

**Title**

Policy instruments for innovation towards environmentally sustainable buildings in Norway

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## Introduction

Buildings, both new and existing, are responsible for a significant share of greenhouse gas emissions and natural resource use. Changes in the construction sector and its output, the built environment are key to meet climate change policy targets. This paper examines the specific policy instruments relevant for innovation towards sustainable buildings and retrofits in Norway. Policy instruments in this field are diverse and sometimes incompatible, with differing underlying rationales and sometimes-conflicting goals. Traditionally innovation has been thought of as a purely economic phenomenon. Innovation as a part of a sustainable transition is a normative and inherently political project, which magnifies the importance of policy and governance (Smith, Voß et al. 2010; Meadowcroft 2011).

## Research questions

1. *Which policy instruments are relevant in the field of sustainable buildings?*
2. *How do the identified instruments act together?*

Innovation system analyses' have moved beyond static descriptions of system structure, but lack nuance and explanatory power when it comes to policy. It is argued here that closer examination of specific policy instruments can bring useful insights to a systemic analysis of an industry or a technology. The intention of this paper is first (1) to identify the specific policy instruments in the field of sustainability in construction. Secondly (2) to analyse those policy instruments in terms of theoretical rationale and perceived effect.

## Theory/ Conceptual frameworks

Two complimentary frameworks, the multi-level perspective (MLP) and the technological innovation systems (TIS) approach have been developed to inform policy makers on sustainable innovations (Markard and Truffer 2008; Markard, Raven et al. 2012). Both frameworks are relevant for the analysis of sustainability in the building sector. While most TIS studies focus on one technology or niche, multi-level analyses explicitly seeks to analyze large-scale infrastructural changes (Geels 2004; Markard and Truffer 2008). Innovations in the form of novel design strategies (like passive houses, zero energy buildings or active-houses) can be seen as niches or overlapping technological innovation systems. Understanding industry context and the interactions and linkages between agents and institutions is at the core of the systemic approach to innovation. A technological innovation system may be defined as a subsystem of a sectorial system, or around one technology transcending industry limits. A central feature of this approach to innovation systems is the dedication to analysing functionality. As in much of the innovation literature, informing policy makers is made an explicit goal in the TIS approach (Carlsson, Jacobsson et al. 2002; Hekkert, Suurs et al. 2007; Bergek, Jacobsson et al. 2008).

The role of policy is contested in the innovation systems literature. Policy is both an intrinsic part of the system, but also an agent of change. Kuhlmann, Shapira et al. (2010) refers to interaction between policy, practice and theory as the dance of innovation and innovation policy. Finding an optimal policy mix and applying it is enticing, but fails to consider the difficulty of finding a perfect design for an ever-changing system with an unknown end-state. Like the evolutionary roots of the transitions frameworks the idea of perfect information and rational agents is rejected in the study of policy instruments. Instead nuance and precision, beyond the good or evil (carrot or sticks) is called for (Howlett 2004).

## Empirical field

The construction industry has been largely absent from systemic innovation research. Applying a system of innovation approach to the analysis of construction can provide

insights into the functioning of the system as a whole. Additionally this paper explores in more detail the specific policy instruments. Many studies of policy with regard to sustainability in construction exist (Tambach, Hasselaar et al. 2010; Murphy, Meijer et al. 2012), but few studies of innovation incorporate insights or methodologies from these.

There are different names and meanings given to sustainable buildings – because there are many interpretations of sustainability. The term “sustainable building” is used here because it encompasses several specific design approaches. Within this understanding, there are specific product innovations, for example new building materials or very low u-value windows etc. The point here is not to talk only of specific components. The innovations of interest here are conceptual or architectural. That is innovations in organizational form or organization of process (Henderson and Clark 1990).

Howlett (2004) argued that policy should be sensitive to context. There are some features of the construction industry to consider. The uniqueness of each project leads to some “reinventing the wheel” in every project. The discontinuity of project work is not conducive to the formation of routines. Routines cumulate to enhance an organization’s skills and increase firm’s incremental innovation opportunities (Nelson and Winter 1982; Fagerberg 2005). Procurement practices – competitive tendering and extensive subcontracting cause fragmentation. Temporary organizations are held together by legal contracts only.

### **Method**

The intention in this paper is to take the policy instrument as the unit of analysis in an effort to describe and analyse the repertoire of available instruments in the field of sustainable construction (Salamon and Elliott 2002). The method applied is adapted from Murphy, Meijer et al. (2012) and is a simplified version of the theory-based-evaluation applied in Harmelink, Nilsson et al. (2008). The idea behind theory-based-evaluation is that in the formulation of a “theory” of what the instrument should do and why. This process of tracing the logic and thinking behind the instrument can explain how they work (Weiss 1997; Harmelink, Nilsson et al. 2008; Murphy, Meijer et al. 2012).

The process of analysis is iterative, but is expected to follow these steps.

1. Identify the relevant instruments.
2. Trace the theoretical rationale behind the instrument.
3. If it is possible, evaluate its effectiveness. Two data sources are considered appropriate for this. First secondary data from existing policy evaluations, secondly primary data from qualitative interviews in the industry.

### **Expected Results**

The analysis will give an overview of relevant instruments according to category. Policy instruments in the analysis are classified according to type; regulation, economic, information, and de-facto varieties of policy instruments. Classification is also done according to MLP level i. e. landscape, regime, niche. The overview of all the different policy instruments will contribute to a discussion on fragmentation or lack of coherence between instruments.

The analysis of theoretical rationale is expected to open discussion thinking behind specific instruments especially in cases of conflicting instruments. Instruments have been designed with different goals and different rationales i.e. mandatory district heating and

passive houses. An overview of all relevant instruments and their rationale will direct attention to the “cocktail effect” of many instruments.

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