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## Behavioral change and social innovation through reward: an integrated engagement system for personal mobility, urban logistics and housing efficiency

Chiara Bresciani <sup>a</sup>, Alberto Colorni <sup>a,b</sup>, Federico Lia <sup>a</sup>,  
Alessandro Luè <sup>a,b,\*</sup>, Roberto Nocerino <sup>a</sup>

<sup>a</sup>Poliedra – Politecnico di Milano, Via Giuseppe Colombo 40, 20133 Milano, Italy

<sup>b</sup>Dipartimento di Design – Politecnico di Milano, Via Durando 38/A, 20158 Milano, Italy

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### Abstract

A significant role among soft mobility measures to influence people's mobility choices and to raise awareness is played by the provision of targeted information. The integration of user-centered design, social innovation, portable devices, and sensors may have a role in influencing people's choices and consumption patterns. The paper presents two ongoing works that investigate, design and develop tools for valuing people's positive behaviors and rewarding choices in the domain of mobility and energy. The objective of such tools is both to raise people's awareness and to engage it into a collaborative environment, in order to meet a common set of targets. The strategy adopted in both the cases is based on linking "bottom-up" with "top-down" approach, i.e. by making people to behave and to make choices coordinately with decision maker's (i.e. the Public Administration or the Administrator of the system) objectives. The first regards Opti-LOG, a project co-funded by Regione Lombardia under the Smart Cities and Communities program, which concerns last-mile delivery with low emission and zero emission vehicles. The second case regards Sharing Cities, a H2020 project that includes a pilot project in the Municipality of Milano, where the focus is on citizen engagement and behaviors in the domains of personal mobility and energy. The system, by enabling mechanisms of collaboration, sharing and human capital generation, tackles the objectives of lowering energy consumption and promoting sustainable mobility and contributes to the weaving of a more cohesive social tissue.

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\* Corresponding author. Tel.: +39-02-23992905; fax: +39-02-23992911.

E-mail address: [alessandro.lue@polimi.it](mailto:alessandro.lue@polimi.it)

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## 1. Introduction

The Conclusions of the European Council of 8–9 March 2007 emphasized the need for the European Union (EU) to achieve the objective of saving 20% of primary energy consumption by 2020, compared to projections. As a consequence of this, the European Commission defined the Energy 2020 strategy, setting the targets and the priority of actions to be performed to be met them. Such actions tackle the goal from different perspectives: technological, infrastructural, legal and political. As regards the latter, though, just a hint concerning behavioral patterns in the reference document by the EC on 2020 Energy strategy is provided: education and training are spheres that policy making should mainstream since they do deal with lowering energy intensity. The Energy Efficiency Directive (Directive 2012/27/EU) underlines the need for an integrated approach and emphasizes that cost-effectiveness is critical given the 'urgent need to restore sustainability to public finances': changing people's attitude towards energy use is seen as consequence of the application of a full implementation of the Directive and will result in persistent and long-term energy-savings benefits. The interface between a set of policy measures and people reaction towards them, though, is something relevant to address in policy-making as it is broadly considered as a key-element for a successful implementation (Barbu et al., 2013): measures and people feedback are iterating elements within the policy-making process. As a proof of this, while impacts of technical energy efficiency improvements are rather easy to estimate, it is harder to address in a quantitative way possible reductions deriving from changes in behavioral and consumption patterns. A simple reason is that people are often supposed to act rationally whilst in the most cases they do not (Van Bavel et al., 2013).

How, therefore, to consider people's choices and consumption patterns in policy-making? And what kind of tools are nowadays relevant to value behavioral dimension in pursuing common goals, like reducing carbon emissions and achieving an higher level of energy efficiency?

The present paper investigates the behavioral dimension in the field of transport, relating a set of applications and studies under the common goal of reducing carbon emissions and increasing energy efficiency.

## 2. The behavioral dimension: individuals against communities, rewards against penalties

Gardner and Stern (1996) and Jackson (2004, 2005) list four main tools to influence and possibly change people's environmental attitude: (1) laws, regulations and incentives, (2) education and awareness raising, (3) community management of environmental resources and (4) reference to moral, religious or ethical principles. It is interesting to notice that (3) and (4) can arguably refer to groups of people rather than individuals and since such groups do share a common set of values (e.g. environmental care) and a vision (e.g. a zero-emission lifestyle), we will refer to them as communities (Parkhill et al., 2015).

The potential of communities in tackling environmental challenges has been understated for years where targets of energy-related behavioral policies were mostly individuals as consumers of energy (Raven et al., 2008). The relation between targeting individuals rather than communities will be further explored in this paper.

A last noticeable factor is more technical. It is understandable that people need appropriate frames of reference in order to value their behavior: it is quantitative or qualitative, does not excessively matter but terms of reference are needed for both comparing with personal or others' trends and to create synergies among people in achieving a common goal.

An important point, as well pointed out by Ben-Elia and Ettema (2009), is that psychological research on Operant Conditioning Theory shows that in general rewards produce overall better outcomes than punishments. Rewards promote learning and internalization (i.e. sustainable changes) whereas punishment succeeds in compliance and halting of unwanted behavior but creates a problematic effect associated with unpleasant memories and avoidance (Rescorla, 1987). Penalties such as road pricing have been recommended by transport economists as the first best

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