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Title: Investigating the Impact Eco-Feedback Information Representation has on Building Occupant Energy Consumption Behavior and Savings

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4 **Investigating the Impact Eco-Feedback Information Representation has on**  
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6 **Building Occupant Energy Consumption Behavior and Savings**

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12 **Abstract:**

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14 In response to rising energy costs and concerns over environmental emissions, researchers and  
15 practitioners have developed eco-feedback systems to provide building occupants with information on  
16 their energy consumption. While such eco-feedback systems have been observed to drive significant  
17 reductions in energy consumption, little is known as to what specific design features of these systems are  
18 most motivational. One common feature of eco-feedback systems is the way in which energy  
19 consumption is represented to users. In this study, we empirically examine the impact that information  
20 representation has on energy consumption behavior by comparing the effectiveness of direct energy  
21 feedback versus feedback represented as an environmental externality. A one month empirical study with  
22 39 participants in an urban residential building was conducted. Participants were divided into two  
23 different study groups; one group was provided with feedback in direct energy units and a second group  
24 was provided feedback in environmental externality units. Results revealed that information  
25 representation has a statistically significant impact on the energy consumption behavior of users, and that  
26 users receiving eco-feedback as an environmental externality reduced their consumption more than their  
27 counterparts who received feedback in direct energy units. This study represents a crucial first step  
28 towards gaining a deeper understanding of how information representation can be leveraged to maximize  
29 energy savings.  
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51 **Keywords:** *data representation; eco-feedback; energy use feedback; energy efficiency; information*  
52 *representation; interface design; monitoring; user interface*  
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