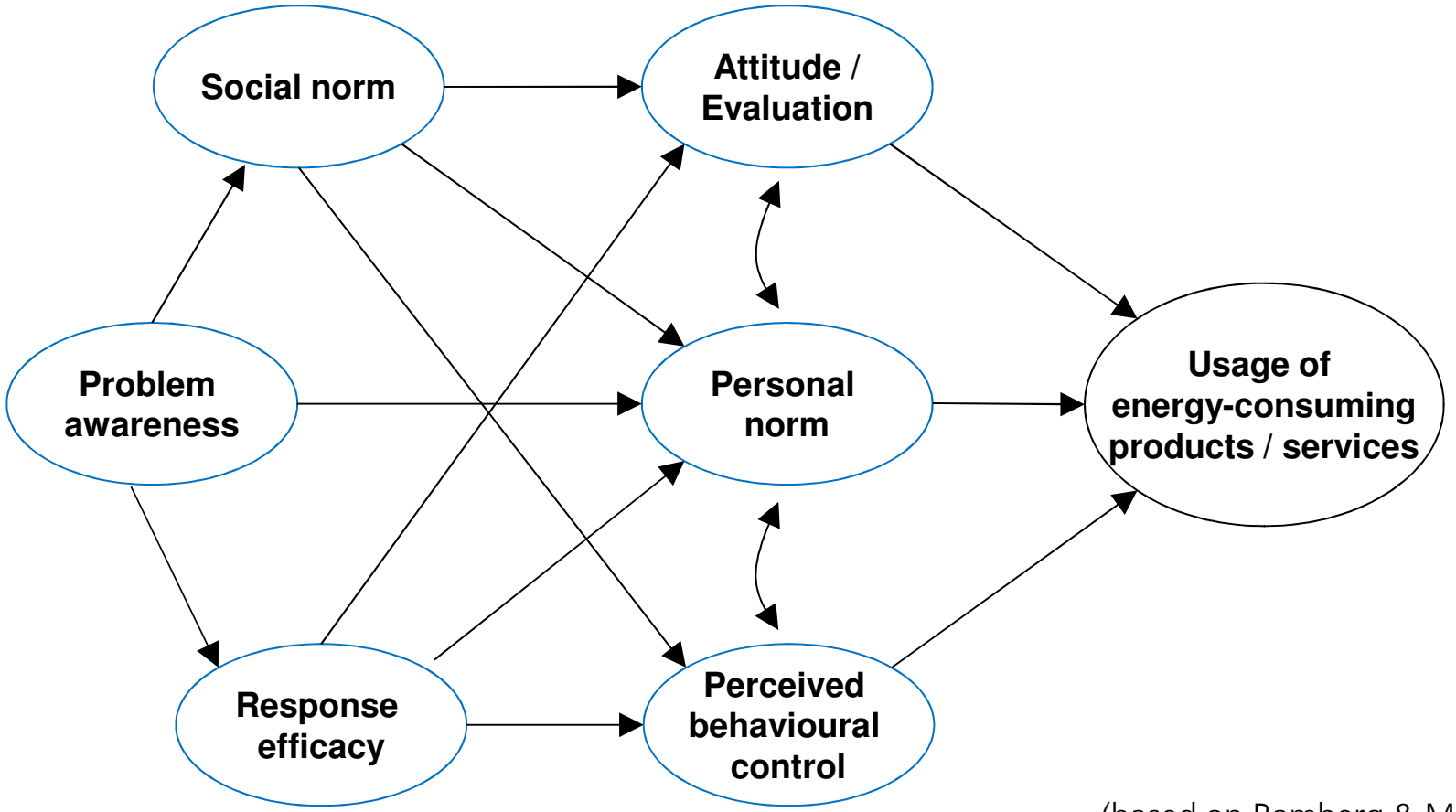
Theoretical framework: 1. Explanation of usage of energy-consuming products / services



(based on Bamberg & Möser, 2003)

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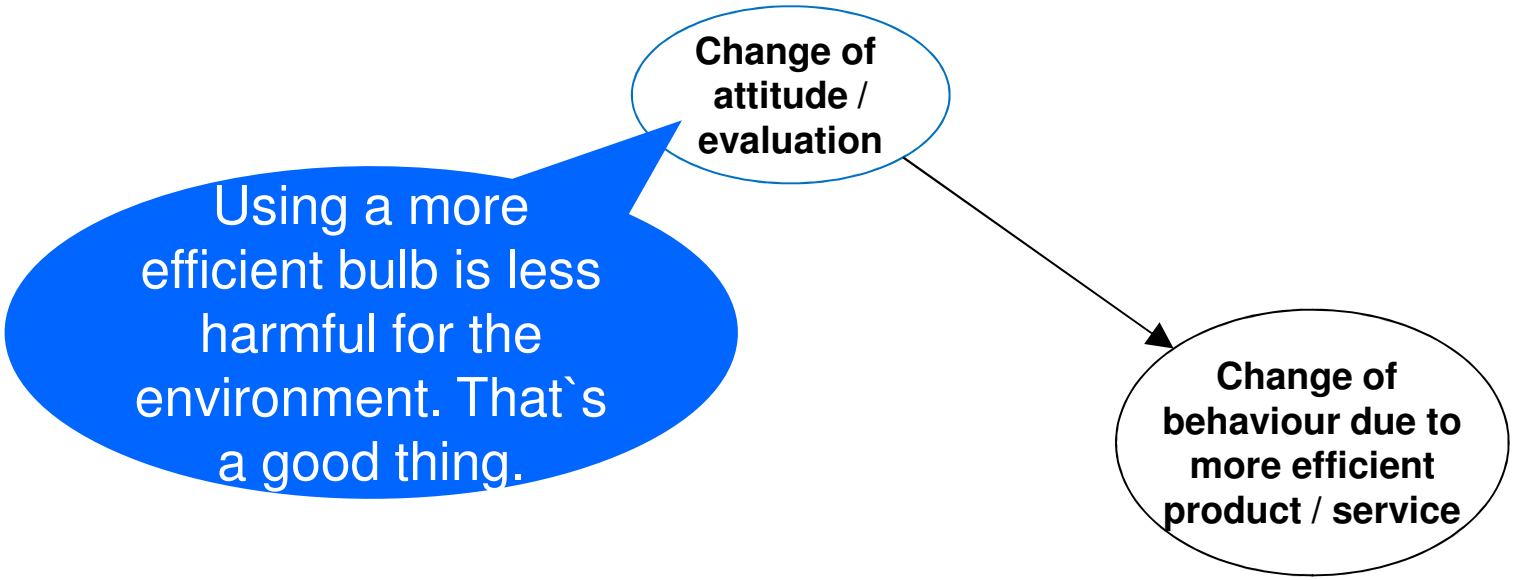
Theoretical framework: Relevant factors for rebound effects



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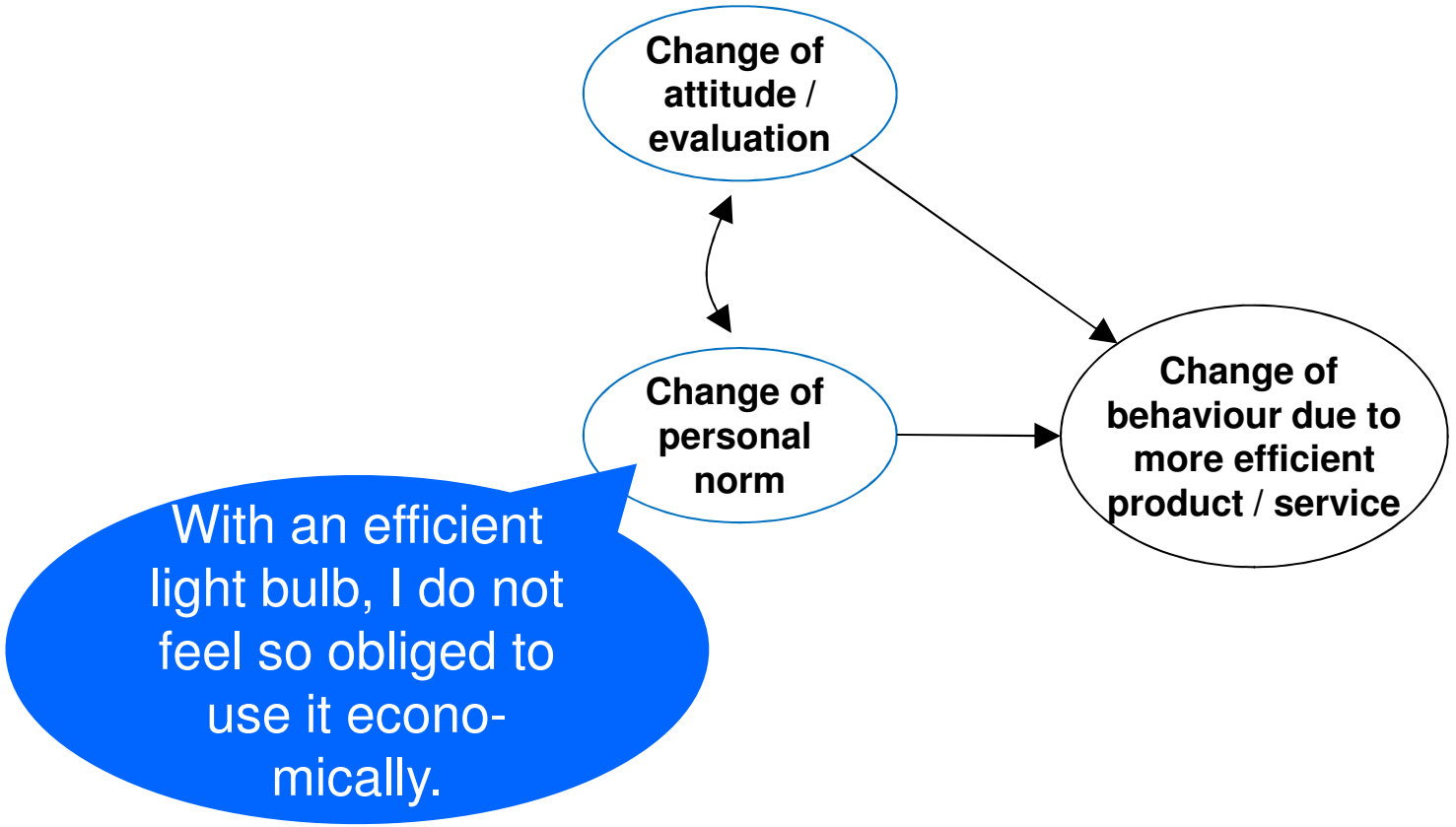
Theoretical framework: Relevant factors for rebound effects



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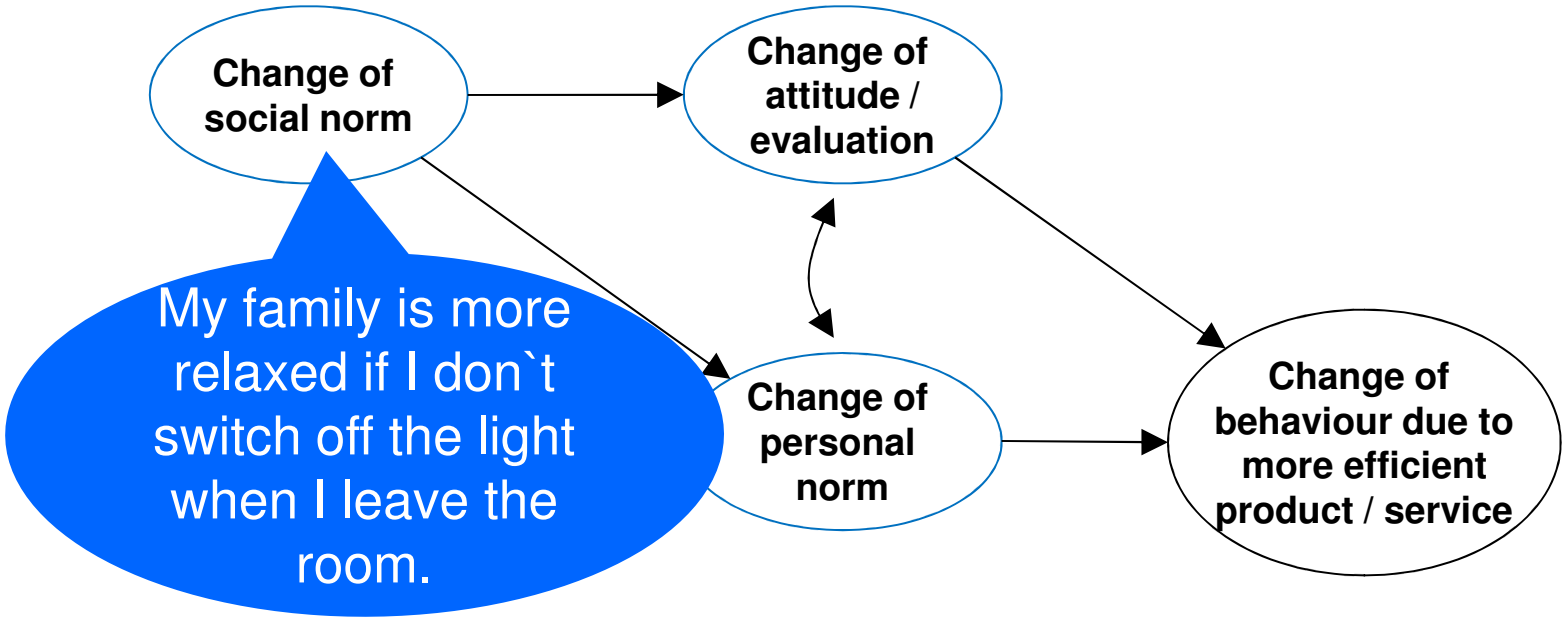
Theoretical framework: Relevant factors for rebound effects



→ Core variables to explore

→ But also need to explore relevance of other variables such as problem awareness, habits and needs

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Two methodological steps

- **Qualitative approach:**

  Aim: explore relevant factors and mechanisms

  Method: focus groups = moderated and structured group discussions on a specific topic

- **Quantitative approach:**

  Aim: analyze relevant factors and test derived hypotheses

  Method: representative questionnaire survey

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Method I: Focus groups

- 10 focus groups: 5 for transport, 5 for residential behaviour
- May – July 2011
- Requirements for participants:
  - Adoption of energy-efficient products / efficiency improvements:
    - transport: change to a more efficient vehicle
    - residential behaviour: insulation of home, change to more efficient appliances or lighting

Sample: *N* = 61; age: 16 to 69, Ø = 42; 78,7 % male

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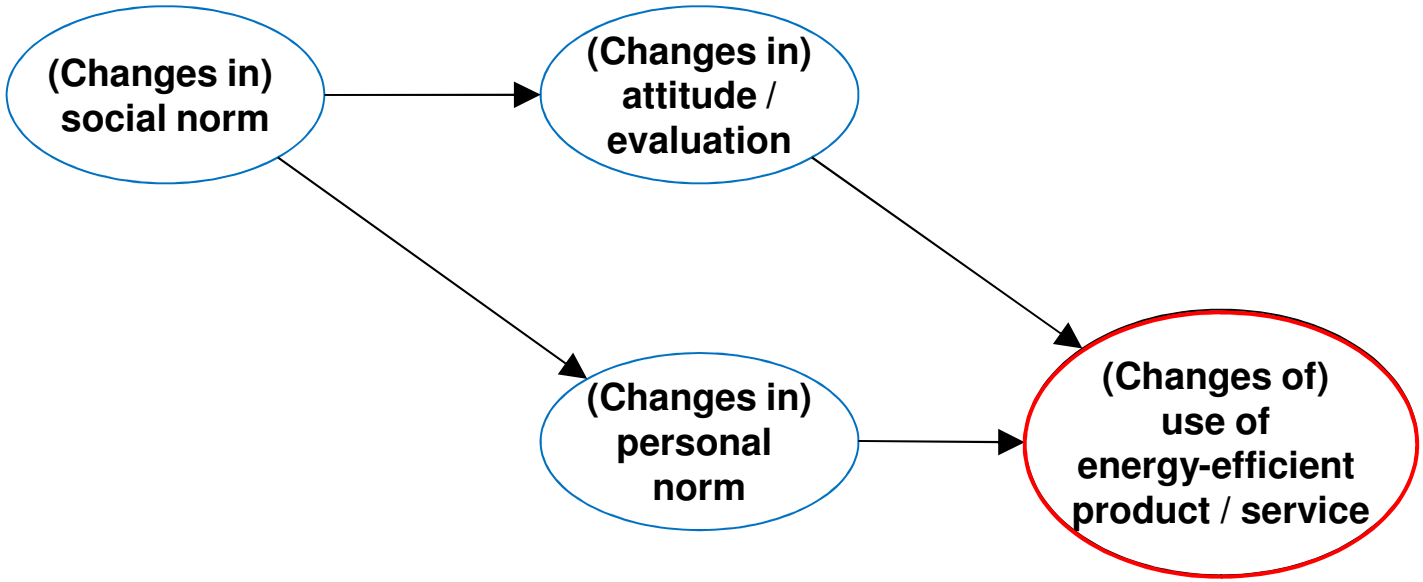
Evidence: Occurring changes of behaviour



→ Increased usage/ demand (= rebound effects) identified mainly for mobility and lighting

→ Also, evidence for absence of behavioral changes and "negative rebound effects" (further reductions)

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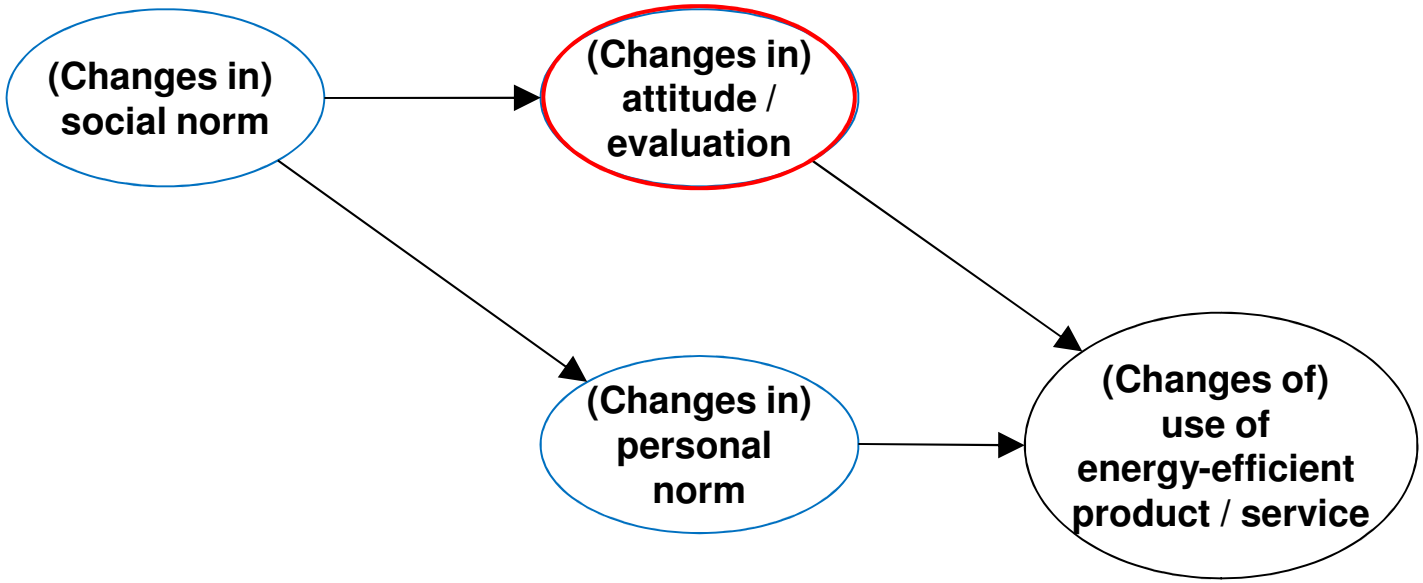
Evidence: Attitude as relevant factor



→ Changes in attitudes inducing rebound effects are more likely…

- …if needs are not yet satiated (→ if changing behaviour means an asset).
- …if environmental motives and norms are less strong.

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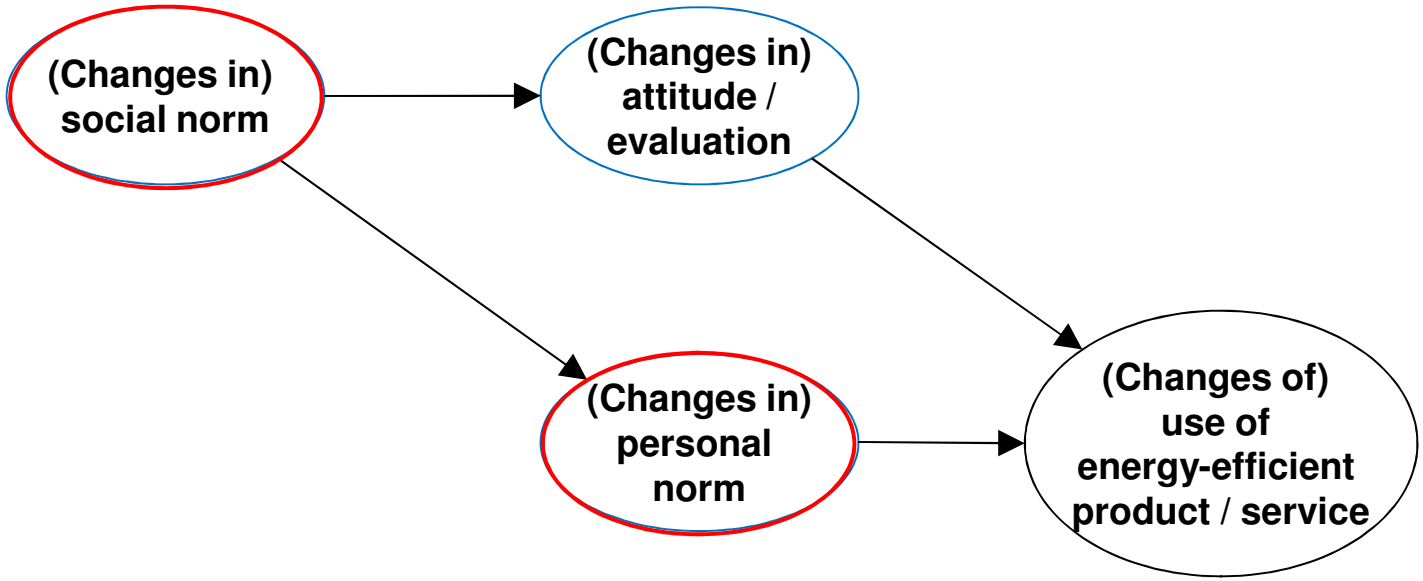
Evidence: Attitude as relevant factor



→ Changes in personal and social norms inducing rebound effects are more likely…

- … for low or moderate norms and low problem awareness.
- … if needs are not yet satiated.

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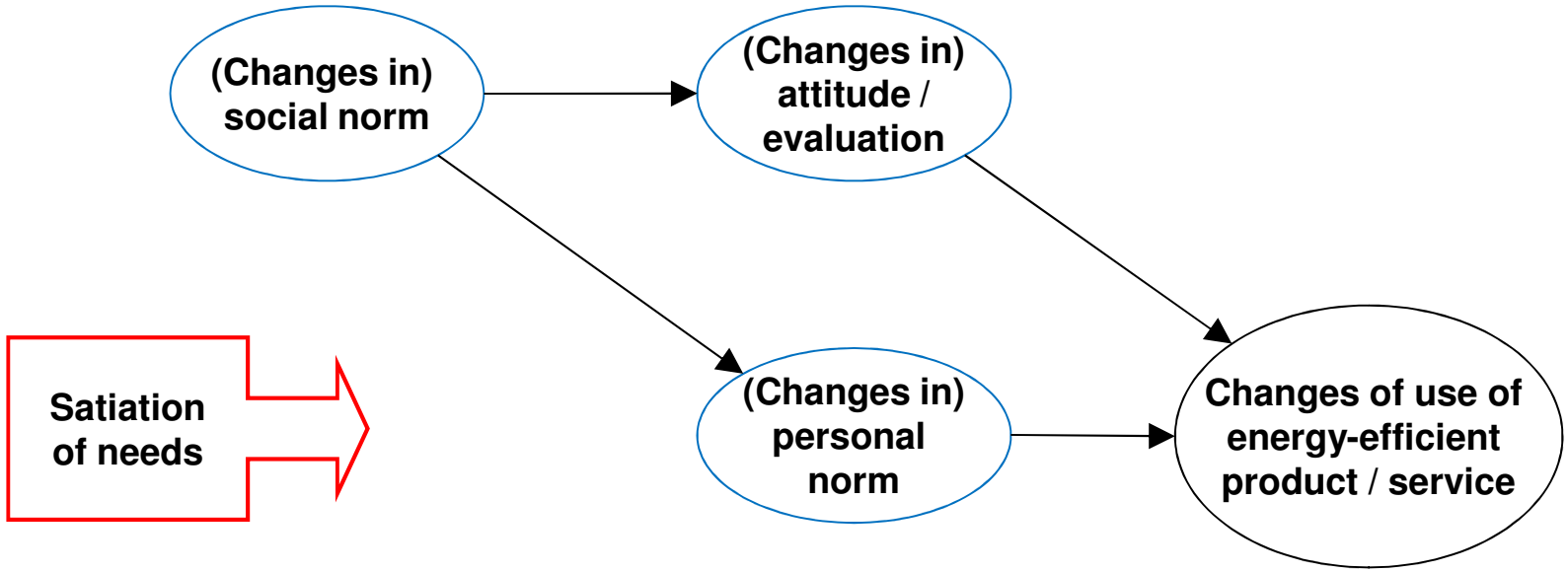
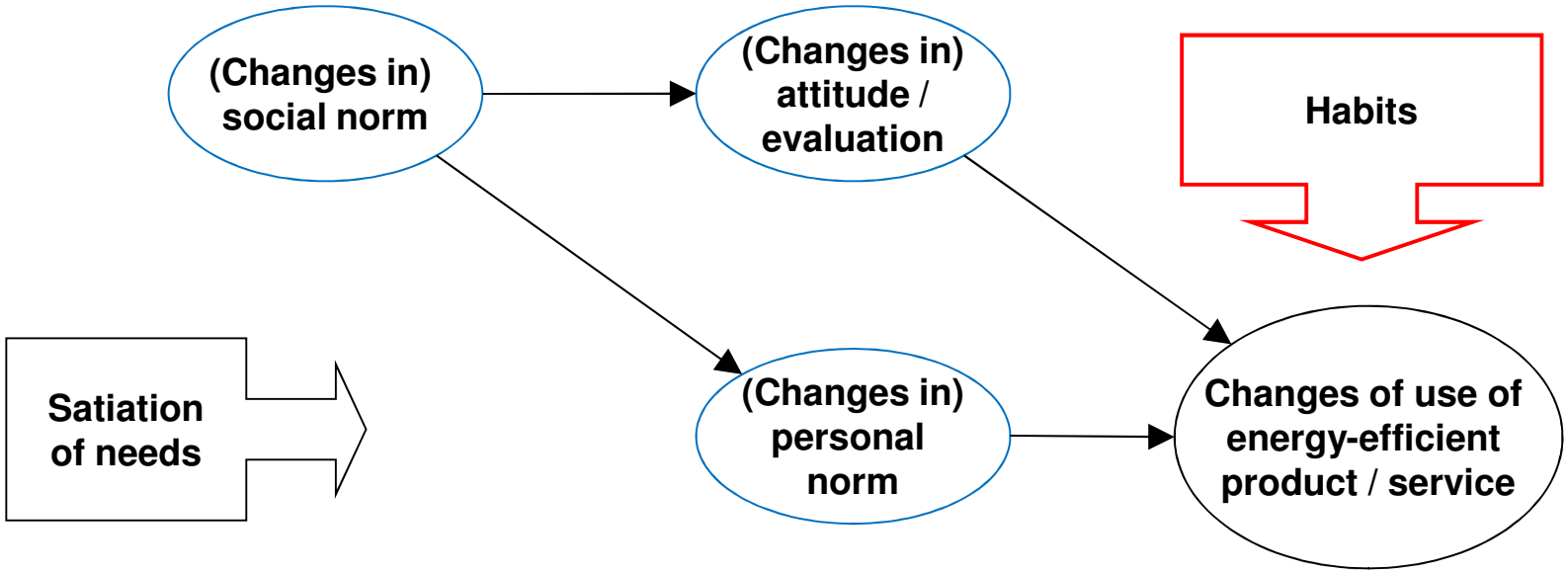
Evidence for further factors influencing rebound effects



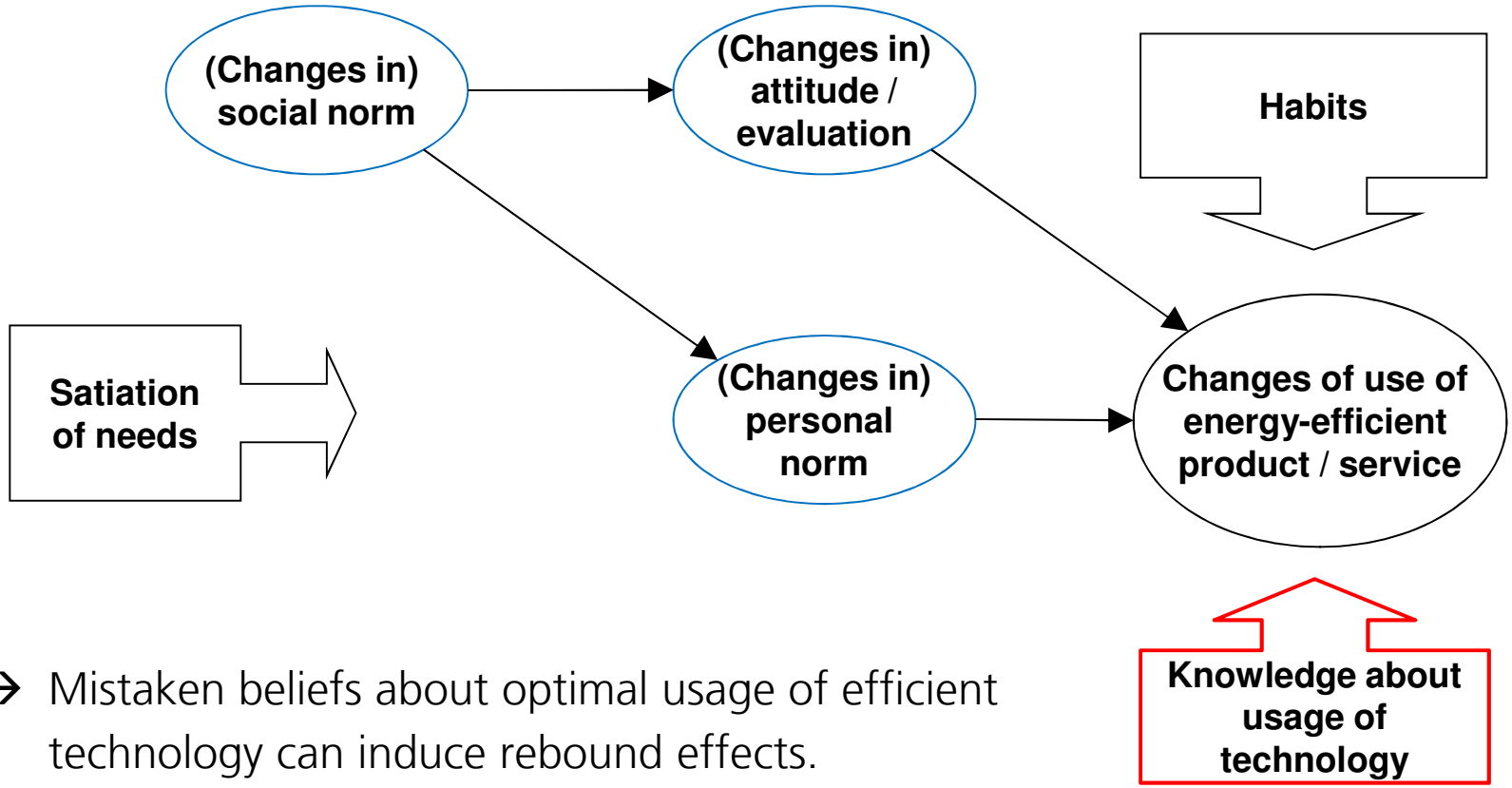
→ Needs seem already more satiated for residential living than for mobility.

Evidence for further factors influencing rebound effects



→ Strong habits can stabilize behaviour and prevent rebound effects.

Evidence for further factors influencing rebound effects



→ Mistaken beliefs about optimal usage of efficient technology can induce rebound effects.

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Method II: Survey

- April- May 2012
- 6409 participants recruited via representative panel of market research institute
- Topics:
  - Mobility, heating and lighting
  - efficiency measures and relevant decision criteria
  - usage behaviour and psychological determinants
- Analyses focused on participants who adopted more efficient technology.

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Preliminary results: Estimation of relevance of rebound effects in different areas

- Lighting:
  - Burning time: 30% of respondents let more efficient lights burn 10% longer on average → 11 minutes per day.
  - Brightness: More than 50% of the new bulbs were brighter than the old → on average 25% brighter
  - → Moderate rebound effect of 8.5% for all light bulbs, 5.3% for main lighting in living-dining area
- Mobility: relatively high direct rebound effects of 40-60%, but based on specific classical economic assumptions
- Heating: Modern heating systems run 40 minutes longer per day.

→ Analyses still ongoing, in particular with regard to psychological variables

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Conclusions and discussion

- Energy-efficiency improvements may have different effects on behaviour
- First evidence:
  - Rebound effects seem more likely for mobility and lighting than for heating and usage of appliances
  - Relevant factors: Motives, personal and social norms, attitudes, beliefs about optimal usage, need satiation, habits and visibility of savings.
- Exploration by focus groups can only give first hints (depends on own awareness of behavioural effects and mechanisms).
- Influencing factors and mechanisms very complex.
- Psychological variables not easy to analyze in a cross-sectional survey
  → longitudinal study / pre-post design would be optimal

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Thank you for your attention!

Contact for further details or questions:

Anja.Peters@isi.fraunhofer.de

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