Towards a Social License to Automate in Demand Side Management: Challenges, Perspectives and Regional Aspects

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Motivation and Objectives

Without automation, demand side management (DSM) is unlikely to provide the electricity system with the fast-acting response needed to manage changing network and system requirements (IEA, 2012). A major challenge for introducing automation, however, is the deep distrust that energy users often exhibit towards corporate energy industry entities (Stenner et al., 2017). At the household scale, we cannot always expect customers to explicitly agree to automation systems reaching behind the meter to access the customer's equipment to provide third party services. Customers who do not trust the electricity industry to act in their personal interest may not be the only party to hesitate to make the accommodations required for DSM to flourish; established participants such as distribution networks, retailers and regulators may be wary of the wholesale changes implied. The notion of a 'social license' cf. [1] describes the extent of an initiative's acceptance and approval by a community of stakeholders.

The main contribution of our paper outlined in this short version is a structured analysis of the current state of knowledge and remaining challenges towards securing a social license to automate DSM. The topic is being analysed by an international group of experts from different scientific disciplines participating in the Social License to Automate Annex within the recently relaunched User-Centred Energy Systems Technology Collaboration Programme (Users TCP) (https://userstcp.org/annex/ social-license-to-automate/). The second contribution of the paper is to introduce this Annex, which analyses leading automated DSM projects to understand key social, organizational, economic and regulatory determinants of successful customer engagement, implementation and transitions of institutional regimes. We especially show how institutes and countries are expected to participate in this research process, in order to get a better understanding how end-user trust to automate is built and maintained across different national contexts.

The Current State of Knowledge and Open Issues

The paper provides a description of the current state of relevant fields of research and practice surrounding the social license to automate. A first topic cluster relates to the user's interactions with automation technologies. Novel demand side services have to be communicated and introduced to the user through communication technology. The communication design has to be tailored to the actual purpose of the service as well as to the (personal, social, environmental and technical) context of use, taking advantage of established guidelines and reflections in the area of Human-Computer Interaction and Environmental Psychology (e.g. [3]). We discuss the related state of knowledge with regard to the acceptance of different forms of DSM automation, and we show that research so far has been focused on specific research questions and studies with possibly restricted generalizability. To this end, inconsistencies, open issues and broader views that could be accommodated by the Social License to Automate Annex are derived.

The success of many DSM initiatives depends on the willingness of householders to reconsider and reconfigure energy consumption practices to achieve the flexibility necessary for load shifting and

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shaving [6]. A literature applying social practice theory to the analysis of energy consumption has contributed analysis of different **energy practices** and how some are more malleable and available to rearrangement and rescheduling than others [2]. It has illustrated the ways in which 'daily and weekly schedules are defined by collective social and temporal rhythms, not by individual choice', implying that 'people are *not* free to rearrange the timing of energy demand at will' (e.g. [4]). The Annex seeks to better understand the possibilities for and limits of load flexibility through analysis of everyday energy practices and the meanings that they hold.

The analysis in the Social License to Automate Annex is also undertaken from the viewpoint of the **socio-technical making of automation and load flexibility**. Critical social scientific research on user engagement in DSM initiatives has suggested that program success hinges on the alignment of the objectives of program designers and the interests of users. In fact, the introduction of smart home technology without considering the everyday context of users may reinforce unsustainable energy consumption patterns [7]. An analysis of efforts to include users in smart grid projects reveals a dominating focus on technical and economic aspects, which may become a barrier to development [5]. With regard to DSM, users may reject proposals to employ automation when they do not understand or accept its necessity broadly, the use of automation technologies to achieve it, or the role of particular actors in managing it. The Annex explores the ways in which a flexible electricity grid is perceived and valued as a shared social infrastructure.

Economic analyses and demand response pilot projects have revealed various aspects of the contract design, behavioral aspects and the institutional setup that influence the cost and success of demand response schemes [8]. The immediate milieu of household practices is also constituted by laws and regulations that enable or constrain behaviours. These include 'hard' law governing crime and 'soft' laws such as the standards that enable orchestration of devices between households and grid operators. A further objective of the analysis of the Annex is thus the design and alignment of relevant institutions. Questions addressed from this perspective relate to the role that various actors (governments, electricity companies, network operators, DSOs etc) see for automated DSM to play in electricity reforms. More specifically, the influence of ownership structures on engagement and governance is analysed. Finally, we analyse the governance of automation in DSM. Questions to be addressed relate to how national and EU-level electricity sector regulations affect the forms of automated services available to residential and non-residential consumers. Also, the accountability of energy companies with regard to potential mistakes and unjust practices are considered.

A Methodology for Global Case Study Collection

Our second contribution, the first presentation of the Social License to Automate Annex at a research conference, focuses on a suggested methodology for case study data collection. We show how the key factors, issues and gaps addressed in the above analysis will be reflected in the data collection materials. A major benefit sought for by the authors team is the opportunity to discuss at the EnInnov2020 event with delegates about the data gathering approach and to engage them in contributing to and even joining the Annex.

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