Adoption of Innovative Domestic Heating Systems in Sweden

Krusnna Mahapatra and Leif Gustavsson
Ecotechnology, Mid Sweden University, SE - 83125 Östersund, Sweden

Research Motivation
- About 50% of the Swedish detached houses have oil and electric heating systems
- Potential for greenhouse gas mitigation by replacing these heating systems with innovative heating systems (IHSs) such as brine/water-based heat pumps, district heating or pellet boilers
- Homeowners' perceptions of the IHSs determine diffusion pattern of such systems

Objective
- To analyze factors affecting homeowners adoption of an IHS
- To understand the variation in rate of adoption of IHSs

Theoretical Model
- Stage 1: Need for a new system
- Stage 2: Plan for a new system
- Stage 3: Collection of Information
- Stage 4: Selection of a system

Methodology
- Questionnaire surveys of 1,500 Swedish homeowners in Autumn 2004 (Survey2004) and Spring 2007 (Survey2007)
- Respondents selected through stratified random sampling by Statistics Sweden
- Response rate 44% and 48% in the Survey2004 and Survey2007, respectively
- No significant non-response bias was found from the comparisons of composition of respondents with respect to region, income, age and heating systems

Important Factors in Heating System Choice

<table>
<thead>
<tr>
<th>Survey2004</th>
<th>Survey2007</th>
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<tbody>
<tr>
<td>Factor</td>
<td>%</td>
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<tr>
<td>Annual cost of heating</td>
<td>**</td>
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<td>Functional reliability</td>
<td>**</td>
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<td>Investment cost</td>
<td>N.S.</td>
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<td>Indoor air quality</td>
<td>**</td>
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<td>Security in fuel supply</td>
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<td>System automation</td>
<td>N.S.</td>
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<tr>
<td>Environmental benignity</td>
<td>=</td>
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<td>Increased market value of the house</td>
<td>N.S.</td>
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<tr>
<td>Low GHG emission</td>
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<tr>
<td>Time for collection of information</td>
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Homeowners’ Ranking & Relative Advantage of Heating Systems

- Bedrock heat pump: Annual cost of heating, Security of fuel supply, Environmental benignity, Low GHG emission
- District heating: Functional reliability, System automation, Time required for collection of information
- Pellet boiler: Investment cost

Annual Installation of Innovative Heating Systems in the Swedish Detached Houses

Conclusions
- More than 75% of the homeowners were satisfied with their heating systems and did not intend to install a new one
- Installers/vendors and interpersonal sources were the most important sources of information on heating systems
- Economic aspects, functional reliability and indoor air quality were the most important factors in heating system choice
- Pellet heating system had fewer relative advantages than a heat pump system and therefore, such systems diffuse slowly in Sweden
- Large proportion of homeowners were unaware about different aspects of heating systems

References