Inclusive planning in transport and energy STI-policies

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Introduction

Transition to a more sustainable and fossil-free energy system is of global interest, and implies social challenges for the developed world including the European Union. In particular, the energy consumption related to transport constitutes a significant challenge. If not serious changes are made the transport sector can lead to more than a doubling of CO2 emissions by 2050 (Edenhofer et al., 2014). Transport in this context includes transport of both people and goods, and it includes transport on land, sea and air. Responsible research and innovation should take into account this large social challenge of securing a more sustainable and fossil-free energy system. Furthermore, responsible research and innovation should take into account both the required changes in all citizens' daily life due to this transition as well as the driving force of grassroot innovation movements.

This work-in-progress reports from a large ongoing research project, the COMETS project, which aims to develop a decision tool for identifying and optimizing public STI policies and investments within the energy and transport sector (www.cometsproject.dk). COMETS is designed to be a participatory project between academic researchers, policy makers, and relevant stakeholders. COMETS aims to contribute to a cost-effective fossil free energy and transport sector by 2050, by understanding the impact on the energy system from 1) the transport sector, 2) consumer preferences and behavior regarding transportation, and 3) planning of cities and transport infrastructure. As a part of this larger project one work package explores participatory approaches to scenario development combined with a joined energy system model (TIMES DK) and a newly developed behavior based national Danish transport model (LTM). The aim of the work package is 1) to advance theoretical and applied research into novel methods of stakeholder inclusion in scenario analyses and 2) to develop and apply qualitative methodologies (participatory and interactive methods) in order to add informed expert and stakeholder assessments to the developed scenarios. This includes both front-end (input to scenarios) and back-end input (vetting the preliminary results) from key stakeholders and users. Among the stakeholders and users are: energy and transport model researchers, interests groups (e.g. associations/NGOs within public transport, car owners, bicyclists), technology companies, energy companies, citizens, policymakers, and politicians.

Stakeholder inclusion in scenario planning

Public engagement in science and technology has been studied for several decades (Rowe and Frewer, 2005; Selin et al., 2016; Stilgoe et al., 2014). This research has documented, that involving stakeholders and citizen is crucial to secure impact on actual policy making (Volkery and Ribeiro, 2009), and that the political processes affect the citizens choices of more sustainable technologies (Kern, 2015).

The theme has also become high on the political agenda in Europe. The Rome Declaration has emphasized that '*early and continuous engagement of stakeholders is essential for sustainable, desirable and acceptable innovation*' (EU-Council, 2014). This has been conceptualised as 'Responsible Research and Innovation (RRI) defined in as the on-going process of aligning research and innovation to the values, needs and expectations of society. Stilgoe et al. (2013) have suggested a framework for responsible innovation that includes four dimensions: Anticipation, Reflexivity, Inclusion and Responsiveness.

The literature (e.g. the science sociology literature) lists numerous methods for stakeholder involvement in scenario planning and similar in long term planning. One study has identified approximately 100 methods for public engagement (Rowe and Frewer, 2005).

The scenario literature has produced several reviews and categorizations which have dealt with principles of participatory processes (Amer et al., 2013; Bradfield et al., 2005; Cairns et al., 2016).

However, most of literature on stakeholder inclusion seems to be of a conceptual kind, and there seems to lack empirical information on the content of the participatory processes and on how impact of the processes and contextual factors affect the processes.

The work behind this paper relates to this gab in literature. The overall research question of this paper is: how can we apply qualitative methodologies (participatory and interactive methods) in order to add informed expert and stakeholder assessments to scenarios in the energy and transport sector?. This includes both front-end (input to scenarios) and back-end input (vetting the preliminary results) from key stakeholders and users. From this overall research question, three detailed research areas are derived. First, the paper investigates the functions of stakeholder involvement in scenario planning. No comprehensive overview seems to exist in literature. However, a preliminary literature review indicates that stakeholder involvement mostly is related to judgmental and anticipative elements of scenario planning. Second, the paper investigates the relation between functions of stakeholder involvement in scenario planning and the types of stakeholders participating in the process. Literature often mentions stakeholders in general with limited details, or it focusses on particular stakeholder types; e.g. grass roots (Smith et al., 2014). Third, the paper investigates detailed processes or methods for stakeholder inclusion, and how best to design a process according to type of stakeholder and type of inclusion. Fourth, the paper investigates factors affecting implementation of stakeholder inclusion (Calof and Smith, 2010; Stilgoe et al., 2013). Finally, the paper considers how to study stakeholder involvement in scenario planning. Literature has surprisingly little information on this. Studies of stakeholder involvement and scenario processes is a practice-oriented field. Similar academic scenario literature is usually descriptive/normative and based largely on practitioner experiences (Miles, 2008) - and in few cases the studies are of a conceptual kind (Selin et al., 2016). Studies mostly use traditional qualitative research methods; e.g. case studies based on observations, interviews, and questionnaires. However, some exceptions can be found; a recent Finnish study has employed protocol analyses of similar processes (Dufva and Ahlqvist, 2015).

Later stages of this ongoing research will comprise the development of methodologies for integrating participatory methods with qualitative models and socio-economic analyses as well as full scale experiments with participatory and interactive processes. The latter are carried out in cooperation with the Danish Board of Technology Foundation and includes experiments with actual stakeholder inclusion through ‘Interview-meetings’, ‘Deliberative (Mini-publics) workshops’, ‘Perspective workshops’ and a digital ‘voting conference’. However, this is beyond the scope of this paper.

Approach

The work presented here is based on a systematic literature review. The material for the study was retrieved through searches on Scopus and Science Direct databases, and covered the timeframe 1945-2016. The collection included only journal papers leaving out conference papers and abstracts. A total of 198 papers were found. The abstracts of those papers were studied according to the scope of our study and 43 papers were extracted as being the most relevant. Hereafter the papers were evaluated against the research question and the papers that included the most thorough description of the stakeholders were applied to the final list. This list was narrowed down to 25 by evaluating the papers against the research question.

Preliminary findings

The paper presents the findings in relation to functions of stakeholder involvement in scenario planning, types of stakeholders, and processes or methods for stakeholder inclusion.

The table below summarizes the preliminary findings on linkages between types of stakeholders and functions organized by the four dimensions of responsible innovation as suggested by Stilgoe et al (2013). As mentioned above literature has identified approximately 100 methods processes or methods for stakeholder inclusion (Rowe and Frewer, 2005). However, the literature review find that only few methods are utilized: Workshops, Interviews (open or structured), Questionnaires, Surveys & Delphi like methods, and Expert notes. Finally, the paper discusses approaches to study stakeholder involvement in energy scenarios.

Table 1. Typology of stakeholder inclusion and its functions in scenario planning (first draft).

Dimension	Type of stakeholder	Function in scenario planning
Anticipation	Citizens	Identifying possible future trends and challenges in the external environment (e.g. demographics, oil prices)
	Experts	Visioning – establishing coherent visions Forecasting – judgmental assessments of future eco-technical specifications (e.g. cost and fuel efficiency of electrical cars in 2030)
Reflexitivity	Researchers Experts	Wind tunneling – testing policy and strategies in different scenarios
Inclusion	Citizens Policy makers Politicians	Prioritizing (with respect to impact and uncertainty) among the identified trends, challenges and technological solutions. Selection for further analyses
Responsiveness	Policy makers Politicians	Backcasting – identification of policies to arrive at a socio-technical vision

Source: Dimensions based on Stilgoe et al. 2013).

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