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# Understanding energy efficient lighting as an outcome of dynamics of social practices

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ABSTRACT

In policy-making, reducing energy consumption from lighting is largely treated as a matter of *optimizing products*. However, since lighting is a highly cultural and socio-material phenomenon, this article argues that current ways of using light cannot be attributed to the properties of the light sources alone. It is therefore important to understand how and why lighting is used in particular ways, and what that implies for energy-consumption.

This article explores how current Danish ways of 'illuminating' have come about as a result of dynamics *within and across* various household- and professional practices, by presenting a historical account of particular spatio-temporal moments in the development of domestic lighting. The analysis unfolds how a number of lighting-related practices seem to have influenced each other and that these practices have been (re-) configured in particular ways due to certain social-political arrangements (such as breaks with dominant philosophical tendencies in lifestyles as well as lighting design), cultural-discursive arrangements (such as emphasis on increasing energy demand vs. emphasis on decreasing energy demand), and material-economic arrangements (such as the design of buildings, configurations of electrical grids and infrastructures).

In developing this account, particular attention is paid to how the performativity of practices with a shared goal of 'doing light within the home' is embedded in as well as emerging from the constitution, institutionalization and modifications of these wider practice-arrangements related to the provisioning and consumption of lighting. In doing so, this research extends the current field of social practice theoretical understandings of innovation and consumption dynamics.



## 1. Introduction

Due to a combination of challenges, such as climate change, resource depletion, and energy security, the EU and several national governments have increased their focus on transforming the current energy systems to achieve reductions of energy consumption and increased use of renewable energy sources. These strategies are targeted at several types of energy consumption. In 2005, lighting accounted for approximately 19% of electricity consumption worldwide and approximately 14% in the European Union (EU),[1] which led the EU to initiate policies and programs to reducing electricity consumption in the usage of light. A policy to increase the performance standards for light bulbs was included in the European Eco-design directive (2005/32/EC). One element of this policy is focused on domestic lighting, the first stage of which led to the complete phase-out of European production and import of incandescent light bulbs as of September 2012. As a result of the increased performance standards, new light sources have emerged and, today, the lighting market accommodates various types of light sources such as halogen spot-lights, light emitting diodes (LEDs), compact florescent light bulbs (CFL), and certain incandescent lights for specific purposes.

However, because of inconsistent quality, particularly of the CFLs and the LEDs, the rate of household adoption of these technologies has been somewhat low (e.g., Chappin and Afman, 2013; Monreal et al., 2016). Given that CFLs and LEDs are currently the most efficient lighting technologies available, low adoption might be argued a problem. The EU is aware of issues with lighting quality

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[1] Guide on the Importance of Lighting, 2011, www.celma.org.

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and has tried to accommodate these issues by introducing Quality Charters[2] for both CFLs and LEDs. However, these have only secured a limited level of "lighting quality", such as minimum requirements for color temperature and color rendering capabilities, which largely treat lighting quality as something that is quantifiable. However, studies show that other, less explicitly definable aspects such as cultural expectations and differences (Bille and Sørensen, 2007; Wilhite et al., 1996), household routines and habits (Wall and Crosbie, 2009) and particular performances of practices (Jensen, 2014) also influence the adoption rate and quality experienced (Wallenborn et al., 2009). It would thus appear to be problematic that these aspects are not recognized in the current policies.

### 1.1. Is energy efficiency meaningful?

The tension between the embedded ontological understandings of consumption in much policy making (Shove, 2010) and the actual consumption dynamics, such as those noted above, has been widely documented in current consumption studies, and a better understanding of what facilitates or hinders a decrease in energy consumption seems to be increasingly important. On that note, a better understanding of *how to incorporate acquired knowledge of (household-related) energy consumption into the way of thinking in policy-making* seems important and called for as it is becoming evident that there is a relationship between escalating final consumption (consumption of goods and services by private consumers) and environmental impacts (e.g., McMeekin and Southerton, 2012). An increasing proportion of contemporary consumption literature rejects the rational choice school of thought that dominates much policy-making, and points to the importance of integrating an understanding of everyday life routines and related energy consumption into energy efficiency schemes, by acknowledging the deeply intertwined relationship between technology and people (McMeekin and Southerton, 2012), the dynamic interplay between innovation and use (Shove and Walker, 2010) and the agentive relationship between end-use technologies and 'end-using' practices (Wilhite, 2008). Merely focusing on technological optimization, as most directives do, usually falls short of obtaining lower energy consumption (e.g., Evans et al., 2012; Wilhite et al., 2000). This may very well be due to *energy efficiency* being a highly abstract term that only makes sense in connection to energy-related activities and practices (e.g., Røpke, 2009).

### 1.2. Bringing energy efficiency into practice

One way of exploring the role of energy consumption and energy efficiency in relation to how people consume, is by paying close attention to what people *do* when they consume. Theories of social practice increasingly focus on routinized practices related to final consumption (e.g. Shove et al., 2012; Warde, 2005).

Wall and Crosbie (2009) assert that routines and habits are of great importance when trying to understand how people use, relate to, and talk about light. Furthermore, Gram-Hanssen (2005) and Monreal et al. (2016) have found that there may be different levels in the extent to which people relate their use of lighting directly with their energy consumption. Shove (2012) explains that it is not energy in itself that people consume but the services that the energy makes possible: writing, cooling, lighting, etc., and that these forms of service consumption can only be understood in relation to the social practices of which they are a part. This is further documented in a number of Danish household case studies I have conducted, where people clearly talk about, and "do" light in terms of the practices they perform where lighting plays an important role, particularly in relation to activities connected with dining, cooking, and entertaining guests (Jensen, 2013).

Therefore, in order to be able to explore the potential for reducing energy consumption from lighting it seems appropriate to assess the dynamics of social practices that constitute current ways of "illuminating". However, it might not be appropriate to understand ways of "illuminating" as a result of the practices carried out within the context of the home alone. Household-related practices, especially those that depend on energy consumption, are heavily intertwined with practices of provision. According to Pantzar and Shove (2010) consumption can be conceptualized as a result of the reproduction of practices in which both consumers and producers are involved. Welch and Warde (2015) document how practices, and the elements that these practices consist of, are intertwined with systems of provision and what that means for sustainable consumption. Wilhite (2008) emphasizes the agency with which technology and products act on practices by carrying certain potentials for the performance of practice. This potential is partly designed through the design and provision of technology.

This article intends to contribute to the above debate by pursuing two main objectives:

1) To articulate the dynamic relationship between the provision and consumption of light by looking at relationships between practices of which lighting is a part;
2) To demonstrate how a policy push for energy efficiency should better embody, and be embodied within and across household- and professional practices.

In particular, this article extends the emerging field of social practice theory in terms of innovation and consumption dynamics, by explicitly addressing the role of *performativity* of practices and any space given for this performativity in order to understand what people do, why and when in relation to particular consumption dynamics. Performativity is here argued to be constituted by the spatio-temporal configurations of (social) practices, meaning that practices that unfold at particular spatio-temporal moments are, in part, held together through dynamic constellations of cultural, discursive, political and material arrangements. These practice-arrangements form and become certain institutionalized ways of provisioning and consuming, however only as long as they are performed.

Section 2 develops the theoretical and methodological foundation for this article. Section 3 presents an analysis of the history of (Danish) light, and Section 4 discusses the findings of this study and their implications for policy-making in terms of the current dynamics of energy efficiency and lighting consumption.

## 2. Theoretical and methodological approach

The following section provides an overview of how theories of practice can provide answers that assist our understanding of the links between the dynamics of provision and the dynamics of consumption in relation to light. This overview should not be considered as a full account of the basics of theories of practice, but rather as a reference to existing competent and elaborated accounts that deal with theories of practice in terms of the study of practice(s) (Nicolini, 2012; Shove et al., 2012), changes in practice (e.g., Gram-Hanssen, 2011), dynamic configurations of practices (Hargreaves et al., 2013; Kemmis et al., 2014), systems of practices (Watson, 2012), sustainable practices (Shove and Spurling, 2013;

[2] E.g., http://iet.jrc.ec.europa.eu/energyefficiency/residential-lighting/european-led-quality-charter.