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Reality Test: Users, Innovation and Sustainability

European Policymakers' View on Sustainable User Innovation and Entrepreneurship

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REALITY TEST: USERS, INNOVATION AND SUSTAINABILITY

European policymakers' view on sustainable user innovation and entrepreneurship

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Executive summary

Good ideas and innovations are hard to spot and often come from the most unlikely of circumstances – once successful their value seems almost self-evident, but in the early stages a new idea or innovation remains largely anonymous and in dangerous waters. The growth of the Danish windmill industry was for example in the early stage hard to foresee. The utilization of wind power as a source of energy was not a novel concept in the 1970s when Riisager (a carpenter by trade) and others began to experiment with different turbine designs, nor was it a lucrative endeavor as it for many years remained, from a market perspective, unprofitable. Despite this, a small group of enthusiastic (and idealistic) individuals managed to dramatically improve existing designs, increasing the kW production of turbines from 15-30 kW in 1974-1979 to 180-450 kW by 1989. The success of the Danish wind turbine case was possible because multiple and diverse but interlinked actors tested varying designs in different locations, drawing both on their localized learning-by-doing knowledge but also on the successes and failures of others. Step-by-step what had been a discarded idea for power production became the foundation of a large scale sustainable industry. The Danish windmill story has arguably become an oft-repeated story, but nonetheless it illustrates a key point: knowledge relevant for innovation is widely dispersed and is therefore typically outside the realm of any one individual, firm or organization.

Having previously explored – in our report 'Users, Innovation and Sustainability' – the role of individual citizens (or end-users) in the sustainable innovation process, and having identified how this frequently ignored actor within innovation could be supported policy-wise, we now seek to reality test our insights. Specifically by conducting 25 in-depth interviews with a series of European policymakers in order gauge their awareness and understanding of the user-driven innovation process, and asking them to identify what needs and expectations they have of this alternative form of innovation process. In this way, we can compare academic insight with our observations of the experiences of policymakers in practice in order to determine the current barriers to the proliferation of policy aimed at supporting end-user driven sustainable innovation.

Broadly we observed that the conceptual vagueness and lack of definitional cohesion within the field leads to a myriad of terminologies being used to describe the engagement of end-users in innovation processes. This lack of clarity results in a confused policy discourse when discussing end-user innovation, difficulties in drawing upon others for insights, and a fragmented policy toolset. In addition to this ambiguity, it was clear from the interviews that end-user innovation within the sustainability field remains largely neglected on the policy agenda. In fact, several individuals stressed that the end-user angle has been completely overlooked by policymakers who instead have a more traditional perception of innovation and its main actors. Viewing the consumer role as that of 'the informed consumer' who drives the demand side, but does not overly influence the supply side of things.

In order to draw upon end-users to greater degree than presently we recommend three primary policy tools. Firstly, there is a prevalent need to raise awareness of the role that the end-user could play in sustainable innovation within policy circles. The awareness-raising process should involve establishing a clear conceptual framework, developing a database of best practices, and changing the perception of end-users as passive recipients of innovation. There is an urgent requirement for a more concise and conceptually clear framework wherein policymakers and laypeople can more easily navigate. At the moment there is an abundance of theoretical definitions and concepts to explain the involvement of users in innovation, which function as a barrier for the proliferation of the concept. This conceptual framework could be clustered around a data-

base of best practice examples – this would allow end-users, companies, and policymakers to gain a more practical understanding of the concept. It can additionally act as source of inspiration and therefore spur more end-user innovation and integration. Secondly, we suggest that the initial financial barrier for end-users to innovate should be tackled via a dual approach of simplifying current funding schemes, and drawing upon the growth of the alternative finance sector like crowdfunding. Current funding schemes have been deemed too inflexible and burdensome to properly facilitate end-user innovation and integration. Instead, political institutions should build funding schemes with fewer formal requirements and limited application complexity, thus providing easier access to funding for end-user innovators. Alternatively policymakers could draw upon the growth of crowdfunding and utilize it as a potential vehicle through which to co-finance sustainable projects and ventures. This could be achieved by facilitating the creation of designated platforms and through the direct co-financing of successful crowdfunding campaigns. Finally, effective diffusion mechanisms for the dissemination of end-user innovation remains paramount both in order to ensure that end-users stay motivated and see real benefit from their actions, but also in terms of creating a viable business model. Currently policymakers rightly assess that end-user innovation without diffusion and marketization remains a hard sell in the existing policy setting given the demands for business, turnover, jobs, and welfare creation. One opportunity could be the creation of online fora and portals for end-users to share their innovation and ideas. At the moment these portals are user-created and therefore typically limited to a relatively small group of individuals. However policy actors could feasibly create larger platforms potentially in cooperation with the business community sectors. Alternatively, crowdsourcing innovation challenges could also be implemented to draw-out end-user insights to multiple challenges.

We conclude that the existing policy concerns do not revolve around whether users innovate or not (which it seems evident that they do), but whether this form of innovation can translate into public goods. The key takeaway for proponents of end-user driven sustainable innovation is that the business case, as compared to other innovation types, remains to be made.

We would firstly like to thank all interviewees for taking a moment out of their busy calendars to support our work – we can truly say that without their insights and support this report would not have been possible. We would also like to thank the EU-InnovatE project, led by Prof. Frank-Martin Belz (TU Munich), for making this report possible. Finally, but not least we would like to acknowledge the hard work done by Christine Mera, Rosina Watson, Laura Melanie Purnell and Friederike Döbbe in multiple capacities.

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Chapter 1
Introduction

The importance of end-users within innovation is an increasing mainstay within the traditional innovation literature; identified both independently and in a facilitated fashion as a major source of innovation (von Hippel 2005; Chesbrough et al. 2006). However, within the sustainable innovation literature, the involvement of the end-user remains a "neglected site of innovation for sustainability" (Seyfang & Smith 2007, p. 585), while producer-led innovation remains "the mainstay of both empirical research and theoretical development" (Hargreaves et al. 2013, p. 869). The end-user's role within sustainable innovation is consequently often relegated to that of a passive recipient of innovation (Belz 2013). Nonetheless an increasing number of articles within sustainable innovation research challenge this conception (Feola & Nunes 2014) and – while diverse, compartmentalised and typically single-case based – illustrate the multitude of ways in which end-users innovate for sustainability ends (Hoffmann 2007; Hyysalo et al. 2013). These end-user innovators and entrepreneurs represent a type of niche innovation actor that insulate novel ideas and prototypes against the dominant socio-technical regime and tolerate uncertainty and low product performance levels and low efficiency (Geels 2002; Kemp & Rotmans 2004). End-user entrepreneurship, innovation and community action could therefore represent an oft-ignored, but critical early stage driver of sustainable ideas, projects, and products/services.

Having systematically reviewed the academic literature for policy options to support this alternative form of innovation type in our 2014 report - 'Users, Innovation and Sustainability' (Nielsen et al. 2014) – we now build upon our observations by reality-testing our observations with European policymakers. Through a series of expert interviews we gauge policymakers' awareness and understanding of this form of user-driven innovation process and ask them to identify what needs and expectations they have of this alternative form innovation process. In pursuit of this, our report will firstly define our understanding of the role of end-user within sustainable innovation. In alignment with the previous report this was labelled Sustainable End-user Innovation and Entrepreneurship (SEIE)[1]. Section 2 introduces the results of our previous report and our initial Policy Innovation Workshop findings conducted in June 2015. Section 3 introduces and outlines our methodology. Finally, Sections 4 and 5 present the outcomes of the interviews and a discussion thereof.

Sustainable end-user innovation and entrepreneurship

The role of the end-user within the sustainable innovation literature is diverse and hence lacks concise terminology to draw upon. We therefore utilize the traditional open innovation and user innovation literature as a conceptual buttress for framing our report (Nielsen et al. 2014). This literature creating a simpler conceptual basis on which we can understand

[1] The previous report labeled this process Sustainable End-user Innovation (SEI), but it was rightly noted that this focus on end-user innovators potentially ignored the role that end-users could play as entrepreneurial drivers of sustainable innovation.

and frame the roles that the end-user can adopt in supporting sustainable innovation. In addition we draw upon the literature on sustainable entrepreneurship in order to frame the blurry transitory state from end-user to entrepreneur. Figure 1 represents the demarcation of the scope of this report.

Figure 1. *Demarcation of the literature review*

Since the Brundtland Report there have been many attempts to define sustainability. Nevertheless the most oft-cited definition remains the reports' own where sustainability is seen as "...development that meets the needs of the present without comprising the ability of future generations to meet their own needs" (Brundtland Commission 1987, p. 45). We draw upon this conception by defining sustainable innovation as a novel product, service, or process system that serve not only economic criteria, but also environmental and social criteria (Bansal 2005; Freeman et al. 2010) A sustainable innovation should therefore not only have an economic component, but also a social and/or environmental element – often referred to as the triple bottom line (Elkington 1997).

When viewing the innovation process itself we draw upon the notion arguably underpinning both user innovation and open innovation – that knowledge relevant for innovation is widely dispersed and hence often falls outside the realm of any one firm or organisation (West & Bogers 2014). In heeding this call we argue that a budding literature is emerging within the field of sustainable innovation looking at the role that stakeholders outside the respective organisation play in this process. (Ayuso et al. 2011; Korsunova et al. 2015). The focus of our research within EU-InnovatE is on end-users. In conceptualising the term "user" the present report draws upon the work of Eric von Hippel (2005) who distinguishes between two ideal types of users, namely intermediate users and end-users. An intermediate user is typically a firm that utilizes equipment and components from other producers (i.e. upstream products) to produce further products and ser¬vices. An end-user represents a consumer user (or groups of consumers) who is the end-consumer of a given product and service. This study is deliberately focused on and limited to the latter. Additionally, from an open innovation perspective, the focus is on the so-called "interactive coupled model" (Chesbrough et al. 2014) that conceptualizes innovation as a collaborative activ-

ity between the end-user(s) and a given firm, organisation or project. In this model view, end-users partake in all or multiple phases of the innovation process rather than purely in the refinement phase (Weber 2003). The report therefore seeks to uncover not only how end-users themselves innovate, but also how they may be co-opted and involved in a firm or project-driven sustainable innovation process. Finally we draw-upon the literature on sustainable entrepreneurship to differentiate between an end-user innovator and entrepreneur with guarded caveat that in practice distinguishing between end-user innovator and entrepreneur is often blurry at best, hence we do so only for conceptual clarity (Shah & Tripsas 2007). In terms of sustainability the notion of the triple bottom line remains central, however, we propose that the transition from end-user innovator and entrepreneur is characterised by the attempt of the end-user (or group of end-users) to commercialise a previously concealed or concentrated invention.

For the remainder of the paper we will refer to this process as Sustainable End-user Innovation and Entrepreneurship (SEIE) that is further broadly characterised, based on the literature, as either facilitated or independent in nature. Facilitated SEIE refers to the integration of end-user into an organisation-driven sustainable innovation process, while independent SEIE reflects innovation by the end-user that is not facilitated by outside involvement (Nielsen et al. 2014). Much in line with Smith et al. (2014, p.115) we view this process not "as a blueprint for the future, but rather as a resource for debating and constructing different pathways to sustainable futures."

Chapter 2

Background: Report on 'Users, Innovation and Sustainability

Our report on 'Users, Innovation and Sustainability' (Nielsen et al. 2014) challenged the notion that end-users only play a peripheral role in the development of sustainable products and services. It also offered initial academic insights into how policymakers could better facilitate this alternative form of end-user driven innovation process. The following section provides an overview of this first report (Del. 6.1), outlines its main observations as well as subsequent revisions and further learnings. Based on 84 papers published from 1992 to 2015, the report summarized and synthesized key insights within the field[2]. The results served to inform our analysis on how policy could be adapted to better support this form of innovation process. In the following, we briefly introduce a descriptive and categorical overview of the academic literature, an overview of the noted barriers and drivers as well as a sketch of the potential policy options noted in the literature. We round up with thematic insights gained from our first Policy Innovation Workshop held at Copenhagen Business School in June 2015.

2.1 Descriptive analysis

The results of our literature review revealed a diverse and compartmentalised academic field studying the multitude of roles that end-users can take upon themselves when pursuing sustainable innovation. This is also reflected by academic journals represented within the literature having diverse foci across 50 different journals[3]. As Figure 2 illustrates, the field is growing rapidly especially within the last five years (2010–2015), during which 62 out of the total 84 articles identified in our review were published.

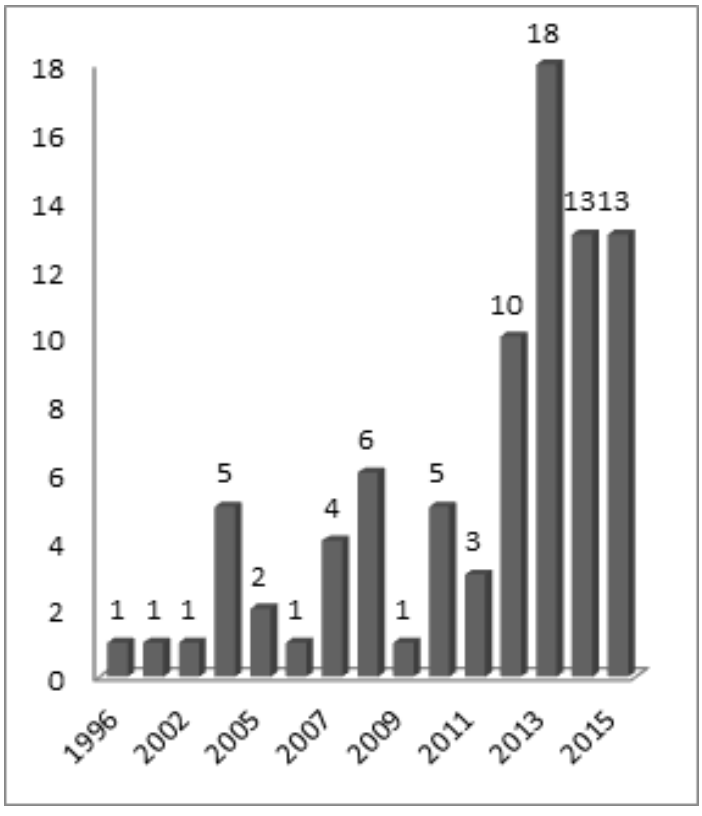


Figure 2. *Overview of publications per year within the field of SEIE (between 1992 – 2015).*

The literature on SEIE is predominantly case-based with 56 out of the 84 articles adopting a case-based approach. These cases vary both in scale and focus including, for example specific user inventions (Juntunen & Hyysalo 2015a), localised grassroots innovation groups (Yalçın-Riollet et al. 2014), and firm-driven commercialisation of end-user insights and innovations (Hoff-

mann 2007). This diversity in cases creates a multiple of narratives that provide a strong empirical basis; however, the theoretical framework is still in its infancy.

The report also sought to discern the major areas where SEIE is presented within the literature. Utilizing Tukker and Jensen's (2006a) Environmental Impact of Products (EIPRO) approach we grouped the empirical cases into four different product and service fields with a high environmental impact, namely: food, energy and heating, living[4] and mobility. Moreover, we created three inductively coded subcategories discerned from the literature that fell outside this general product-centric characterisation, namely: citizen science, development, and civic engagement[5]. Figure 3 illustrates the distribution of the literature based these subcategories. The numbers for each subcategory refer to the number of articles on topics in this subcategory[6]. The strong focus on end-user innovation within the field of energy and heating – the largest share of all – illustrates the potential innovativeness of end-users even within fields often characterised as complex and top-down from both an institutional and technical perspective (Juntunen & Hyysalo 2015b).

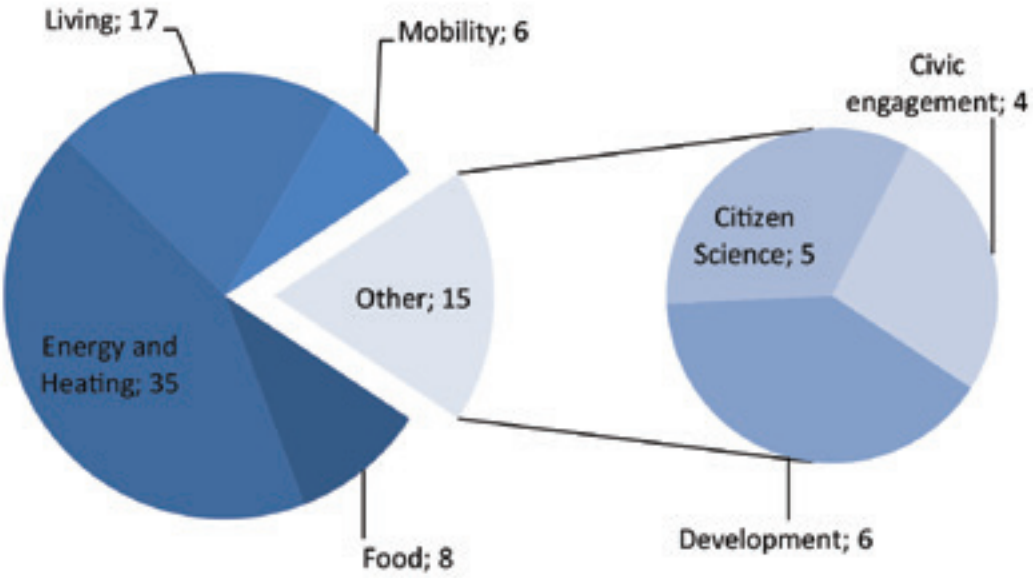


Figure 3. *Overview of the major subcategories within the literature*

[2] The original report drew upon 64 articles, but later follow-up research and an expanded search resulted in the identification of an additional 20 articles.

[3] Three journals none-the-less stand out within the research field: the Journal of Cleaner Production (8 articles), Global Environmental Change (8 articles) and Energy Policy (7 articles).

[4] "Living" refers to products and services utilized in residential homes apart from electricity and heat production, e.g. kitchenware.

[5] Citizen science is research on how end-users' abilities are utilized to collect observations, study natural phenomenon and even – as in Cornwell and Campbell (2012) – assist in the documentation and conservation efforts of endangered species. Development refers to research on end-user innovation within the fields of sustainable development (such as: co-innovation of knowledge between scientists and farmers to increase the productive capabilities of the respective farms and improve their sustainability, see (Dogliotti et al. 2014). Civic engagement refers to research on end-user innovation and how this results in individual and communal behavior and value shifts.

[6] Certain articles touch upon multiple subcategories and are hence represented more the once in Figure 3, e.g. Ornetzeder & Rohracher (2013) who focus on solar collectors, wind power, and car sharing and hence qualify both as a paper focused on 'Energy and Heating' and 'Mobility'. However, overall, the degree of overlap was minimal with only a small portion of articles focusing on multiple subcategories.

2.2 Categories for analysis

In order to observe the drivers and barriers to SEIE we used a series of deductively constructed categories to analyse this, based on the Motivation-Opportunity-Ability-Behaviour model (Ölander & Thøgersen 1995). The MOAB model conceptualizes the determinants of consumer behaviour in relation to sustainability, and while not particularly tailored for understanding innovation-oriented literature it is well suited for studying end-user behaviour. First, it has a broadly applicable coding tool for identifying potential drivers and barriers to end-user behaviour that also accounts for the observed attitude-intention-behaviour gap, not adequately covered by most other behavioural models (Zanna & Fazio 1982; Devinney et al. 2010). Second, it focuses on the end-user and has previously been effectively applied to studying sustainable consumption, production and investment behaviour as well as policy design (Jackson & Michaelis 2003). In this study, the MOAB-model served as the initial deductive coding scheme for classifying key barriers and drivers of SEIE identified in the reviewed articles. Also, the key variables, motivation, ability and opportunity, allowed for stylised coding for identifying how and where policy instruments can be implemented to facilitate SEIE. The three coding variables are defined as follows (Ölander & Thøgersen 1995):

- *Motivation* represents the underlying reason(s) for a given action that drive(s) the individual's recognition of wants and the subsequent action to satisfy them.
- *Ability* captures the individuals' personal competences and resources and thus includes elements such as end-user knowledge, the ability to carry out this knowledge in practice and access to resources.
- *Opportunity* captures the external conditions supporting or impeding intended action and the connection between intent and action.

Given the lack of an innovation component within the MOAB-model and the need to later link to potential effective innovation policies, the coding scheme was extended with three additional innovation specific variables: first, and as already illustrated, the environmentally most relevant product and service fields (Tukker & Jansen 2006b); second, the original driver of the innovation process (facilitated or independent SEIE) and third, the type of innovation pursued (incremental, novel or system) based on work by Carrillo-Hermosilla et al. (2010). Figure 4 illustrates the difference between incremental, novel and system innovation.

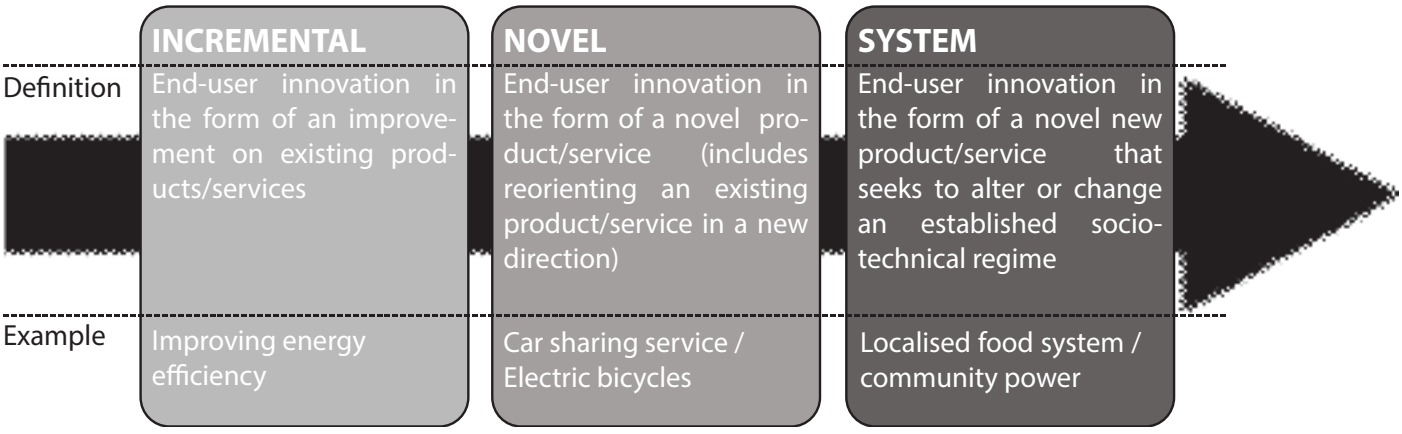


Figure 4. *Incremental, Novel and System Sustainable Innovation (Nielsen et al. 2014)*

Grounded in the case-based literature (n =56), Figure 5 below illustrates that the original driver of the innovation process appears to influence the type of innovation pursued. The numbers for each subset of the two pie-figures refer to the number of case-based articles covering each.

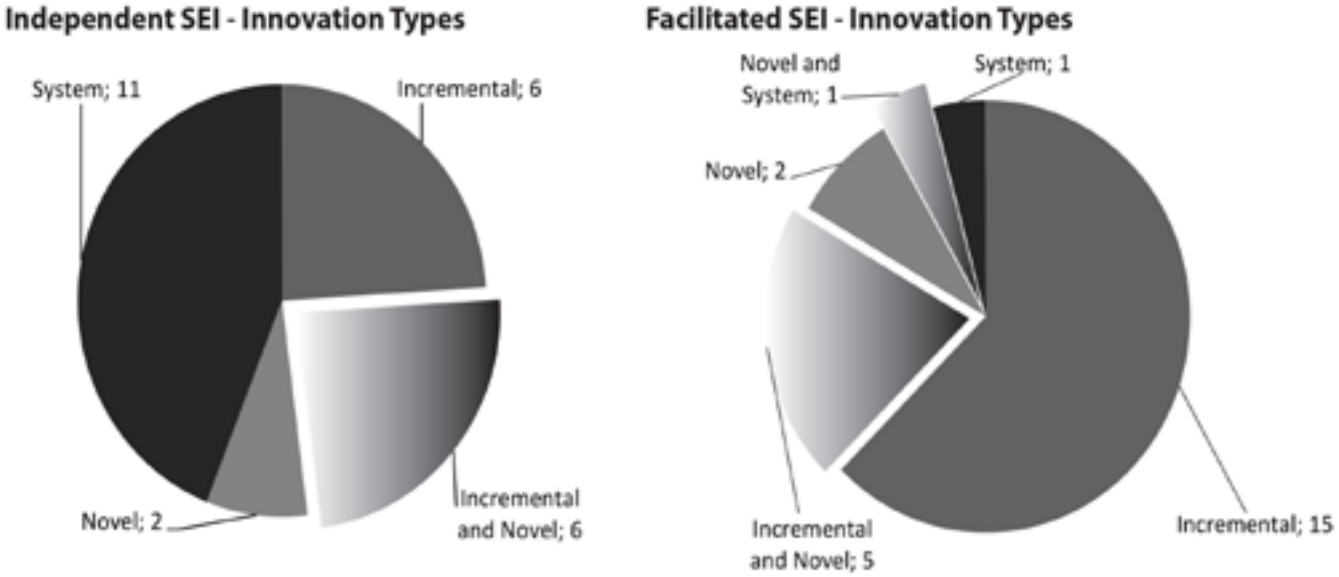


Figure 5. *Overview of the innovation pursued by independent and facilitated SEIE*

Based on the case-based literature, it appears that while system innovation dominates in indepedent SEIE literature (n = 11), incremental innovation appears to be the norm within faciliated SEIE literature (n = 15). While this may be due to biases in the source literature itself it is also consistent with earlier observations by Seyfang and Smith (2007) when studying grassroots innovation. They suggested that bottom-up initatives operating outside a market-based framework pursue more radical system innovation, whereas market-based iniatives pursue more incremental market-fit oriented innovation. Hence, it seems relevant to make a disctinction between independent and faciliated SEIE when considering policy barriers and drivers.

2.3 Enabling SEIE

The review of academic literature clearly suggested that end-users actively innovate for sustainable ends in multiple capacities, contributing with novel and technically sophisticated designs (Mattinen et al. 2015). Having shown the role that the end-user can play within sustainable innovation, we then sought to identify how policy could better ameliorate this form of innovation process based on the observations from the reviewed literature. Using the categorization tools presented in Section 2.1 and 2.2, the key barriers and drivers to SEIE from both an independent and a facilitated perspective were distilled. Table 1 illustrates these observations structured according to the MOAB-model[7].

[7] It is important to note that the variables of the model should not be perceived as isolated from one-another, but as interdependent. An increased ability to perform a certain task, for example, often also positively influences the motivations to do so (Thøgersen 2005).

Table 1. The drivers and barriers to independent and facilitated SEIE

		Driver(s)	Barrier(s)
Independent SEIE	Motivation	- Personal investment in project. - Project has a visible impact. - Collaboration with others (social component). - Community support (real world or internet enabled). - Effective and dynamic leader or group of individuals.	- Feeling of disenfranchisement from the "system". - Lack of necessary skills leads to a feeling of impotence. - Frustration with innovation process and feeling of isolation. - Dissemination of the innovation is perceived to contradict the innovator's ideals.
	Ability	- Having enough resources (time, skills, money and materials) and information to carry out the idea project. - Knowledge partnerships with others. - Early access to finance and other resources.	- Lack of technical know-how resulting in stalled or uninitiated projects. - Trouble identifying technical experts willing to help. - Innovation and/or modifying existing products is too expensive for end-users.
	Opportunity	- Open source platforms and online communities. - Support from an NGO, cooperative or other external intermediary. - Access to volunteer help (especially "expert" volunteers with either technical skill or an understanding of economic management)	- Complex grant scheme(s), bureaucracy surrounding grants, and the fluidity of the external funding landscape. - Failure to fit into classical funding criteria and confusion regarding eligibility. - Loss of warranty and insurance on products or services modified. - Lack of specialised tools required to alter products. - Dependence on unstable volunteer base undermines small projects.
		Driver(s)	**Barrier(s)**
Faciliated SEIE	Motivation	- Clear specification of expectations and goals. - Seeing that ideas and feedback result in actual adjustment and changes. - Feeling that insights are valued and not ridiculed or taken for granted. - Interactive group meetings	- Scepticism from the firm or project managers regarding end-user knowledge and intentions –some view end-users as troublemakers.
	Ability	- Users experience needs that producers may not be aware off.	- End-user and expert opinion may diverge due to information gaps.
	Opportunity	- Users offer multiple testing sites for the given product or service.	- Many tools for incorporating end-users into the innovation process remain novel and untested. - Projects focused on end user innovation require flexibility on behalf of funding regimes that is currently not offered.

Motivation Barriers

As revealed in the user innovation literature (von Hippel 1976), end-users primarily innovate for personal reasons and only secondarily, if at all, for commercial gains (Gabbott & Hogg 1999; Lettl 2007). Therefore the general perception is that many end-user innova¬tors have no intentions to achieve commercial success and only do so by accident,

along the way (Shah & Tripsas 2007). The key characteristics shared with user innovation in general therefore include innovating due to the personal enjoyment of the process (Hertel et al. 2003; Jalas et al. 2014), the social capital gained by doing so (Ornetzeder & Rohracher 2013; Seyfang & Longhurst 2013) and, in certain circumstances, the financial element at stake (Ross et al. 2012). As opposed to traditional user innovation, however, end-users involved in SEIE innovate (also) for others as opposed to (only) for themselves. Independent SEIE is therefore often characterised as being driven primarily not by market forces but rather by personal interests, passion and idealism (Seyfang & Smith 2007; Seyfang & Haxeltine 2012).

The "historical disenfranchisement of lay people from centralized systems" (Jalas et al. 2014, p.90) seems to be a central motivational barrier to independent SEIE. End-users often perceive themselves as incapable of causing change or as lacking the necessary skills to do so (Ross et al. 2012; Jalas et al. 2014). This is also translated into a sense of frustration faced by a significant number of independent SEIE due, for example, to a sense of isolation and failure to obtain funding from overly complex and shifting funding regimes (Kirwan et al. 2013; Hargreaves et al. 2013; Feola & Nunes 2014). Further, the often idealistic (or even activist) approach to sustainable innovation characterizing many independent SEIE also creates issues with regard to the diffusion of the innovation(s) (Seyfang & Haxeltine 2012). Often, independent SEIEs want to create their project as a counterpoint to the mainstream and therefore do not wish to "integrate" it into the dominant regime (Seyfang & Smith 2007). This internal dynamic, while understandable, can act as a barrier to the dis¬semination of especially system innovations as any step towards the mainstream could be conceived of as "selling out".

From a facilitated SEIE perspective, end-users are often highly motivated to take part in an innovation process, provided their role in the process is clear and they feel that their views are taken seriously (Rohracher 2003; Hoffmann 2007). Lack of motivation by the end-user seems to be a less important barrier for end-user integration than scepticism by the facilitators regarding the competences of the end-users involved (Rohracher & Ornetzeder 2002; Cornwell & Campbell 2012). Rohracher (2013) notes that some experts view end-users as "troublemakers" or "irrational" in their comments. This divergence between expert and end-user opinions has also been observed in citizen-led conservation, where local knowledge can be in conflict with expert knowledge (Cornwell & Campbell 2012). Hence, the major challenge for facilitated SEIE is to identify platforms that can bridge this gap between facilitator experts and end-users.

Ability Barriers

The major ability barriers to independent SEIE identified in the literature can be broadly classified into two types: lack of end-user competences and lack of resources. The lack of competences includes a lack of technical expertise (Heiskanen et al. 2011; Jalas et al. 2014), difficulties with finding and organising suitable collaborators (Feola & Nunes 2014), and issues concerning where and how to access potential external resources (Seyfang & Smith 2007; Ross et al. 2012). The importance of lack of resources is for example highlighted in Heiskanen et al.'s (2011) case study on end-user innovation regarding heat pumps that cost up to EUR 20,000. The financial risks involved when tin¬kering with such an expensive system would seem a natural barrier to many potential end-user innovators (Hyysalo et al. 2013b). Time constraints are also a major barrier for many end users. Maintaining micro-generation of heat and power, for example, is time consuming (Juntunen & Hyysalo 2015b). In addition, a significant number of the independent SEIE reviewed in the literature depend on the labour resource of volunteers for their survival and consequently struggle to secure and maintain their access to a stable volunteer base (Hoffman & High-Pippert 2005; Seyfang & Smith 2007).

As sketched above, within facilitated SEIE, expert and end-user knowledge and opinions may conflict. This could be due to the previously discussed motivational component and/or due to information gaps between end-users and experts. These gaps arise as information sharing is often hampered by the "stickiness" of information – referring to the often costly acquisition and transfer of information from one location to another (von Hippel 2005). This makes the sharing of information "highly contextual, tacit and difficult to transfer from one site to another" (Heiskanen et al. 2013, p.242). End-users often simply speak a different "language" than experts within their respective fields. While incorporating end-users into a facilitated SEIE process is meant to ease the stickiness of information transfer, this remains an issue.

Opportunity Barriers

From an opportunity perspective, independent SEIE remains challenged by the fact that the project is either wholly financed by their own income, and innovators therefore view the process as a personal project, or reliant on shifting funding landscape (Hyysalo et al. 2013; Hargreaves et al. 2013). Seyfang and Smith (2007) noted, with reference to Church (2005) and Wakeman (2005), that many of these initiatives spend 90% of their time simply surviving economically, thus leaving little time for their focal activity. These projects also remain enormously dependent on key individuals in the group and when these individuals inevitably leave the project, the projects often fail to receive additional funding (Kirwan et al. 2013). Consequently, limited access to finances remains a significant opportunity barrier to the independent SEIE process, driven by a number of issues. The first issue relates to the grant funding process itself, which a significant number of independent SEIE note as being overly complex and therefore a source of considerable frustration (Seyfang & Smith 2007; Ross et al. 2012). This relates to identifying eligibility, but also to the bureaucracy and requirements usually associated with the application process (Smith 2007; Walker 2008). In addition, some independent SEIE, especially within system innovation, face issues with regards to matching the currently available grant and funding schemes, es¬pecially since they fall between "the interstices of traditional social, economic, and en¬vironmental issue boundaries" (Seyfang & Smith 2007, p. 596). The inaccessibility of some government institutions has also been noted as a barrier to independent SEIE (Ross et al. 2012; Seyfang & Haxeltine 2012). Hence, the lack of opportunity for end-users to alter or change existing products or services in a simple fashion is currently a significant barrier to SEIE. In addition, the fact that modifying a product or service often leads to an immedi¬ate loss of warranty and insurance is another external constraint on end-users' willingness to engage in user innovation (Hyysalo et al. 2013). Many producers also actively attempt to prevent end-users from tampering with their products by, for example, requiring specialised tools to disassemble the product (Ornetzeder & Rohracher 2006; Heiskanen & Lovio 2010). Finally, the often isolated nature of end-user innovators has been noted as greatly endangering the survivability of many projects as isolated independent SEIE (Feola & Nunes 2014).

According to the reviewed literature, facilitated SEI especially faces two practical issues, one with regard to funding constraints and the other with regard to identifying methods for effectively co-opting end-users. End-user involvement and co-design requires a flexible project planning environment, and current funding regimes have been found to be too in¬flexible to properly facilitate end-user integration and involvement (Heiskanen et al. 2013). Most government-funded projects require detailed plans that cannot easily be altered to fit new information or end-user feedback gained during the project. Coupled with this, there is also the issue of identifying the correct tools to use to effectively integrate the end-user into different facilitated processes.

2.3.1 Policies for enabling SEIE

Given the observed varied barriers and drivers of independent and facilitated SEIE policy tools need to be adapted to each respectively. This is outlined below - additionally we also briefly highlight the frameworks independent and facilitated SEIE appear to inhabit inspired by Seyfang and Smith (2007).

Independent SEIE

Independent SEIE is driven by a number of factors, but most pronounced is the end-users' interests, passions and even idealism rather than the expectation of monetary return. They therefore operate in what could be called an individual and social-need framework, seeking localised niche solutions to signifi¬cant systematic issues. Given their independent nature, they are often carried out by only a few active individuals, relying heavily on limited external resources, their own personal finances and volunteer work by community members. Finally, a significant number of independent end-user innovators engage in radical innovation, such as localised food and energy systems or community currencies. This invariably causes significant barriers to the diffusion of the invention - both given the radical nature of the invention itself, but also a lack of willingness on behalf of the inventor(s) to engage or integrate into the dominant regime - specifically as this is often perceived of as 'selling out'.

Policy should therefore typically strive to ameliorate end-user competences and support the motivations for innovating in the first place. Especially the utilisation of awards and competitions and DIY/self-building courses and groups represent simple and practical policy tools for supporting independent SEIE with regard to increasing end-user competences, facilitating intergroup collaboration and learning, and with regards to making sustainable innovation doable and enjoyable. The implementation of simplified micro-grants also represents a potential driver as end-user typically face issues gathering very early stage seed-funding. Finally, independent SEIE often depends not only on the end-user innovators themselves, but also on intermediary actors (such as cooperatives and voluntary associations) who support the independent SEIE processes in a number of capacities. Policymakers should therefore not only seek to support the end-user innovators, but also consider the relevant intermediary actors. Table 2 provides an overview of the policy tools identified.

Table 2. *The policies tools to support independent SEIE*

	Independent SEI	Policy Tools
Framework	Individual and social-needs framework.	**Awards and competitions:** Exposure, Credibility, Public awareness and Encouragement
Drivers	Personal projects based on interests, passions and idealism. Typically facilitated by individuals or small groups.	**DIY and self-building courses and groups:** Ameliorate perceived (and real) lack of necessary skills, empower the end-user(s), deepen community membership and facilitate the enjoyment of creating and sharing competences.
Solutions	Localised and context specific solutions to larger issues. Dominance of system innovation.	**Intermediary actors:** Foster community awareness, empowers end user(s) by giving them a voice, builds end-user con¬fidence, ameliorates the dissemination process
Resources	Grant funding, voluntary input, crowd sourced competences via e.g. internet forums. Some commercial resources if successful.	**Micro-grants:** Initial small-scale seed-financing **Data accessibility:** Open source standardised datasets For more policy options see our report 'Users, Innovation and Sustainability'

Inspired by Seyfang & Smith (2007) and Nielsen et al. (2014)

Facilitated SEIE

Facilitated SEIE is conversely often focused on the marketability of the given sustainable innovation as it operates within a market-driven framework. This at times limits the parameters for innovation as the given innovation often has to be applicable in a current setting. Radical innovations typically in the early stage represent a niche phenomenon that have a marginal economic value – hence organisations are in some cases limited by their pursuit of innovation as it needs to be commercially viable or at least cost neutral. As a result, the innovations produced appear to often be incremental improvements on existing products and services carried out in order to find generalizable sustainable innovations that could be applied at scale.

The primary issue facing many facilitated SEIE processes is ameliorating end-user and expert (project leader) motivations, expectations and differences. While some have also noted that current funding schemes also lack the flexibility to encourage end-user integration the primary concern remains identifying methods for facilitating end-user and expert collaboration. One method for successfully engaging end-users is to identify so-called 'lead-users.' Lead users are characterised as playing a particularly active role in the sustainable innovation process. Identifying these lead users and co-opting them into a facilitated innovation process has already been a successful technique for driving innovation within classical user innovation. We suggest a similar approach within sustainable innovation could be used, where the utilisation of forums, blogs and other online represent a method for identifying lead users. The emergence of the interconnectivity of the Internet has also facilitated the potential use of the "crowd" as source of knowledge, ideas and resources through the use of crowdsourcing and funding. The success of the Harvard Crowd Innovation Lab and NASA Tournament Labs illustrating the complexity of problems that the "crowd" can solve. The rapid growth of crowdfunding could also represent an additional interesting policy tool for policymakers. In the UK experimentation with crowdfunding as co-investment tool has already been implemented. Finally the LivingLabs (LL) method represents a novel approach to integrating end-users into the innovation process via direct end-user involvement. Specifically by involving the end-user not within an external context, via e.g. workshops at a university, but instead within their own everyday lived lives and context.

Table 3. *The policies tools to support facilitated SEIE*

	Faciliated SEI	Policy Tools
Framework	Market-driven framework.	**Identify lead users:** Draw upon inventive end-users and lead users, and co-opt them into a given project.
Drivers	Typically firm, government or university driven projects. Typically facilitated by one or more institution(s).	**Crowdsourced innovation challenges and crowdfunding as a co-investment tool:** Large aggregate knowledge and resource pool, empowers-end users to take part in the innovation process, often intrinsically not extrinsically motivated
Solutions	Generalisable solutions to larger issues, built in part on end-user knowledge. Dominance of incremental innovation.	**Sustainable LivingLab:** Real world sustainable innovation testing and activate end user explorational learning Micro-grants: Initial small-scale seed-financing Dominance of incremental innovation.
Resources	Income from commercial viability of the given product or service. Larger government and university grants. Small SMEs can also seek crowdfunding	For more policy options see our report 'Users, Innovation and Sustainability'

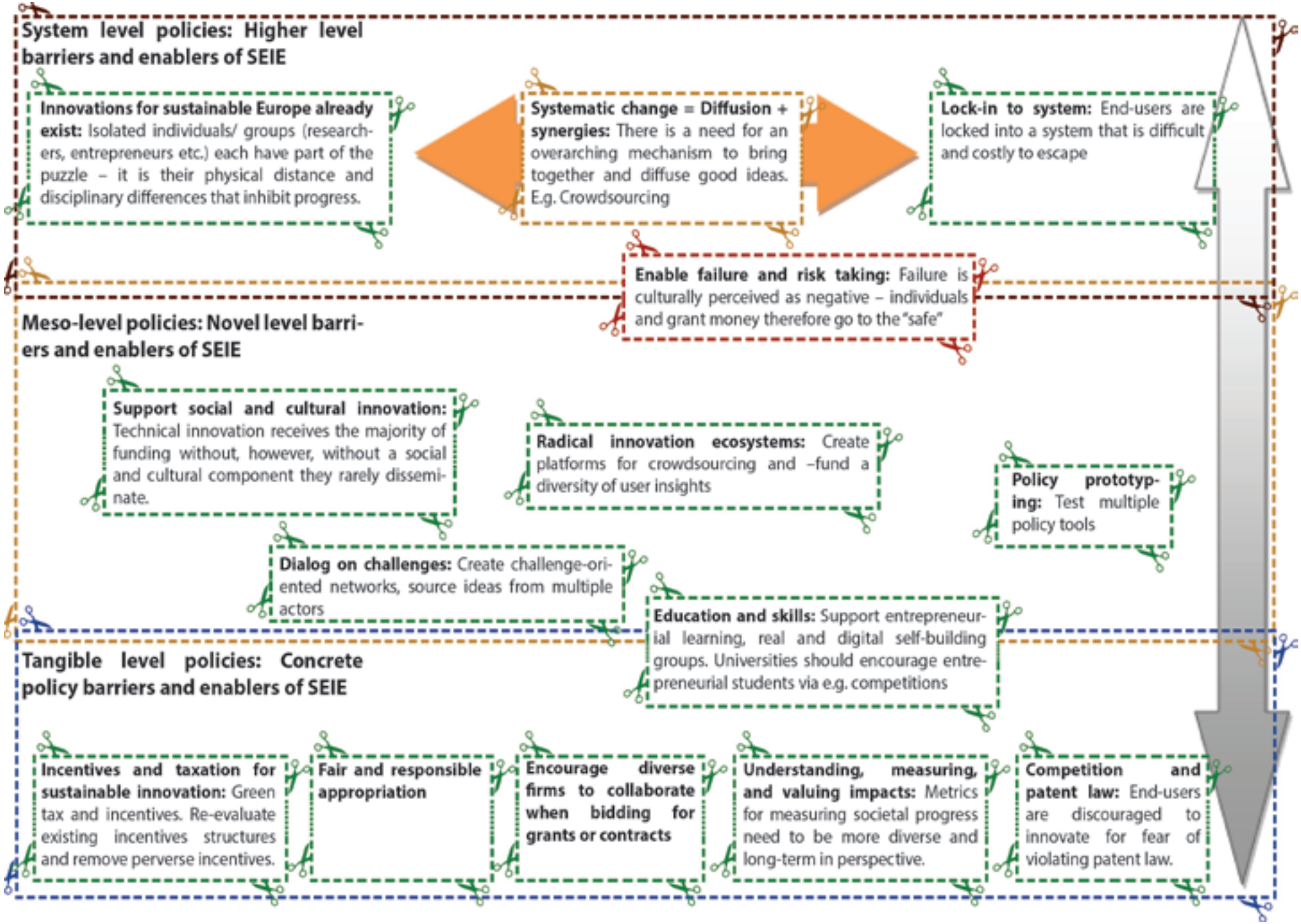
Inspired by Seyfang & Smith (2007) and Nielsen et al. (2014)

2.4 Policy Innovation Workshops

In order to reality test our observations with practitioners and experts within the field of sustainable innovation and entrepreneurship we conducted our first Policy Innovation Workshop in June 2015 at Copenhagen Business School (CBS). The day long event, hosted by CBS and Forum for the Future, brought together a diverse range of leaders seeking to learn from and build on their practical experience - be it as an entrepreneur, within business, or within a community that is developing new sustainable innovations. The workshop's goal was to create a thematic overview of what practitioners of sustainable innovation view as the major barriers to their work. Figure 6 illustrates the major thematic observations that participants noted as playing, or could play, a key role in enabling SEIE. The workshop therefore served, as with the current report, to reality test our academic observations but from the point-of-view of the sustainable innovator and entrepreneur. Ultimately shaping the direction of the questions posed to policymakers in this report and the overall direction of our research. By drawing upon insights from the academic world, practitioners of sustainable innovation and policymakers we hope that our future research finds relevance within all three domains.

The figure is overall subdivided into three levels of policies – from tangible concrete policy recommendations to more vague systematic level issues that need to be addressed. The concrete policy recommendations represent "tried and true" policy tools for promoting growth within certain areas for example by implementing, in this case, green incentives and preferential taxation to promote sustainable innovation. While systematic level policies conversely represent broader, more complex and harder to define issues e.g. the lock-in nature of the current unsustainable regime, where sustainable innovations face several constraining factors. These constraints both formal and informal in nature: formal constraints including legislation, economic rules and contracts, while informal constraints, could be social conventions and codes of behavior. Generally it can be said that complexity increases as we approach the system level of policies. For example, changing a regime to be more sustainable requires multiple approaches, but none-the-less represents a significant barrier to SEIE. The meso-level policies are at the intersection between the two and represent novel tools or ideas that are on the one hand more concrete then system level policies, but still only roughly defined and underexplored. The prototyping of policies by for example the Behavioral Insights Team (BIT) in England is increasingly being called for within policy circles, but remains relatively uncommon. Finally the green boxes indicate potential drivers of SEIE while the red indicate barriers.

Figure 6. *Identified thematic barriers and enablers of SEIE (June 2015 Policy Innovation Workshop)*



Chapter 3

Methodology

The goal of the present Report (Del. 6.2) is to explore policymakers' awareness and understanding as well as needs and expectations of SEIE. As a methodological approach, we used semi-structured qualitative interviews as this allowed in-depth understanding of the phenomenon under study (Denzin & Lincoln 2005). Given the breadth of the research goal and the diversity of interviewees, we created a thematically framed semi-structured interview guide comprising a series of guiding questions. The thematic areas included: (i) opening questions exploring the purpose of policy and the role of consumers in the context of sustainable innovation, (ii) the interviewees' awareness and subsequent understanding of SEIE, (iii) their views on the key barriers to SEIE and (iv) their needs and expectations of this alternative form of innovation process (see Appendix A for an example of the short semi-structured interview guide). The background for each category was derived from the Nielsen et al. (2014) report as well the first Workshop introduced in Section 2. Given the exploratory nature of the interviews themselves the questions only served as potential departure point for discussion. The aim was not to fully cover all questions, but rather to let them guide the interview process if the thematic areas remained unexplored.

The thematic areas also served to ease the analysis creating a common reference point for categorizing insights and ideas. The themes therefore also serve to systematize the complex character of the phenomenon that we are studying – allowing for a simple way of presenting the diversity of insights gained (Boyatzis 1998). In engaging in this form of interpretative research the researcher engages in subjectively driven delimitations of the key insights gained from the interviews. This subjective interpretative approach allows for an in-depth analysis, but also risks that interpreted views become a reflection of the researcher's own consciousness rather than the interviewee. In order to minimize this we used two researchers to analyze the interviews independently and discuss coding results.

3.1 Sampling design

The overall sample comprises interviews with 25 individuals organised around two distinct groups of respondents – policymakers and policyshapers – seeking to strike a balance of two groups as illustrated in Table 4.

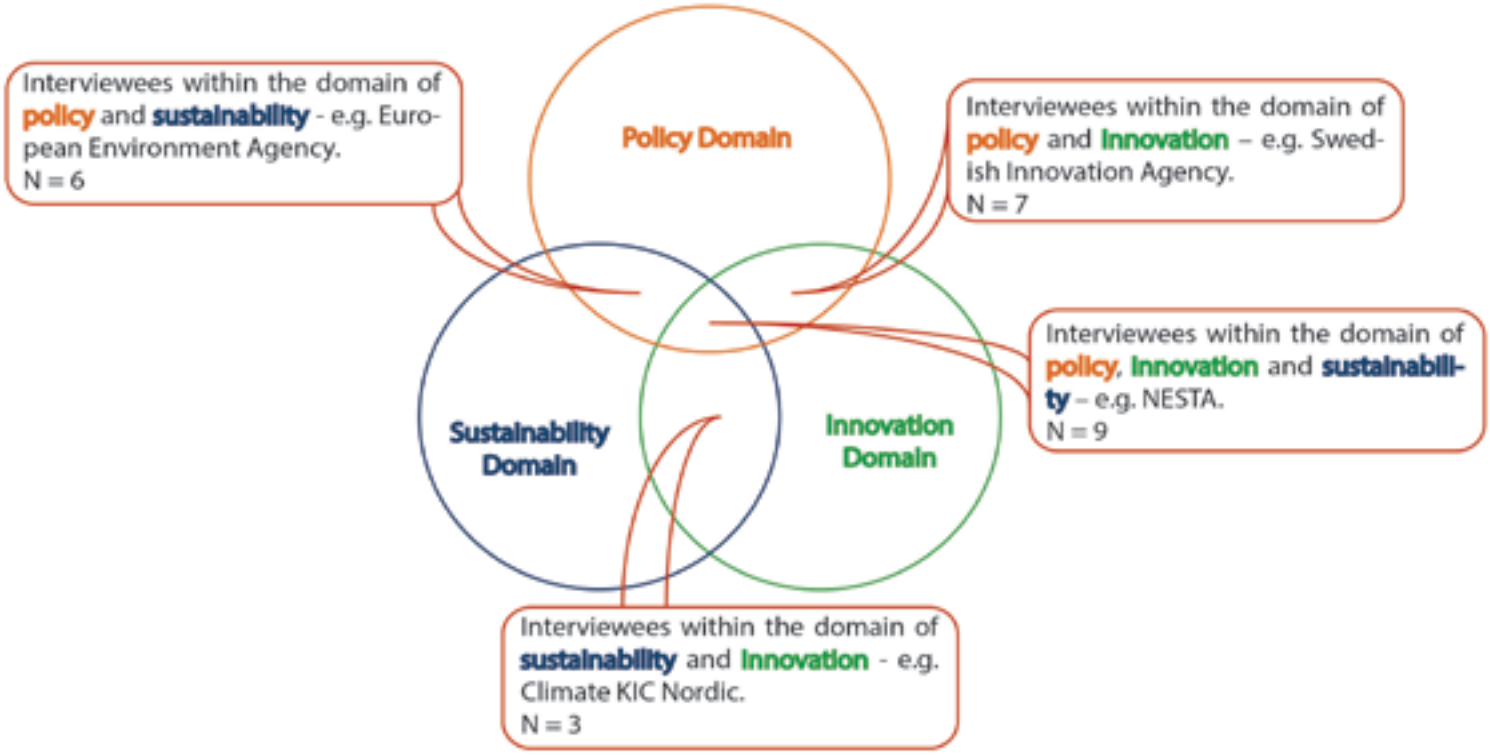
Table 4. *Overview of interviewee sample – Policymakers and policyshapers*

	Definition	Examples
Policymakers (n = 13)	Persons directly responsible for or involved in formulating policies at a national or at an EU-level.	- European Environment Agency - Swedish Innovation Agency - DG for Research and Innovation - Danish Ministry of the Environment and Food
Policyshapers (n = 12)	Persons indirectly involved in policy formation typically through their role as informants to governmental policymakers.	- British Retail Consortium - NESTA - Nordic Innovation - Wuppertal Institut

The sample is diverse by design and comprises national, regional and EU-level policymakers and -shapers. It covers interview partners from five EU-countries, a range of regional and pan-European policy organisations (e.g. Nordic Innovation and Climate-KIC) as well as EU-level institutions including the EEA, DG Health and Food Safety, DG Environment and DG Research and Innovation (see Appendix B for a full overview of all institutions and organisation interviewed - for rules of anonymity the interviewees' names have not been included).

Broadly speaking our report inhabits three primary domains – the policy domain, the sustainability domain and the innovation domain. Ideally we would have selected interviewees operating within all three domains. However, we realized that the novelty of the field of SEIE limits the number of potential contact points. As a contingency we ensured that our interviewees were positioned could comment on at least two out of the three domains (see Figure 7).

Figure 7. *Distribution of interviewees within the three domains of policy, sustainability and innovation*



The underrepresentation of interviewees within the domains of Sustainability and Innovation was deliberate given our policy focus. However, we used these expert interviews to validate our observations. The semi-structured interviews were carried out as either face-to-face (N= 8) or phone interviews (N= 17) and typically lasted between 35–45 minutes.

3.2 Coding

The interviews were thematically coded based on themes deductively derived from Nielsen et al. (2014). The purpose was to validate the themes derived from the scientific literature with the real-life experiences and reflections of the interviewees. Prior to the coding process, the codes were tested through a pre-screening of a data sample to assess whether a modification of the codes was needed. The recorded interviews were then listened to and screened for the presence or absence of the themes. After completing the coding process, all coding themes were once again reviewed to ensure that the themes had been meaningfully coded. In instances where alterations of the coding themes were deemed necessary the data was subsequently recoded. The following analysis highlights our main observations (See appendix C for an example of the coding scheme template).

Chapter 4

Results

The following analysis is structured in five segments that together outline policymakers' and policyshapers' awareness and understanding of SEIE, their thoughts on the purpose of policy in relation to SEIE, potential barriers to SEIE, and their needs and expectations for the future. In the presentation of the results, we enrich the report with direct quotes from the interviews. Some interviewees preferred to stay anonymous; some allowed us to cite them by name

4.1 Conceptual vagueness

A prevalent issue addressed in the scientific literature (Nielsen et al. 2014) and during the interviews was the conceptual vagueness and lack of definitional cohesion connected with sustainable end-user innovation and entrepreneurship. A myriad of terminologies have been used to describe the engagement of end-users in innovation processes, and the lack of a concise terminology proved to be a challenge throughout the interviews. Despite having defined SEIE prior to the interviews, many interviewees chose to use different terms to describe the role of the end-user such as co-creation, social innovation or co-innovation. However these terms largely suffer from the same lack of definitional clarity and are oftentimes used interchangeably by policymakers and policyshapers.

> "*When I hear co-creation I get 3-4 ideas of what it could be*"
>
> Peter Svensson, VINNOVA Sweden

Adding to the confusion, the terms sustainability and innovation often allow for broad interpretations and can as a result be conceptualized in various ways (Nielsen et al. 2014). This tendency was frequently observed during the interviews, where several interviewees mentioned sharing economy and collaborative consumption as examples of SEIE, although these concepts are distinctively different from SEIE. While recognizing that the terminological challenges could stem from an abundance of theoretical terms seeking to explain the same concept, another reason could be the lack of mainstream familiarity with innovation terminology and end-user integration in particular.

4.2 Awareness of SEIE

Due to the broad spectrum of interviewees representing different institutions their level of awareness of SEIE was expected to vary significantly. Some interviewees worked explicitly with sustainable innovation, others with environmental policy or sustainable consumption. Generally speaking, the awareness of SEIE among interviewees was rather limited and thus aligned with our expectations. The interviewees most aware of end-user innovation typically worked specifically with innovation. This was also evident in their ability to distinguish between the different innovation-terminologies. However, despite being well aware of SEIE, only very few actually worked with end-user integration on a daily basis.
A number of interviewees had no prior knowledge of SEIE and were therefore unable to discuss the phenomenon in greater detail. These individuals mainly worked with innovation on a more peripheral basis, which could explain the lack of familiarity. This strength-

ens our perception that end-users have not yet broken into the mainstream as a source of innovation and entrepreneurship.

> *"The concept of consumer-led innovation is not a concept I was familiar with"*
>
> Policymaker, male

Most interviewees regarded policymakers' awareness of sustainable innovation to be on the rise, but with the end-user (i.e. consumer) aspect being largely neglected on the policy agenda. In fact several individuals stressed that the end-user angle has been completely overlooked by policymakers who instead have a more traditional perception of innovation and its main actors. The traditional view of consumers in relation to innovation was a recurring theme throughout the interviews. There was universal agreement that the end-user currently inhabits a role as a recipient of innovation rather than being part of the innovating process.

> *"Consumers can push the market towards more sustainable and efficient products"*
>
> Policymaker, male

The classical view of the consumer as a market actor was also prevalent among many interviewees who often referred to 'the informed consumer' and the ability to influence markets from the demand side. Here the consumer's role involved purchasing more sustainable products and to accept new business models greater aligned with the natural boundaries of the environment. These actions should then impact markets and further sustainable innovation and in result lead to more sustainable and efficient products.

Other interviewees perceived the consumer's role to be undergoing change, with the consumer becoming a more important actor on the market and in innovation. The shifting dynamic can largely be attributed product and production information being widely available due to the Internet and technical capabilities becoming more attainable through open source software.

According to several interviewees, there is a perception among most policymakers that innovation predominantly occurs in research and development (R&D) departments in large businesses, at universities or in innovative start-ups and SMEs. Especially the latter has, according to interviewees, gained more attention in policy circles recently and is increasingly viewed as an essential source of economic growth and innovation. As a result SMEs are, unlike SEIE, gaining more prominence in new policy measures.

Despite SEIE being largely negligible on the general policy agenda, some political institutions are beginning to grasp the potential of end-users in sustainable innovation. These institutions, mainly focusing on research and innovation, have implemented initiatives that included end-user involvement. Although these initiatives prove the presence of end-user involvement in policy-making, they have so far only been of a limited scope. One interviewed policymaker acknowledged the largely untapped potential of SEIE and recognized end-users as being a valuable actor in driving sustainable innovation. However, the general assessment of the awareness of policymakers and existing policies was not as promising. Throughout the interviews only few examples were given of existing policy measures involving end-users and in most instances none could be recalled.

> *"Whether at a national or EU-level, I cannot think of any specific policy geared towards consumers to support their engagement in innovation processes either in companies, municipalities or society at large"*
>
> Policyshaper, female

Conflicting arguments were made about at which political level the awareness of SEIE was most prevalent. One interviewee argued that initiatives at the EU-level have been easily overlooked, whereas local politicians (in Sweden) are more aware and supportive of initiatives from end-users. Another interviewee regarded the interest in SEIE to be higher at the EU-level, where she observed end-users becoming increasingly integrated in research and innovation projects. The seemingly opposite observations likely stem from referring to two different concepts of SEIE - independent and facilitated SEIE. The interviews revealed a greater awareness of facilitated SEIE among both policyshapers and policymakers.

> *"In regards to independent SEIE policymakers are less aware"*
>
> Tiziana Pagano, TECHNOFI and
> Networks for Eco-innovation Investment (INNEON)

The greater awareness of facilitated SEIE is likely due to the common perception that most innovations are the result of company processes. As a result, it is more imaginable that end-users would become integrated in company processes rather than innovating independently.
A number of interviewees also recognized that large companies are beginning to integrate end-users at an increasing rate. In this regards the example of the Danish toy-company Lego starting to co-create with consumers was mentioned. Given large companies' resonance in global media and political clout they have a greater likelihood of gaining EU-level policymakers' attention than small grassroots (independent) innovations, which are often local and outside the "system." The usually local aspect of independent SEIE could explain why the awareness of local policymakers is deemed greater than national and EU-level policymakers concerning this type of innovation. The fact that most interviewees were less aware of independent SEIE was also reflected in their ability to give examples of independent SEIE. Although very few examples were identified, the example of the Danish wind power cooperatives was mentioned by a couple of interviewees. The scarce awareness of independent SEIE is hardly surprising as this currently represents a small niche in innovation. identified, the example of the Danish wind power cooperatives was mentioned by a couple of interviewees. The scarce awareness of independent SEIE is hardly surprising as this currently represents a small niche in innovation.

4.3 Purpose of policy in SEIE

The importance of policy to support sustainable innovation and SEIE was almost unanimously agreed upon. Policymakers were recognized as having a key role in enabling, facilitating, and advancing sustainable innovation by providing favorable framework conditions in which end-user innovation and entrepreneurship can flourish. Broadly speaking, policy can contribute to SEIE by pushing development in a sustainable direction and by establishing binding rules. This involves integrating the end-user and sustainability perspective into policy measures concerning infrastructure, regulations, standardizations, business environment, financial systems, public funding, citizen behavior and more.

> *"Policymakers have the responsibility of creating the favorable framework conditions for moving our social and economic system towards a real sustainable trajectory"*
>
> Policymaker, male

The multitude of policy areas connected to SEIE clearly underlines the important role of policymakers and the necessity of their active involvement in advancing sustainable innovation and SEIE in particular. Interviewees addressed the need for public funding schemes and environmental regulation in order to better incentivize and facilitate the engagement in end-user innovation and entrepreneurship. Public funding is of critical importance to most end-user initiatives in order to develop and succeed. This is especially true of inde-

pendent projects, which are often heavily reliant on external funding.

Imposing new regulation to help spark sustainable innovation and entrepreneurship was widely regarded as a necessary policy intervention. One interviewee highlighted the ability of forthcoming regulations to catalyze new innovation in companies as it forces them to adapt to the changed market conditions. Implementing new sustainability-related regulation could then push innovators and entrepreneurs toward focusing more on environmentally friendly products and services.

> *"The anticipation of legislation often comes as the main driver for companies to start doing something"*
>
> Policyshaper, female

Although imposing stricter environmental legislation upon businesses could drive innovation in a sustainable direction, its dubious political feasibility was acknowledged by a number of interviewees. An interviewee argued that there is great resistance on both a national and European level towards introducing new environmental regulation due to the current political environment. It was further argued that introducing regulatory policy measures are perceived as curbing individual freedom within certain policy circles, thereby impeding its implementation likelihood. Furthermore, any environmental policy is required to prove its benefits in terms of increasing employment and economic growth, which can be difficult.

While policymakers are significant stakeholders in relation SEIE they should be wary of becoming overly meddlesome in the innovation and entrepreneurship process. If too formal and inflexible requirements are implemented, the probability of ousting more radical innovation increases significantly. According to some interviewees, policymakers ought to provide elastic framework conditions, wherein end-user innovators and entrepreneurs can freely operate in order to maximize innovativeness and creativity. This is expected to facilitate more valuable sustainable innovations. Policy can hence also become a barrier if too narrow and selective in nature.

> *"If you meddle too much, there is a risk that you select the users that are doing innovation, but not as radical"*
>
> Peter Svensson, VINNOVA (Sweden)

Nearly all interviewed policymakers and shapers judged the role of policy to be central in connection with SEIE. However, one interviewee questioned the relevance of policies targeting facilitated SEIE. She argued that integrating end-users and their ideas into company processes should be the responsibility of companies themselves. In addition, it might be difficult for policymakers to see the need for supportive policies besides providing innovation or financial support and encouragement to small SMEs and start-ups. The underlying reasoning is the fact that companies mainly promote facilitated SEIE due to its profit potential or that they can better customize their products to customer needs. As a result, the interviewee only saw a limited role of policy to further facilitated SEIE.

4.4 Barriers to SEIE

Numerous barriers to SEIE were identified throughout the interviews. The barriers are structured in accordance with the MOAB-model framework by Ölander & Thøgersen (1995) as presented in Section 2.2. Afterwards the barriers from a policy-making perspective are accounted for.

Motivational Barriers

The interviewees only identified a small number of motivational barriers to SEIE. The most prevalent barrier related to independent SEIE was the lack of a financial mechanism motivating end-users to spend time and resources on becoming innovators. One interviewee presented the example of electricity bills, which are usually fixed on a one-year basis. Despite being able to monitor the electricity consumption throughout the year, the end-user is rarely able to change the paid amount before the next one-year period is initiated. Therefore the resulting benefits of reducing one's energy consumption or thinking innovatively are delayed and cannot be immediately experienced. The delayed benefits, in this case financial savings, often do not motivate end-users to make small incremental or novel innovations. The interviewee further argued that the absence of feedback systems could discourage end-users from innovating, thus functioning as a motivational barrier to SEIE.

The lack of a financial mechanism can also dissuade end-users from investing resources in more time- and financially-consuming innovation projects. This is due to the fact that any repayment or other positive outcomes usually do not take place before a substantial time has passed.

In connection to facilitated SEIE, the most frequently identified motivational barriers were the perceived risks and time consumption involved in integrating end-users into the company's innovation process. By integrating end-users in the early stages of the innovation process, the company is required to spend resources on locating the most relevant and capable end-users to ensure that their contributions are useful and valuable. This process can become overly time consuming and with uncertain outcomes in sight companies are often not sufficiently motivated to take on the risks involved. The motivational barriers to engage in facilitated SEIE do not merely concern companies, but also the end-user who has to dedicate time and effort with an undefined yield to follow. A couple of interviewees speculated about what incentives existed that could encourage end-users to participate in facilitated SEIE. These interviewees generally struggled to find reasons as to why end-users would be willing to dedicate themselves to an innovation process that are mainly beneficial to the company.

Opportunity Barriers

The most widely recognized barriers during the interviews were in relation to the opportunity to engage in SEIE and in particular independent SEIE. End-user innovators are confronted with a number of barriers that must be either overcome or dealt with continuously.

> *"The main barrier is a lack of resources in terms of time and money"*
>
> Tiziana Pagano, TECHNOFI and
> Networks for Eco-innovation Investment (INNEON)

The majority of interviewees especially highlighted lack of time and money as being the most prominent barriers facing independent end-users. The two barriers are largely interconnected (at least to most people) since the innovation process oftentimes is very time-consuming, thereby forcing end-users to dedicate their working hours to the project. As a result, the issue of financial support becomes highly important as limited income can be attained elsewhere. The end-user(s) is therefore dependent on external subsidies such as governmental funding schemes in order to be paid a living wage. Adding to this is the likely costs connected to the development of the innovation. Unless the end-user(s) can achieve external financial support he or she is forced to bear the costs on their own. Many interviewees stressed this fact as a key barrier to independent SEIE. Closely related to the necessity of financial support is the lack of flexible and easily accessible funding schemes

directed at end-users – a barrier addressed by a number of interviewees. The prospects of living in a financial struggle and having limited opportunities to attain external funding throughout the process were regarded as a major barrier to the willingness of end-users to become independent innovators. The absence of funding schemes is particularly true for more system-challenging innovations. These end-user innovators sometimes work on the outskirts of political convention with scarce attractiveness from a governmental and business perspective. Therefore, it requires much dedication on the behalf of the end-user(s) in order to sustain a project with a long-term outlook and limited income potential.

> *"If you want to innovate you have to challenge and reinvent the established systems around you"*
>
> Mariana Nicolau, Collaborating Centre
> for Sustainable Consumption and Production (CSCP)

Another barrier facing independent end-user innovators is the diffusion of the innovation once developed. One interviewee argued that diffusion failure is one of the biggest problems concerning SEIE. The reason being that the end-users do not share their innovation, not because they do not want to, but the fact that there is no mechanism for it. Sustainable end-user innovations thus run the risk of disappearance if unsuccessful at diffusing their project. The risk is further reinforced by the absence of diffusion mechanisms and facilitation processes within political institutions. However, the risk of diffusion failure cannot merely be attributed the lack of a diffusion mechanism. Other interviewees underlined the importance of project scalability for successful diffusion. The issues of scalability and societal transposition are also likely connected to fund allocation, as funding schemes might be more supportive of innovative projects, which can be upscaled to national or international markets.

The opportunity barriers identified in connection with facilitated SEIE were mainly centered on the company-perspective. However the acknowledged barriers were closely aligned with the opportunity barriers for independent SEIE – namely time and money. The integration of end-users into innovation processes generally requires much dedication from the company. It involves dedicating a substantial amount of personnel and working hours as well as financial resources in order to achieve a successful outcome. One interviewee addressed the required commitment of companies in reference to the growing trend among companies to solicit feedback from end-users. The interviewee argued that while the process of soliciting feedback and ideas from end-users do not require many resources the actual processing of the incoming information is a whole other matter. The information processing and subsequent action could demand the attention and assumed responsibility of an entire department. This is especially true in the early stages of the innovation process, where the product or service has not yet been formalized. Another interviewee likewise found it easier to integrate end-users when the project is closer to market.

> *"If you look at the user-driven providers such as service design companies who have a strong understanding of including users and customers and putting them at the center of their value creation (…) they still have to prove their methods and their way of doing business to the more established companies and institutions"*
>
> Policyshaper, female

Some interviewees also addressed certain barriers confronting companies that actively engage end-users. There is a prevalent skepticism within some companies and government institutions about the validity of integrating end-users into business processes. This skepticism often results in overlooking companies that engage end-users when awarding bids or developing new business collaborations.

Ability Barriers

The skills and abilities of the end-users are a key aspect for successful SEIE. Though, according to a number of interviewees there exist some limitations concerning end-users' abilities that could explain the scarce dissemination of SEIE. Most notably was the lack of technical know-how among end-users. This is largely the result of technology becoming increasingly complex and the centralization of knowledge within companies and research institutions, thus making it more difficult for end-users to obtain the knowledge. However as mentioned, the knowledge and abilities of end-users were found to have advanced with the Internet and more technical information becoming available through the increased online sharing of research and innovations. The acquisition of knowledge is similarly related to the issue of restricted time, as end-users might be more restricted in their ability to acquire new knowledge than company employees or researchers. For end-users with a wealth of technical knowledge another barrier could be a lack of the managerial skills needed to ensure the successful development and diffusion of the project.

The lack of knowledge and skills are not only prevalent among end-users, but was found to be similarly lacking within companies. Several interviewees argued that although companies might possess the technical knowledge, they often do not have the knowledge of SEIE and how to integrate end-users into their business models. A likely explanation is the novelty of SEIE and the fact that it is only rarely being taught at universities. One interviewee also addressed a lack of flexibility in the organizational structure of companies as a barrier to end-user integration. Especially multinational companies are exposed to the risk of becoming disconnected from end-users due to their global value chains. This complicates the process of locating relevant and knowledgeable end-users as well as integrating them into their innovation processes.

> *"The barrier is also the global supply chain where there is a big gap between consumers and the producer"*
>
> Policyshaper, female

The above-listed barriers have mainly outlined the end-user and company perspective. However the interviewees also identified barriers to SEIE from the outlook of policymakers, where markedly three barriers emerged. The first barrier concerned the present lack of knowledge of SEIE among policymakers. Policymakers were believed to be largely unaware of the possibilities associated with SEIE and to still consider businesses and university research as the primary source of sustainable innovation. One interviewee also explained that there is a perception among policymakers that end-users do not make sophisticated innovations. The second barrier involved the difficulty of policymakers to locate and initiate interactions with end-users. Due to the heterogeneity of end-users it can be intricate for policymakers to identify who the relevant end-users are and how to best involve them in the policy-making process.

> *"I think policymakers have an extremely hard time finding the consumer (…) they basically do not know who to contact"*
>
> Lars Fogh Mortensen, European Energy Agency

The third barrier identified by interviewees is the length of the policy-cycle. As a consequence of the short time-horizon of many policymakers, there is a limited incentive to promote and implement policy-measures where the benefits are only visible in the long-term. Instead most policymakers prioritize status quo policies wherein the expected outcomes can be accurately forecasted beforehand. As a result, they avoid more experimental and perhaps risky policy initiatives such as promoting SEIE. perhaps risky policy initiatives such as promoting SEIE.

4.5 Needs and expectations

In spite of current barriers, SEIE was widely regarded as an interesting avenue for the future. The interviewees suggested a number of policy actions that could help facilitate SEIE. One important policy area in need of revision is the infrastructure surrounding sustainable innovation and entrepreneurship. Most prevailing is the need for local, national, and international funding schemes that are less administratively burdensome and more adaptable to the limited capacity of the majority of end-user innovators. For example, an interviewed policymaker addressed the significant role of financial institutions not only in terms of providing funding, but moreover to provide assistance and management skills to the innovators and entrepreneurs. However the responsibility of facilitating knowledge and skills were similarly thought to lie upon political institutions by establishing knowledge sharing networks and databases for best-practice cases. Here it was suggested to establish maker-space initiatives and app-stores that could help end-users make prototypes and diffuse their innovations. Another interviewee emphasized the importance of national governments and EU-institutions to continually work on reversing existing unsustainable incentive systems that discourage sustainable action and innovation.

Many interviewees underlined the need for greater knowledge of SEIE among policymakers and to improve their policy toolbox. At the moment policymakers were not perceived to possess the necessary tools to advance SEIE and to engage the end-users in policy initiatives.

Some interviewees linked the absence of appropriate policy tools to the insufficient knowledge of policymakers, thereby suggesting a need for educating policymakers followed by rethinking available policy tools. Several of the interviewed policymakers called for more interaction with citizens and to increasingly include them in the policy-making process. They considered the current process to be overly top-down with limited influence of citizens in establishing and implementing policies.

> *"The traditional way of establishing and implementing policy is very much top-down (…) in many fields of policy we do not yet use all the available tools to carry through reactive policy implementation"*
>
> Hugo-Maria Schally, DG for the Environment
> Eco-Innovation and Circular Economy

One interviewed policymaker regarded citizens as the eyes and ears of society and advocated the need for involving them in the co-creation of solutions. As a result, policymakers should ensure more inclusiveness in order to avoid losing citizens in the policy-making process. Others proposed to open more comprehensive communication channels to engage citizens and end-users. This would allow them to have their opinions and voices heard in political decisions such as what kind of research and innovation to prioritize.

The limited knowledge among policymakers and the restricted number of policy measures addressing SEIE were also attributed to the lack of a clear business case illustrating its potential. A number of interviewees therefore called for more business cases proving the economic and societal benefits of SEIE. Providing examples of best practices and how they affect society at large could act as a catalyst for the involvement of end-users both politically and in companies. Additionally, examples of SEIE could help increase awareness of the concept and inspire end-users to innovate.

"The interesting issue is how such a concept would translate into a business model and how it could be seen to generate business, turnover, jobs, and welfare creation"

Hugo-Maria Schally, DG for the Environment
Eco-Innovation and Circular Economy

Some practical examples of present policy initiatives were provided throughout the interviews. One example given of existing policy initiatives addressing end-users is the EU-program Horizon 2020. In the program there is a high emphasis on the involvement of citizen including a call for ideas, whereby citizens could submit proposals to the program. Furthermore, the EU innovation deals allow for the possibility of innovators and entrepreneurs to challenge existing regulation and the regulation is de facto made by the solutions they propose. This is based on the assumption that the time to implement regulation is slower than the time for innovation and technology. Other interviewees outlined examples involving idea competitions, which were generally perceived as being a promising method for engaging end-user innovators and entrepreneurs. Although as one interviewee argued, the ideas generated in competitions are mostly incremental and only rarely novel or systemic.

Precisely this need for systemic or paradigmatic changes was emphasized by two interviewees. They argued that incremental changes alone would be insufficient given the challenges ahead. In order to realize sustainable systemic changes many actors must work together. The renewed policy objectives should be achieved in close collaboration between businesses, citizens, and policymakers. Such alternative measures are currently being put in place to speed up the sustainable transition - particularly on a European level. Here steps are taken away from normal practices involving a push-strategy of technology toward implementing a pull-strategy accomplished by supporting market creation and niche markets for climate solutions.

"You want to change the system (…) in order to change the system you want a paradigmatic change – not incremental"

Policymaker, male

One interviewee highlighted an often overlooked, but very promising aspect of integrating end-users in the innovation process, which is the ability to identify bad ideas more quickly. He noted that this ability allows policymakers and/or companies to shut down bad ideas at an early stage and progress with the more promising ideas instead. The idea of using co-creation or user-led activities could thus actually help reduce risks in innovation both economically and time-wise. As a consequence, end-user integration could reduce the likelihood of spending time and money on solving the wrong problems as well as avoiding putting forth products or services that will fail. The same principle can also be transferred to policy-making.

Chapter 5

Discussion

When seeking to reality test the observations of the academic literature against the impressions and insights of our sample of policymakers we were struck by the high degree of overlap in insights. In popular discourse the academic world and "reality" are often seen as separate entities, but at least within the field of SEIE this was generally not the case as their insights were often aligned. For example within both domains issues of conceptual vagueness were clearly evident and as can be observed from Table 5 many of the observations from our review regarding to barriers to SEIE are repeated by our interviewees.

Table 5. *Policymakers' insights - The drivers and barriers to independent and facilitated SEIE*

		Review observed barrier(s)	Policymakers' observed barrier(s)
Independent SEIE	Motivation	- Feeling of disenfranchisement from the "system". - Lack of necessary skills leads to a feeling of impotence. - Frustration and isolation. - Dissemination of the innovation is perceived to contradict the innovator's ideals.	- Lack of a financial mechanism motivating end-users to spend time and resources on becoming innovators. - Lack of feedback mechanism to inspire end-user innovation.
	Ability	- Lack of technical know-how resulting in stalled or uninitiated projects. - Trouble identifying technical experts willing to help. - Modifying existing products is too expensive	- Lack of technical and managerial skills and knowledge.
	Opportunity	-Complex grant scheme(s), bureaucracy surrounding grants, and the fluidity of the external funding landscape. - Failure to fit into classical funding criteria and confusion regarding eligibility. - Loss of warranty and insurance - Lack of specialised tools required to alter products. - Dependence on unstable volunteer base undermines small projects.	- The innovation process oftentimes is very time-consuming, thereby forcing end-users to dedicate their working hours to the project. - The issue of financial support becomes highly important as limited income can be attained elsewhere. - Lack of flexible and easily accessible funding schemes directed at end-users. - A lack of mechanism to share innovations leading to a lack of diffusion.
		Review observed barrier(s)	**Policymakers' observed barrier(s)**
Faciliated SEIE	Motivation	- Scepticism from the firm or project managers regarding end-user knowledge and intentions –some view end-users as troublemakers.	- Perceived risks and time consumption involved in integrating end-users into the company's innovation process. - End-user reservations as they have to dedicate time and effort with an undefined yield to follow.
	Ability	- End-user and expert opinion may diverge due to information gaps.	- A lack of managerial experience on how to integrate end-users – it is a business model rarely taught at universities. - A lack of technical know-how amongst the end-users could limit their desirability as partners in the innovation process.
	Opportunity	- Many tools for incorporating end-users into the innovation process remain novel and untested. - Projects focused on end user innovation require flexibility on behalf of funding regimes that is currently not offered.	- The integration of the end-users into innovation processes generally requires a high degree of company dedication. - Information processing and subsequent action on end-user insights are labour intensive. - The viability of the business model remains contested.

One overlap of insights was found regarding the limitations of existing funding schemes, which are deemed largely incapable of embracing the alternative nature of SEIE. Both domains similarly underlined the lack of technical skills as a prominent barrier to independent and facilitated SEIE. The most notable difference between the academic literature and the sample revolved around the motivations of end-users. Throughout the interviews only limited attention was paid to the motivations of independent end-users, and particularly the challenges surrounding their political ideals and visions were rarely recognized. In contrast, the academic literature acknowledges the primary motivations of independent end-users to be based mainly on personal enjoyment of the process and political aspirations rather than commercial gains. For example, it is evident in relation to the innovation diffusion process, where the end-user(s) can be forced to compromise on their personal ideals, which is often perceived as "selling-out". An interesting aspect put forward in the interviews is the motivations of end-users to participate in facilitated SEIE. Here it was questioned what could motivate end-users to dedicate time and effort to take part in an innovation process that is primarily beneficial to the company. This contrasts the academic literature, where the motivation of end-users to engage in facilitated SEIE has not been found to be a prominent barrier (Cornwell & Campell 2012).

A barrier only addressed in the academic literature is the issue of warranty and the inability to experiment with products due to the intentional design of producers. When end-users seek to modify or experiment with existing products or services it often results in a loss of warranty, which could prohibit modifications of more costly products. Furthermore, some producers intentionally design their products in ways that hinder end-users from tampering with it in order to protect commercial interests.

5.1 Future directions

The cohesion in the barriers identified by the academic literature and the sample of policymakers and shapers provides a more clear-cut direction as to which future actions are needed to enhance SEIE. Most prevalent is the need to raise awareness of SEIE within policy circles. The awareness-raising process should involve establishing a clear conceptual framework, developing a database of best practices, and changing the perception of end-users as passive recipients of innovation. There is an urgent requirement for a more concise and conceptually clear framework wherein policymakers and laypeople can more easily navigate. At the moment there is an abundance of theoretical definitions and concepts to explain the involvement of users in innovation, which function as a barrier for the proliferation of the concept. In building more conceptual clarity, the role of the drivers of the innovation process (end-users, firms or policymakers) and the primary aim of the innovation process should be more precisely outlined. The conceptual framework must be supported by a database of best practices including examples of independent and facilitated SEIE. This allows end-users, companies, and policymakers to gain a more practical understanding of the concept. It can additionally act as source of inspiration and there through spur more end-user innovation and integration. The best-practice database should similarly include subdivisions across sectors, scope and nature of the innovating organization, thereby enhancing its usefulness and relevance. The improved dissemination of SEIE is expected to challenge the prevailing perception of end-users as passive recipients of innovation. Providing best-practice examples can help illustrate the prospects of integrating end-users in commercial innovation processes as well as highlight the valuable contributions of independent end-users. Increasing the awareness of SEIE and changing the perception of end-users could suggest a need for revising existing policy measures in order to better encompass the new role of end-users.

Another recognized necessity is the development of more flexible funding schemes targeting SEIE. This need has been strongly advocated in the academic literature and during the

interviews. Current funding schemes have been deemed too inflexible and burdensome to properly facilitate end-user innovation and integration (Heiskanen et al. 2013). Instead, political institutions should build funding schemes with few formal requirements and limited application complexity, thus providing more easy access to funding for end-user innovators. As a consequence of reducing the scope and requirements of the funding process, the schemes should mainly provide micro grants. This will reduce the initial financial barrier of SEIE and therefore encourage more end-user innovation. Alternatively, policymakers could draw upon the growth of the alternative finance sector (e.g. peer-to-peer lending, crowdfunding) and utilize it as a potential co-financier of sustainable projects and ventures. This could be achieved via a dual strategy of both facilitating the creation of designated platforms and through the direct co-financing of successful crowdfunding campaigns.

The example of the German crowdfunding platform EcoCrowd (https://www.ecocrowd.de/en) illustrates how public finances can be utilized to create platforms to tackle environmental challenges . The added benefit of these types of platforms is that they, if successful, become self-sustaining resource centers for sustainable ideas and ventures. In addition they also act to engage end-user in the process of sustainable innovation in varied capacities – from intensive engagement in the form of initiating a campaign to less intensive engagement in the form active campaigning for a specific project or passive contributions. The co-financing of projects if they hit a certain level of financing could be an additional way for policymakers to draw-upon the potential of crowdfunding. For example, the Mayor of London, Boris Johnson, recently utilized city funds to co-finance community projects seeking funding via the civic crowdfunding website like e.g. SpaceHive. One example included the 'The Peckham Coal Line urban park' that sought to convert the old raised Peckham coal line in London into a raised urban park. The community-initiated project ultimately successfully raised £64,140 of which government funds represented £10,000 in backing. An added benefit to civic crowdfunding is that these community projects typically enjoy, at least initially, a high degree of democratic legitimacy and can thereby also draw upon the goodwill of multiple sources of volunteers. Overall we argue that this method could prove both an affective mechanism to ensure co-financing of projects creating more value for public money, but also act as means for mobilizing and litmus testing potential ideas. Government projects could rather than being implemented solely top-down be facilitated via the entrepreneurial ideas from a community of end-users. Thereby citizens play both an active role in supporting the projects they would like to see happen, while also seeing the government as a facilitating actor in enabling these projects.

Finally, effective diffusion mechanisms for the dissemination of end-user innovation remains paramount both in order to ensure that end-user stays motivated and sees real benefit from their actions, but also in terms of creating a viable business model. Currently policymakers rightly assess that end-user innovation without diffusion and marketization remains a hard sell in the existing policy setting given the demands for business, turnover, jobs, and welfare creation. One opportunity could be the creation of online fora and portals for end-users to share their innovation and ideas. At the moment these portals are user-created and therefore typically limited to a relatively small group of individuals. However policy actors could feasibly create larger platforms potentially in cooperation with the business community sectors. Alternatively, as noted in Section 2, crowdsourcing innovation challenges could also be implemented with effect from a policy perspective to draw-out end-user insights. We argue that the success of the NASA Tournament Labs and the implementation of crowdsourcing by large firms like Unilever illustrate latent potential of this type of innovation process.

5.2 Limitations

The aim of our study was to understand from a general perspective how the observations and policy recommendations from the academic literature fare when 'reality tested' against the insights of European policymakers. Given the breadth of the topic it should therefore also be noted that our observation and insights do not reflect the European policymaker discourse in general. Instead it represents the opinions of policymakers most likely to have insights within the field of study. Hence our observations only represent expert knowledge on field as the concept currently remains far from the radar of most policymakers and shapers. The general nature of SEIE also results in a lack of concrete step-by-step recommendations on how the given policy recommendations should be implemented. For example, there might be a consensus that funding opportunities should be more flexible, yet it remains unclear how this should be executed in practice in order to avoid fraud or misuse of public money. As a result, we argue that the issue of proving the business model of SEIE remains, at least for this report, unachieved. Finally, the small sample size also means the regional and national differences are not reflected well especially given the northern and western European dominance within the sample. The policymaker and shaper observations therefore remain exploratory only and shouldn't be seen as a reflection of the actual policy domain.

Chapter 6

Conclusion

> *"The modern state should help families and senior citizens, domestic farmers and the economies of developing countries; they should have low taxes and expensive welfare programs, offer a good working environment for their police force and provide police service 24 hours a day and seven days a week. As positive as these demands are, it is not easy for a state to satisfy them all. Success in one dimension often decreases success in another."*
>
> Brunsson, N. (2003)

We believe this statement in some sense captures the central issue that many policymakers face in their everyday work, not least within a novel field like SEIE that has yet to gain traction in the mainstream policy discourse. The demands on policymakers remain as great as ever with competing voices each highlighting the value and importance of their specific area of interest. However, given finite resources and time not all demands can be met and often meeting one demand challenges another. Given this multiplicity of interests lobbying for policymakers' attention, new ideas and insights are arguably at disadvantage - they compete not only with established discourses, but must also initially prove their worth on multiple fronts. For a concept like SEIE, which remains compartmentalised and conceptually vague, this seems to constitute the largest policy hurdle. The business case of SEIE remains to be made and important questions remain for policymakers, such as:

- Can end-user innovation truly lead to novel and radical innovation?
- Can this innovation process really result in job creation or is it simply a hobby for enthusiastic end-users?
- Are end-users capable of taking their ideas and converting them into viable business models?

Even if these issues will receive empirical support, the superiority of SEIE over alternative recommendations must similarly be demonstrated. Should policymakers e.g. slacken intellectual property (IP) rules to encourage more end-user innovation without fear of legal action? Here it should be documented that not only does current IP act as barriers to end-user innovation, but also that in changing the legislation the net positive of increased end-user innovation is not offset by the potentially detrimental effects it could have on major companies' willingness to innovate. The question now seems to be not, whether users innovate or not (which seems evident that they do), but whether this form of innovation can translate into public goods and if so which policy instruments are the most effective and appropriate ones to promote SEIE.

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Appendices

Appendix A - Interview parameters and interview guide

EU-INNOVATE CASE REPORTING TEMPLATE (WP6)
Unit of Analysis = Policymakers and -shapers
Target group: EU officials and other policymakers from relevant administrations and political bodies, corporate network and business associations or chambers of commerce.

Overall aim of study:

- to assess policymaker's awareness and understanding of user innovation, including invention and entrepreneurship for SCP policy making;
- to understand the needs and expectations of policymakers as regards user sustainability innovation;
- to assess their expectations on how these new kinds of policies and policy making of enhanced user integration, invention and entrepreneurship will impact sustainable lifestyles in Europe as well as social and political life and democratic systems in the future on a more general level.

Timeframe for interview:

30 – 40 Minutes

Interview

Introduction (5 minutes) Awareness and Understanding (10 minutes)

- Assess awareness and understanding
  - o Awareness of user innovation, open innovation and end-user driven innovation in general
  - o Relevance of the above mentioned in current policy dialogs (policymaker awareness)
  - o Understanding of the consumer as an innovator and open innovation
  - o Perceptions of the consumer within sustainability (recipient of innovation OR maker of innovation)
- Perceived barriers from consumer
- Perceived barriers from firm side
- Potential for policy to overcome these barriers
- Current barriers for policymaker

Barriers to independent and facilitated SEI (15 minutes)

- Consumer Perspective: Perceptions of identified barriers to independent SEI (Themes from Nielsen et al. paper)
  - o Capacity: Aptitude to carry out task
  - o Finance: Ability and access to financial resources
  - o Seclusion: Perceived or real access to liked-minded individuals
  - o Distance: Perceived or real access to gov't or private institutions
  - o Resistance: Motivational apprehensions about dissemination
  - o OTHER
- Firm Perspective: Perceptions of identified barriers to faciliated SEI (Themes from Nielsen et al. paper)
  - o Gap: Differences between motivations and expectations of end-users and experts Relevance of the above mentioned in current policy dialogs (policymaker awareness)
  - o Funding: Issues with current funding regimes
  - o Access: Difficulty identifying and attracting participants
  - o OTHER

Needs and expectation of policymakers (10 Minutes)

- General knowledge of the area
- What is needed to improve policymaker awareness
- Gaps in knowledge from a policy perspective
- Expectations for consumer driven sustainable innovation (real or hype)

EU-INNOVATE INTERVIEW TEMPLATE (WP6)

Interview guide

Presentation:

Hello, thank you for agreeing to participate in this interview. For the purposes of accurate analysis of your responses, would you mind if I record our interview this morning/afternoon? I can assure you that this recording, all transcriptions and my notes will be anonymised for the research report and this data (whether audio, written or typed) will be held securely. The only exception to this is if you explicitly state in writing that you would like to be mentioned by name in our report and any related publications. You may choose to stop this interview at any point. I will start by explaining the purpose of this interview and then ask a number of questions relevant to your role in policy development. The whole interview should take no more than 20 minutes. On this basis, are you happy to proceed?

OK, thank you. I would like to take this opportunity to shortly introduce the aim of our research project. Broadly speaking we are interested in uncovering policymaker insights into the field of sustainable innovation from the point-of-view of the consumer. Where the consumer, rather than being viewed as the traditional passive recipient of goods of services, is the driver of innovation via either independent action or in collaboration with firms and other stakeholders.

INTRO

1. Can you first tell me what is your job at [policy agency] and when did you start working for the [policy agency]? What is your background?

OPENING QUESTIONS

1. In your view what is the role/purpose of policy in terms of sustainable innovation?
2. What do you view as the consumer's role in helping us move towards a greener economy?

AWARENESS AND UNDERSTANDING

1. How aware are policymakers of this type of consumer driven innovation?
2. Does it play any role in the current policy discourse? Why/why not?
3. Is there an established vocabulary for understanding the role of the consumer within innovation?
4. What role does the consumer currently dominantly inhabit within policy circles - recipient of innovation OR maker of innovation?
5. Which group is policy targeted at from a sustainable innovation perspective?
    a. Codex: Entrepreneur / SME / Large businesses / Consumer
    b. Innovation policy is primarily aimed at businesses rather than consumers, why is this?

BARRIERS AND FACILITATORS FROM CONSUMER SIDE

1. What do you perceive as being the greatest barriers to consumer led innovation?
2. Could or should policy focus on this type of innovation process. If so why or why not?
    a. What can policy do to help encourage consumer led innovation?
3. Potential to utilize barrier themes in Nielsen et al. paper to frame further discussion:
    a. Capacity: Aptitude to carry out task
    b. Finance: Ability and access to financial resources
    c. Seclusion: Perceived or real access to liked-minded individuals
    d. Distance: Perceived or real access to gov't or private institutions

e. Resistance: Fear of selling out

BARRIERS AND FACILITATORS FROM FIRM SIDE

1. What do you perceive as being the greatest barriers to firm's integrating consumers into their innovation process?
2. Could or should policy play a role in encouraging firms to bring in consumers into their innovation process? If so why or why not?
    a. What can policy do to help encourage the process of consumer integration?
3. Potential to utilize barrier themes in Nielsen et al. paper to frame further discussion:
    a. Gap: Attitudinal and knowledge gap
    b. Funding: Issues with current funding regimes
    c. Access: Difficulty identifying and attracting participants

NEEDS AND EXPECTATIONS

1. How informed are policymakers on this type of consumer led innovation? Why is this?
2. Where have you heard about this type of innovation process?
3. What is needed to improve policymaker's awareness?
4. There is a lot of talk about co-creation, co-innovation and co-production – how do you view this real world or hype?

ADDITIONAL INTERVIEWEES

1. Could you recommend someone else who you think could be relevant for us to speak to?

Thank you very much for an interesting discussion, this is the end of the interview – do you have any questions or anything you would like to add? OK, thank you once again for your time. Would you be prepared to take part in a second interview on this subject? (Yes/No). Goodbye.

Appendix B - Overview of all institutions and organisation interviewed

British Retail Consortium	Trade association for the UK retail industry. Includes news, details of policy work, events, and business information.
Climate KIC Nordic	The Climate-KIC's community provides innovative and imaginative solutions to climate change via a dynamic alliance of Nordic partners drawn from academia, industry and the public sector.
Collaborating Centre on Sustainable Consumption and Production	The Centre provides scientific support to clients from the private and the public sector including development, testing, implementation, and monitoring of concrete projects within the field of sustainability.
Copenhagen Institute on Risk and Sustainability (IRIS)	IRIS works with public and private institutions in developing and testing risk management strategies within the field of sustainability - for example Business Models for a Circular Economy.
Danish Board of Technology Foundation (DBT Foundation)	The DBT Foundation is devoted and engaged in tasks and contributions concerning public matters that require knowledge of technology, values and widespread action in society.
Danish Ministry of the Environment and Food	The Ministry of the Environment and Food is responsible for administrative and research tasks in the areas of environmental protection, farming and food production.
DG for Environment	The DG for Environment is the EC department responsible for EU policy on the environment. It aims to protect, preserve and improve the environment for present and future generations, proposing and implementing policies that ensure a high level of environmental protection and preserve the quality of life of EU citizens.

DG Research and Innovation	The DG for Research and Innovation defines and implements European Research and Innovation (R&I) policy with a view to achieving the goals of the Europe 2020 strategy and its key flagship initiative, the Innovation Union.
DG Health and Consumer Policy	DG Health and Consumers job is to ensure that food and consumer goods sold in the EU are safe, that the EU's internal market works for the benefit of consumers and that Europe helps protect and improve its citizens' health.
Ecologic Institute	Ecologic Institute conducts inter- and transdisciplinary environmental research. The experts at Ecologic Institute also prepare political analyses and function as consultants. Ecologic Institute operates branches in Berlin, Brussels and Washington DC.
European Environment Agency (EEA)	The EEA is an agency of the EU that is tasked with providing sound, independent information on the environment. We are a major information source for those involved in developing, adopting, implementing and evaluating environmental policy, and also the general public.
Government Offices of Sweden	Represents the national cabinet and executive authority in Sweden operating as the collegial body with collective responsibility.
Danish Ministry of the Environment and Food	The Ministry of the Environment and Food is responsible for administrative and research tasks in the areas of environmental protection, farming and food production.
MindLab	MindLab is a cross-governmental innovation unit which involves citizens and businesses in creating new solutions for society.
National Endowment for Science, Technology and the Arts (NESTA)	Nesta is an independent charity that works to increase the innovation capacity of the UK. The organisation acts through a combination of practical programmes, investment, policy and research, and the formation of partnerships to promote innovation across a broad range of sectors.
Networks for Eco-innovation Investment (INNEON)	The INNEON network for eco-innovation investment aims to extend public and private funding sources available for eco-innovation and social innovation in Europe, and provide a unique forum dedicated to the interaction between a select cohort of innovators and relevant investors.
Nordic Innovation	Nordic Innovation is a Nordic institution working to promote cross-border trade and innovation in order to promote Nordic business competitiveness.
The International Institute for Industrial Environmental Economics	Lund University's research and education institute with focus on preventative environmental strategies and cleaner production.
Vinnova	VINNOVA is Sweden's innovation agency. Their stated mission is to promote sustainable growth by improving the conditions for innovation, as well as funding needs-driven research.

Appendix C - Coding template

Interviewee	Purpose of Policy in the Field of Sustainability-led Innovation	Purpose of Policy for / role of Consumers in Area of Sustainability & Innovation	Policymakers awareness of SEI	Barriers to Independent SEI	Barriers to facilitated SEI	Role of policy to support SEI	What is Required to Improve Policymakers' Awareness of SEI
Key insight							
Notes							