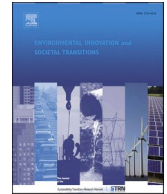




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Steering ‘green’ innovation policy toward sustainability? Lessons from implementing EIP-AGRI in Sweden

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ABSTRACT

This article critically examines the state’s steering capacity of ‘green innovation’ programs using Sweden’s implementation of the agricultural European Innovation Partnership (EIP-AGRI) as a case representing part of the EU’s Green Deal. The innovations should promote the competitiveness of rural areas and contribute to national environmental protection and climate goals.

We found that despite expectations, implementation rests on compartmentalized networking within the agricultural sector, prioritizing increased ‘competitiveness’ before ‘green’ development, and interpreting ‘innovation’ mainly in the technical sense. The results indicate that the state’s steering capacity of ‘green innovation’ programs meets several obstacles: the overall goals from the top tend to be both too many and too vague, leaving it to the administration to interpret what kinds of features should be prioritized from below. The state’s steering in the case of EIP-AGRI relies mostly on internal agricultural expertise contrary to previous research that suggests a recent ‘de-compartmentalisation’ of European agricultural policymaking.

1. Introduction

Innovations are increasingly promoted by governments to steer societies in a more sustainable direction. Historically, however, innovations have primarily been viewed as means to create economic value, rather than to reduce human impact on the environment (Westley et al., 2011). Some technological and economic innovative solutions have even been found to be environmentally detrimental (van der Leeuw, 2010). A challenge facing states today is therefore to steer innovation capacity towards furthering sustainability concerns. If innovations are to contribute to sustainability, a supportive institutional setup must be designed “to stimulate the kinds of innovation that solve rather than augment our environmental challenges” (Westley et al., 2011, p. 763). In this article, we emphasize the need to focus the state’s steering of innovation initiatives as part of the state’s broader role in steering society towards sustainability transitions (cf. Henrysson, 2017; Newell and Bulkeley, 2017). Conceptualizing the state’s steering capacity offers a starting point in examining those processes.

While sustainability transitions represent a rapidly growing field of research, attention to the role of the state is still underdeveloped in the context of green innovation policy implementation (Johnstone and Newell, 2018). We discuss how the dynamic process of implementation is influenced by existing organizational structures and procedures, such as within a particular ministry or agency, as well as by interest politics and negotiations between different groups and interests operating within the state’s decision making throughout the policy formulation, implementation and evaluation stages of the policy process (Ham and Hill, 1997). We analyse what

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aims such innovations are geared towards and what consequences the institutional framing has for the potential of achieving more sustainable solutions, inspired by the analytical framework of the role of innovation in society by [Schot and Steinmueller \(2018\)](#). They distinguish between three different framings: innovation for economic growth, national systems of innovation and transformative change. As we will see, the second and third of those frames are particularly stressed in green innovation policy goals, but we will also look further into the extent to which policy implementation follows suit.

Historically, the European Union (EU) has been firmly anchored in a focus on competitiveness, and primarily viewed innovations as ways to stimulate economic growth. More recently, the EU has moved closer to an understanding of innovation as part of building sustainable societies ([Kastrinos and Weber, 2020](#)). Across Europe, rural areas are facing severe challenges to sustainability (e.g., [Torre, 2015](#); [Marsden, 2017](#); [Pe'er et al., 2020](#)), to which the EU has responded by introducing new goals and measures in its Common Agricultural Policy (CAP) ([Alons, 2017](#); [Hasler et al., 2022](#)). The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) is one example, launched in 2012 as part of the Rural Development Program (RDP), and implemented in several member states. The core idea was to catalyse innovations that “achieves more and better with less” to make European agriculture and forestry more resilient, sustainable and competitive ([EIP-AGRI website, 2022](#)). More recently, the European Green Deal has further spurred the quest for transforming Europe into a more sustainable and inclusive low-carbon economy, and the war in Ukraine is currently motivating speedy development towards self-sustained renewable energy sources as well as circular fertilizer solutions (cf. [Lyytimäki et al., 2021](#)). Indeed, the EU's goal of becoming climate neutral by 2050 puts high pressure on member states to act.

This article focuses on how Sweden has implemented EIP-AGRI. Sweden has since long been regarded as a leader more generally in environmental policy and sustainable development ([Lafferty and Meadowcroft, 2000](#); [Vail, 2008](#); [Eckerberg and Bjärstig, 2020](#)), and the advancement of green technology has been an important ingredient in its progress over several decades ([Du and Li, 2019](#); [Šneiderienė and Ruginė, 2019](#)). Furthermore, Sweden has a long history of fostering innovation and entrepreneurship ([Lindholm Dahlstrand, 2007](#); [Torre et al., 2020](#)) and ranks as second in the world on the Global Innovation Index 2021. This makes Sweden a particularly relevant ‘best case’ in European perspective to learn from as to how ‘green’ innovation is understood and applied in EIP-AGRI. We would thus expect high priority given to sustainability aspects in Sweden's implementation of EIP-AGRI. In Sweden, EIP-AGRI is geared towards Operational Groups (OG) within agriculture, horticulture and reindeer husbandry, while also forestry is targeted in the rest of Europe (and reindeer husbandry not relevant). Until 1 March 2022, about 44 million Euro was allocated to Swedish OGs under the EIP-AGRI and dispersed over large parts of Sweden.

Agricultural policy is an important ingredient in the quest for innovative and sustainable solutions. Still, agricultural policies have since long rested on a narrow productionist foundation with policymaking undertaken in relatively closed policy networks of farm ministries and farm groups founded upon shared values that have more recently become challenged not least by the activation of international institutions ([Daugbjerg and Swinbank, 2012](#)). In particular, studies of the development of European agricultural politics after the 2013 CAP reform suggest that the agricultural policy subsystem has opened up for new actors ([Greer, 2017](#)) and that agricultural politics has become ‘de-compartmentalized’ ([Daugbjerg and Feindt, 2017](#)), providing evidence for a more open and networked agricultural policy subsystem that reflects a broader range of sustainability issues. Nevertheless, other studies are much more critical as to whether the greening of CAP merely implies greenwashing in view of the low level of outputs and outcomes of environmental benefits from agricultural policy ([Alons, 2017](#)). Since ‘green innovation’ has become a key concept in European rural development policy as part of the Green Deal, and the EIP-AGRI an explicit tool to promote new innovative practices, whether EIP-AGRI puts stronger emphasis of sustainability aspects than in previous CAP measures is worth investigating.

[Daugbjerg \(1998\)](#) has shown that the Swedish agricultural policy community constitutes a rather loose issue network in comparison to other Nordic countries, which suggests considerable room for policy influence by those interests pushing for sustainability concerns. Since Sweden became an EU member, its agricultural policy shifted from a neoliberal path of deregulation to re-regulation with direct support to farmers with accompanying increased administrative oversight at the Swedish Board of Agriculture ([Eriksson, 2020](#)), which is now in charge of implementing the RDP and EIP-AGRI ([Gov Offices of Sweden, 2015/2019](#)).

By studying a government program that aims at achieving green innovation in a broader sense through developing products, practices, processes, and technologies, we investigate how the Swedish Board of Agriculture translates its understanding of ‘green innovation’ into practice. We concentrate on reviewing the extent to which green innovation was effectuated by the program and discussing the reasons behind the observed results. Our overall aim is to *critically examine the state's steering capacity of ‘green innovation’ programs in order to promote sustainability goals*.

Our research questions are:

- How is ‘green innovation’ interpreted in Swedish policy documents and administrative processes within EIP-AGRI?
- What kind of Operational Groups became funded? What does this tell us about the prioritization of ‘green innovation’ in practice within the state's steering of the program?
- How can potential discrepancy between interpretation and prioritization of the EIP-AGRI program goals in national policy documents and the operationalisation of those goals in the administrative processes be explained and what could be learned for future policy support to ‘green innovation’ programs?

We expect our results to be relevant not only for Sweden, but also more generally for other EU member states since our results point to the importance of the design of the implementation process, including the criteria for funding in support of green innovation within innovation policy.

We proceed by introducing our framework for analysis and then describe the materials and methods used. The results first clarify the key policy goals behind the program and the organisational setup of the EIP-AGRI in Sweden, including what information is

required to evaluate the 'green innovation' effects from its implementation. We analyse the portfolio patterns of the OGs and how the administrative procedures function to steer the program. We conclude by discussing our findings with concern to the state's steering capacity towards 'green innovation' programs.

2. Framework for analysis

This section introduces key concepts and presents our framework for the subsequent analysis. We begin by discussing the concept of innovations, followed by the framing of innovation in society and finally how the state's steering capacity can be analysed.

The concept of 'innovation' is commonly used in policy contexts without further explaining what it means. Like other popular policy concepts, it bears a positive connotation leaving its interpretation up to the individual user. Most often, it is used in the literature to denote technical inventions or ideas but should also include "new solutions, products, services, processes, methods or concepts for experience with a significant originality and technical character" (Frankelius and Norrman, 2013, p. 32). Innovation can thus signify new social, organizational, and process-orientated ideas, and not only technical ones. Such broader interpretation is reflected in the EIP-AGRI operational criteria for selection of OGs, which mentions the introduction of "new products, services, processes or working methods" (EU Regulation, 1305/2013). In contrast to a mere discovery, innovation implies that the new idea has also become implemented in practice. 'Green innovation' is then a further delineation of the purpose of the innovation. It refers to "all aspects of innovation related to green products and processes, including energy saving, pollution management, waste recycling, product design and environmental management" (Chen et al., 2006, p. 333). The interest in 'green' - and similar notions of 'environmental', 'sustainable' or 'eco'-innovations (Díaz-García et al., 2015) - has accelerated the last decade amongst scholars, and several reviews have been compiled to provide overviews of how 'green innovation' is used and applied in different research fields such as management, economics, engineering, and biology (e.g., Díaz-García et al., 2015; Albort-Moran et al., 2017; Loorbach et al., 2020; Oduro et al., 2021; Takalo and Tooranloo, 2021; Arici and Uysal, 2022). Empirical studies involving quantitative surveys and mathematical modelling dominate the field over other methods like experiments, qualitative case studies and conceptual models (Oduro et al., 2021; Takalo and Tooranloo, 2021). As Loorbach et al. (2020) emphasize, the development of innovation initiatives necessitates translocal diffusion as well as governance support. By applying both a quantitative descriptive and a qualitative research approach, we contribute to the social science research field on how 'green innovation' is implemented in policy and administrative procedures.

As mentioned, we apply the analytical framework developed by Schot and Steinmuller (2018) to distinguish different frames for innovation policy. The first frame essentially refers to a linear model of innovation, with stimulation of innovation through research and development which in turn will contribute to growth and address market failures. The second and third frames imply innovation systems models, with the second emphasizing competitiveness and the state's ability to shape a competitive nation. The third frame links to contemporary social and environmental challenges and demands for transformative change. Which framing a state adopts affects which solutions are envisioned and what policies are enacted. Schot and Steinmuller (2018) find that over time, socio-technical system change has become increasingly emphasized in innovation discourse and action but also that the different frames still compete with each other for the imagination of policymakers, and that all might be reflected in a mixture in practice. We conceptualise 'green innovations' to potentially imply a transformative shift, even though it could also refer to 'green innovations' as contained within the second frame to improve competitiveness. The idea behind would then be to achieve "competitive advantage and increased performance through cost reduction and/or improved reputation by investing in environmentally benign products and processes" (Díaz-García et al., 2015). Another way to discuss the relationship between innovation and transformative shift is to use Smith and Raven's (2012) terminology of 'fit-and-conform', where innovations become competitive without changing the socio-technical environment rather than 'stretch-and-conform' where innovations contribute to a socio-technical regime shift. A 'green innovation' could thus potentially imply a major transformative change, for example by scaling-up and becoming widely disseminated but it could also remain contained within the boundaries of the current system when the costs of using it are perceived to be too high or when existing institutional environments resist change. An example of the former is the production and use of renewable energy, which is diffusing rapidly in many electricity grids, thereby going from a partial 'green' ingredient in electricity production to generating major and qualitative changes for existing technologies, organizations, and infrastructures, which in turn leads to a decline of established business models (Markard, 2018). Previous research suggests that to solve environmental problems, Sweden has adopted an "understanding of the relation between economy and environment as a positive-sum game where smart economic growth, social welfare and ambitious environmental policy support each other" (Lidskog and Elander, 2012, p. 421).

Studying the capacity of the state to implement policy remains central to political science research (e.g., Painter and Pierre, 2005). Agricultural policy delivery in terms of sustainable outputs and outcomes is already extensively explored, with different analytical foci. For instance, Fawcett and Daugbjerg (2012) and Daugbjerg and Swinbank (2012) use the concept of network governance while applying the concepts of 'policy community' and 'issue network' as extremes on a policy network continuum to investigate the power-dependant relationships between policy actors in their policy impact. Daugbjerg and Swinbank also show that even if compartmentalized policymaking is opened to outsiders, the basic structure of the agricultural sector's core policies remains more or less untouched (2012, p.268). Similar results are reported by Holmgren et al. (2022) for the Swedish forest bioeconomy, where traditional networks reproduce prevailing ideas rather than spur green transformation. Also, Bogner and Dahlke (2022) find that German bioeconomy policy that was intended to promote the transition to a sustainable knowledge-based bioeconomy still displays a strong technocratic focus on problem-solving rather than applying transformative knowledge, partly due to lack of involvement of transdisciplinary research networks. We will consider whether these findings are relevant also in the Swedish implementation of EIP-AGRI.

We ascertain that for the state to be able to steer innovation capacity towards sustainability, institutional setups must be created that specifically stimulate the types of innovations that solve environmental problems (Westley et al., 2011). To better understand how

the state steers innovations towards sustainability, we focus on how the state's understanding of green innovation translates into practice. As [Johnstone and Newell \(2018\)](#) denote, the state may play multiple and conflicting roles in pursuit of sustainability transitions, as the state is embroiled in various state-society complexes and relations of power, including influence from policy networks ([Ham and Hill, 1997](#); [Daugbjerg, 1998](#)). We use the notion of 'steering capacity' to denote the state's capacity to guide the development of societal action by allocating resources and exerting regulatory and control measures either from the top or from below ([Bäck and Hadenius, 2008](#)). Inspired both by the classic policy stages model of formulation, implementation and evaluation ([Ham and Hill, 1997](#)) and the analytical modelling of the state's administrative capacity in terms of instruments for steering and control ([Painter and Pierre, 2005](#); [Bäck and Hadenius, 2008](#)), we focus our analysis on the extent to which 'green' OGs are prioritized in the overall EIP-AGRI portfolio of funded OGs. We apply relevant measurements from their combined analytical modelling for assessing policy output and hypothesize that the state's steering capacity of 'green innovation' is primarily exercised through:

- (1) the prioritization and interpretation of the EIP-AGRI program goals and their embeddedness in overall national policy using policy analysis ([Ham and Hill, 1997](#)) and [Schot and Steinmuller's \(2018\)](#) framework to explore how green innovation is interpreted;
- (2) how the operationalisation of the goals is translated into administrative processes, including the administrative guidance to applicants and selection criteria for funding ([Painter and Pierre, 2005](#); [Bäck and Hadenius, 2008](#)) as well as the networking and use of expert knowledge in these processes ([Ham and Hill, 1997](#); [Daugbjerg, 1998](#));
- (3) how the reporting of results is orchestrated to measure and evaluate the 'green' aspects of the innovation initiatives ([Bäck and Hadenius, 2008](#); [Ham and Hill, 1997](#)).

We will use these three presumptions as point of departure for the analysis and presentation of the results.

3. Materials and methods

We conducted a commissioned evaluation of the Swedish EIP-AGRI program as a continuous learning exercise financed by the Swedish Board of Agriculture from 2016 to 2021 ([Zachrisson et al., 2019](#); [Eckerberg et al., 2021](#)), on which we base this article. We applied an ongoing dialogue with the central actors engaged in the program to continuously improve the program implementation within the agreed aims and methods, i.e. the evaluation was formative to its character. By analysing dynamics and actors, providing knowledge, observing, reflecting, and analysing actions we took on the role of reflexive scientists (cf. [Wittmayer and Schöpke, 2014](#)). This evaluation focused initially on the design and implementation of the program, with emphasis on how to improve the administrative process and its format, the handling of applications, the selection and funding of OGs, and later observing the outcomes and effects of the EIP-AGRI Program. Recently, a follow-up of the Swedish EIP-AGRI has been published by the Swedish Board of Agriculture ([Jensen, 2022](#)).

The data and methods used for answering our research questions include up to date information (as of 1 March 2022) from the EIP-AGRI database at the Swedish Board of Agriculture that contains information on all OGs (both funded and rejected). The Swedish EIP-AGRI allows for two different types of funding: small funding of 5–8 K Euro is given to Cooperation Groups (CGs) (in Swedish *innovationsgrupper*) with the aim to prepare for an OG innovation project (in Swedish *genomförandestöd*). The CGs represent about 4% of the total budget, while the main part of the budget is allocated to OG innovations projects ranging from 0,2 to 1,4 MEuro each, with the average OG innovation project about 400 K Euro ([Jensen, 2022](#), p. 32). In total, the agricultural sector has been granted 82% of the funding, horticulture 15% and reindeer husbandry 5% ([Jensen, 2022](#), p. 19). The granted funding covers 100% of the OG costs. There is thus a connection between the two types of funding, where many of the CGs later result in full OG innovation project applications. [Jensen \(2022, p.26\)](#) found that more than half of the funded OG innovation projects had earlier received CG support.

We have re-analysed the information in the database to reveal patterns of 'green innovation' in the portfolio, focusing specifically on funded OGs. The results of our statistical analyses correspond to those of the Swedish Board of Agriculture's internal follow up, with the slight difference that the latter also contains data from funded CGs ([Jensen, 2022](#)). We also rely on the extensive research work that served as basis for our five-year commissioned evaluation as mentioned above. This involved a wealth of information gathering: studies of evaluations of EIP-AGRI at EU level; analyses of EU and national policy documents and administrative procedures/guidance at the Swedish Board of Agriculture; a survey in 2018 to 76 EIP-AGRI applicants; 35 interviews carried out from 2017 to 2020 with administrative staff handling the EIP-AGRI and other key individuals engaged in the EIP-AGRI in various functions including external experts, case studies of 18 OGs with 22 interviews of OG leaders; and participant observation at a couple of the EIP-AGRI Advisory Committee meetings as well as a large number of innovation support and liaison meetings documented by field notes. In this article, in addition to the above-mentioned database, we have primarily used information from participant observation and interviews with key individuals engaged in the program administration, while the other sources of information rather serve to strengthen and contextualise our observations.

All data was collected according to ethical principles, interviews were recorded and transcribed and checked by the interviewees with the promise not to disclose her/his identity in direct quotations. Our analysis is based on textual analysis of the relevant policy documents, interviews and participant observations according to the research questions for this study.

4. Results and analysis

In this section, we analyse how 'green innovation' manifests in policy and practice within EIP-AGRI and examine how the

institutional setup of the program influences its implementation. In doing so, we study the program goals and their translation into administrative processes, the use of expert knowledge, selection criteria for funding and reporting of results. In line with our analytical framework, these aspects taken together shape the state's steering capacity of the program which we critically discuss at the end.

4.1. EU and national program objectives

The justification of the EIP-AGRI program at EU level stems from the RDP (EU Regulation, 1305/2013) which calls for activities to promote rural development, aiming at fostering the competitiveness of agriculture, ensuring sustainable management of natural resources and climate change measures and achieving a balanced territorial development of rural economies and communities. The EIP-AGRI is one of five European Innovation Partnerships that was launched to boost the EU's capacity to innovate. It aims at improved coordination of public innovation measures and mechanisms, strengthening the bridges between research and practical farming including between CAP and HORIZON 2020, and encouraging the exchange of practices at EU level. Support is given to OGs to promote co-creation and bottom-up approaches to innovative solutions while fitting the needs of farmers and rural entrepreneurs.

Even if the EIP-AGRI program preceded the Green Deal as such, it rests with political calls for increased productivity and sustainability within agriculture and food chains. The Green Deal reiterates the relevance of EIP-AGRI to support 'smart specialization' through innovations with the aim to combat climate change and environmental degradation and transform the EU into a modern, resource-efficient, and competitive economy. Also, the new Farm to Fork Strategy (EU Commission May 2020) constitutes a cornerstone within the Green Deal calling for innovations and collaboration along the entire food chain to promote sustainable and resilient food systems. For example, the Swedish Food Strategy (Swedish Gov Bill, 2016/17:104) mentions EIP-AGRI in this respect. It particularly emphasizes its importance for networking across the EU to spur innovations in collaboration with research and practice.

The Swedish EIP-AGRI should thus be viewed in this European policy context, where environment and climate goals are given high priority. The Swedish national environmental policy objectives are central to the implementation of 'green' and sustainable innovations in EIP-AGRI. Those consist of 16 specific objectives of which several are highly relevant in the context of EIP-AGRI, including reduced climate impact, clean air, a non-toxic environment, zero eutrophication, flourishing lakes and streams, good-quality groundwater, flourishing coastal areas and archipelagos, thriving wetlands, a varied agricultural landscape, a magnificent mountain landscape and a rich diversity of plant and animal life. An overall goal is also present: to hand over to the next generation a society in which the major environmental problems have been solved without increasing environmental and health problems outside Sweden's borders (Swedish Gov Bill, 2004/05:150; Swedish Environmental Protection Agency, 2018).

Within the operational selection criteria for assessing the OGs, the concept of 'green' is stated as selecting those OGs that support the achievement of national climate and environment objectives. Hence, it is up to the OG applicants and the decision-makers to decide how to express, interpret and judge the climate and environmental aspects of the OG proposals. As we will explain in the next section, a majority of the eight Focus Areas according to the RDP reflect climate and environmental aspects and thus represent the official interpretations of the 'green' EIP-AGRI goals in practice.

4.2. Administrative setup and expert networks

In Sweden, the Ministry of Enterprise and Innovation (since the elections in 2022 changed to Ministry of Environment and Enterprise) has allocated responsibility to the Swedish Board of Agriculture to design and implement the EIP-AGRI within the RDP. The choice of placing a program geared towards innovation support within the Swedish Board of Agriculture rather than with the Swedish Agency for Innovation Systems, Vinnova, could be discussed – this was a pragmatic choice since the EIP-AGRI is part of the RDP which is the responsibility of the Swedish Board of Agriculture within the implementation of CAP. Nevertheless, this was commented upon by several external key interviewees including two who represent innovation clusters/consultancy firms:

"Am surprised that the Swedish Board of Agriculture got the responsibility rather than Vinnova... if one considers all the [existing] Swedish innovation clusters, with regional growth strategies, this (EIP-AGRI) support has taken its own path." (Interview 6 April 2020, Program Officer at AgroVäst)

"Vinnova has totally other criteria [for innovation], why would the Swedish Board of Agriculture invent new ones?" (Interview 1 April 2020, Program Officer at RISE)

Even one representative from the Advisory Committee for EIP-AGRI expressed critical comments:

"It has become so that the Swedish Board of Agriculture is fixed in old structures and routines that they use – this is my personal opinion that might be wrong – it has become much back to basics! (Interview 17 April 2020)

Our commissioned evaluation showed that the Swedish Board of Agriculture was not well prepared at the onset of EIP-AGRI and struggled both to understand what constitutes 'innovation' and how the administrative process should be designed for the application and selection procedures. We also noted that until only recently, the Swedish Board of Agriculture and Vinnova has had almost no collaboration or exchange of experiences even if Vinnova is a key actor in innovation also related to sustainable food systems. Moreover, recent initiatives to cooperate have come from Vinnova rather than from the Swedish Board of Agriculture. (Interview 17 February 2022, Program officer at Vinnova)

The administrative design also concerns its linking to knowledge networks, which remains rather narrowly focused within the agricultural sector rather than widening to new actors as recent research suggests (Green, 2017; Daugbjerg and Feindt, 2017). In

particular, relevant innovation and environmental expertise could have been useful in the EIP-AGRI green innovations context. Apart from the administrative handling of EIP-AGRI at the Swedish Board of Agriculture, an externally organized support unit consisting of a handful of part time experts at the Swedish Rural Development Network arranges information meetings to make EIP-AGRI known in relevant fora. The support unit provides advice to potential applicants and assists them in identifying potential group members to enlarge the knowledge exchange and effectiveness of the OG. The selection process of the fully planned OG innovation projects is supported by an Advisory Committee, consisting of external experts and headed by the officer in charge at the Swedish Board of Agriculture. Officers at the Swedish Board of Agriculture make the final decisions about which OGs become funded. Applications are administered and decided upon 3–4 times per year.

4.3. Steering through prioritization of focus areas

It is important to understand that EIP-AGRI is a bottom-up endeavour, which means that the applicants decide how to frame their OGs in line with the overall goals. In the application process, which is digital, the applicants are asked to fill in information about the OG profile according to the eight Focus Areas in the Swedish RDP.¹ While the majority of those might be classified as ‘green’, the first and second Focus Areas that concern increased *competitiveness, restructuring and diversification* and *increased competitiveness through shortened food chains, local food markets and improved animal welfare* are most emphasized in the communication from the Swedish Board of Agriculture regarding the aims of EIP-AGRI to potential applicants. Even if the total EIP-AGRI budget was initially divided into competitiveness, environment and climate, and resource efficiency respectively, most funding was allocated to the competitiveness area. This suggests that Schot and Steinmuller’s second innovation systems framing dominates the administrative interpretation of what innovation aspects should be prioritized. The applicants were asked from which of these areas they sought funding. But since few OGs filled in for the ‘green’ Focus Areas, money was transferred into the more popular competitiveness focus, and the initial division of funding possibilities therefore did not steer the applicants towards becoming ‘green’.

Thus, we found that the prioritization is made at the administrative level through the application and selection process. The guidance from government and ministerial level is almost non-existent since the overall goals are both many to choose from, and imprecise enough to become interpreted in many ways. This shows the importance of looking beyond the initial program goals into the different aspects of the state’s administrative capacity when implementing the program (Painter and Pierre, 2017; Ham and Hill, 1997). In practice, it is the Advisory Committee at the Swedish Board of Agriculture that ranks the OG innovation projects for funding, using six selection criteria as formulated by Swedish the Board of Agriculture in 2016 and slightly updated in 2019 (Eckerberg et al., 2021, p. 39). The respective weight of these criteria when calculating the total ranking points has been slightly altered over the years, but the following description is what has been used more recently. It should be noted that this weighting is an internal process, which the applicants are not informed about. The planned OG should:

- 1 contribute to improved competitiveness within agriculture, horticulture, or reindeer husbandry (3 or 5 points);
- 2 contribute to new products, services, processes or working methods (1, 3 or 5 points);
- 3 contribute to reaching national environment and climate goals (2, 3, 4 or 5 points);
- 4 have the capacity to become implemented and fulfilled (3 or 5 points);
- 5 have a plan for market introduction (3 or 5 points);
- 6 be relevant with concern to budget, resources and cost efficiency (3 or 5 points).

The digits in parenthesis signify the points that accompanies that criterion. Those OGs that reach the most total points are most likely to become funded. Note that the third ‘green’ criterion can make up at most 5 points out of the maximum 30 points. Most points are given to those ‘green’ projects that state positive environmental effects as their main goal and to those that would lead to considerably decreased environmental degradation not only for the individual company but also for society at large. However, in the next step when adding up these respective points they are weighted with the ‘green’ criterion given only 10% weight, the ‘competitiveness’ 15% and the ‘novelty’ of the innovation 25%. The remaining criteria receive 20% for capacity of the OG, 10% for use of result and market plan and 20% for the budget relevance, which implies that ‘green innovation’ OGs receive even less priority for funding overall. Initially, however, the weighting was more favourable to ‘green’ aspects with competitiveness 20%, novelty 60% and support to climate and environmental goals 20%. This implies that the ‘green’ aspects have become further downplayed over time in the ranking process. The result of the decision process up until 1 March 2022 is shown in Table 1 below. We reflect further on these patterns of approval/rejection after we have presented the full picture of granted OGs.

¹ The Focus Areas in the Swedish RDP of relevance for EIP-AGRI include: 1a foster innovation, collaboration and development of competence in rural areas; 1b strengthen the links between agriculture and food production with research and innovation, including to develop environmental management and quality; 2a increased competitiveness within agriculture, horticulture and reindeer husbandry through restructuring and diversification; 3a increase competitiveness through shortened food chain and local food markets for agricultural products and for improved animal welfare; 4a restore, protect and improve biological diversity and the character of European landscapes; 4b improve water quality, including the handling of manure, fertilizer and pesticides; prevent soil erosion and improve soil management; 5b efficient energy use within agriculture and food processing; 5c promote access to renewable energy and stimulate circular economy; 5d reduce the climate and ammonia emissions from agriculture (Swedish Board of Agriculture 2018, pp. 39-40). Note however that Focus Areas 1a and b are general for EIP-AGRI as a whole.

4.4. 'Green innovation' in funded operational groups

In this section we describe and analyse what types of OGs have become funded and the extent to which the EIP-AGRI portfolio mirrors the objectives of 'green innovation'. Before doing so, we need to know how the OGs are classified according to 'green innovation' in the reporting of the Swedish Board of Agriculture. We had to rely on its ways of classifying the profile of the OGs and other available information about them. As mentioned, they were classified by the applicants (and checked by the officers in charge of EIP-AGRI) in line with the Focus Areas in the RDP. In the following, we restrict our analysis to the OGs that were selected for funding by the Advisory Committee, since they represent the realized innovations and the bulk of the EIP-AGRI budget.

While innovations could be funded both within agriculture, horticulture, and reindeer husbandry, the great majority of funded OGs concern agriculture. Amongst the Focus Areas increased competitiveness within 2a "...through restructuring and diversification" and 3a "...through shortened food chains, local food markets, animal welfare" represent over 4/5 of the OG profiles. The remaining Focus Areas, which are clearly 'green' are much less prevalent amongst the OGs (and include biological diversity and landscapes, water quality and nutrients and pesticides, soil erosion and management, efficient energy use and renewable energy and circular economy, and climate and ammonia emissions). The highest proportion of funded green OGs concerns "restore, preserve and improve biodiversity". All of these 'green' aspects taken together compose only 1/5 of the OGs (Fig. 1).

In terms of allocated budget per Focus Area, the picture becomes even more skewed towards prioritizing the 'competitiveness' categories, especially that of 'improve competitiveness through a short food chain and better animal welfare' (Table 2). The only Focus Area that matches the two competitiveness categories in terms of allocated funding per OG is that of 4a "energy efficiency in agriculture ...", while all other 'green innovation' categories have smaller budgets on average. Here, we note that even though the OGs that promote biodiversity have the highest likelihood of becoming funded (Table 1), they represent much smaller budgets than those promoting competitiveness (Table 2), and therefore might be tempting to endorse by the experts of the Advisory Committee to show that they take some of the more tangible environmental Focus Areas seriously. However, since so few OGs have been granted for the 'green' Focus Areas the figures in Table 2 must be interpreted with caution.

In practice, as we have earlier described, the definition of 'green' is classified in relation to the Swedish environmental quality objectives and the RDP Focus Areas. However, these objectives are also very broad and aspirational, making it possible for very diverse projects to argue that their projects contribute to one or more of them. When applicants specify what their innovation's environmental contribution could be, this description varies greatly in scope and specification. Sometimes there is general argument that the innovation will lead to reduced resource use, which in turn is expected to have many environmental benefits. Such argumentation rhymes with Schot and Steinmüller's (2018) second innovation systems framing as well as with the idea of green innovations to spur competitive advantage (Díaz-García, 2015). The fact that the innovation is to be produced locally is also highlighted as an environmental benefit as it reduces the need for transport. Any information on the specific outcomes in terms of environment and climate effects is however lacking other than general story telling of what the OG is planned to be about, and what specific goals and methods will be pursued. Since each OG has a unique way of describing its potential, this information was not possible to systematize by way of their contribution to 'green innovation' per se. Without dismissing all possible environmental benefits of this, the bottom-up classification has clearly opened up for a very broad interpretation of in what way the environment or climate is improved. It has also rendered evaluation difficult. Thus, the definition of 'green' shows to be vague both at the input and output stage.

We noted earlier that the biodiversity measures tended to have highest likelihood of becoming funded (Table 1). That relatively few OGs show a clear focus on environment and climate aspects could have several reasons. It might be that there are fewer applications in those areas, or that the applicants tend to report their innovations in the 'competitiveness' categories, either because this is what they believe is warranted by EIP-AGRI goals or that they expect this to have most likelihood of success. It is best explained by the weighting of criteria for funding, where the potential 'green' aspects of OGs are generally given less weight in the selection process and therefore tend not to become funded. Regardless of the reasons, we note that the information about the more precise profile and potential effects of the OGs is not systematic enough to investigate more in-depth, for example, whether there might be combined competitiveness and green features that would play out in the end.

Table 1
Number of OGs rejected and approved per Focus Area.

Focus Area	Reject	Approve	All	Reject (percent)	Approve (percent)
Competitiveness, restructuring, and diversification in agriculture, horticulture, reindeer husbandry and forestry	148	62	210	71	30
Improve competitiveness through a short food chain and better animal welfare	35	25	60	58	42
Restore, preserve and improve biodiversity	9	7	16	56	44
Reduce greenhouse gas and ammonia emissions	11	5	16	69	31
Promote the availability and use of energy from renewable sources and other non-food renewable biological resources	18	3	21	86	14
Make energy use in agriculture more efficient	6	2	8	75	25
Improve water management and management of fertilizers and plant protection products	8	2	10	80	20
Prevent soil erosion and improve soil management	14	1	15	93	7
Total	249	107	356	70	30

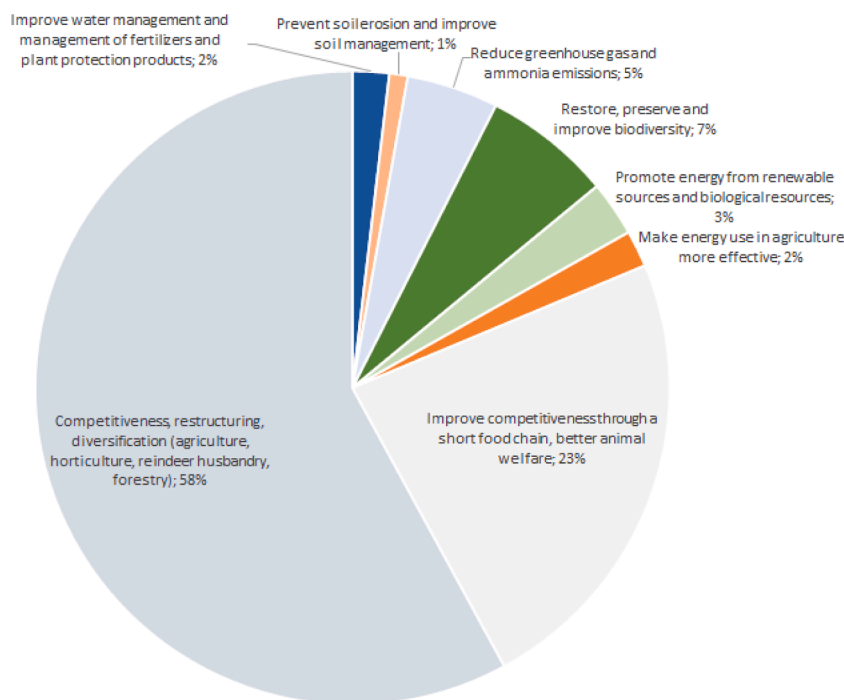


Fig. 1. Percentage of funded number of OGs for each Focus Area.

Table 2

Allocated funding (in SEK) for all funded OGs and prioritization for each Focus Area.

Focus Area	Number of OGs	Average funding per OG SEK	Average ranking points	Total sum awarded	Percent
Competitiveness, restructuring, diversification in agriculture, horticulture, reindeer husbandry and forestry	62	3 911 823	273	242 533 050	57
Improve competitiveness through a short food chain and better animal welfare	25	4 659 836	286	116 495 905	27
Restore, preserve and improve biodiversity	7	3 441 954	273	24 093 677	6
Reduce greenhouse gas and ammonia emissions	5	3 187 181	270	15 935 905	4
Promote the availability and use of energy from renewable sources and other non-food renewable biological resources	3	3 866 431	280	11 599 292	3
Make energy use in agriculture more efficient	2	4 232 946	230	8 465 892	2
Improve water management and management of fertilizers and plant protection products	2	2 317 792	280	4 635 584	1
Prevent soil erosion and improve soil management	1	1 948 090	300	1 948 090	1
Total	107	3 978 574	276	425 707 395	100

4.5. Steering through evaluation

The setup of monitoring, evaluation and feedback of a funding program is an essential ingredient for knowing whether the policy goals are achieved, and to revise and adjust the administrative mechanisms accordingly to improve the effectiveness of the program. However, from our interviews and participant observations we found that neither the Ministry of Enterprise and Innovation nor the Swedish Board of Agriculture have prepared for proper evaluation of the more general societal outcomes from EIP-AGRI, but only collected the information that is required to meet the reporting requirements and standards towards the EU (see also Jensen, 2022).

Measuring and assessing the program effects is admittedly not easy. The methodological issues are manifold, especially with imprecise and possibly conflicting policy goals. In particular, the environmental effects are difficult to grasp, which one of our interviewees at a Research Institute emphasized:

“There is this about environment and climate, but those goals are very weak. If one is used to write and argue one can get full points [in the selection process] regardless of what one has to offer...I cannot believe that one does not find something that supports environment and climate goals.... I think it will be very difficult to express in words what are the effects...often it becomes nonsense.” (Interview 1 April 2022)

The methodological difficulties with measuring climate and environment outcomes of the innovation activities, especially the long-term effects are therefore substantive, not least considering the poor information in the EIP-AGRI database. Possibly, collaboration at the onset of EIP-AGRI with Vinnova could have helped to design a follow-up system that would have been more informative in this respect, as Vinnova has long-standing experience with innovation support. Again, the limited networking beyond the agricultural sector constrains policy evaluation, feed-back and learning (Ham and Hill, 1997; Bäck and Hadenius, 2008).

To our surprise when interviewing the officer in charge of the EIP-AGRI in Brussels, we gathered that the Swedish continuous learning evaluation of EIP-AGRI that we carried out is probably one of its kind. Two EU level evaluations have been conducted in 2016 and 2020 (European Commission, 2016, 2020), collecting information from several member states' implementation of EIP-AGRI, but none of these evaluations measure outcomes but only intermediate outputs in terms of how networking, collaboration and advisory services have been affected. To date, there is no planned evaluation of the societal or sustainability outcomes of EIP-AGRI in sight, neither at EU nor at national level in Sweden. Therefore, the prospects are bleak for knowing whether EIP-AGRI has succeeded to catalyse innovations that "achieves more and better with less" to make European agriculture and forestry more resilient, sustainable and competitive, as the aim of EIP-AGRI is formulated in popular language on the EU webpage. Thus, there is great risk that these 'green' aspirations remain only symbolic. These results confirm evaluations of how agri-environmental schemes within RDP have had limited environmental impact and faced low adoption by farmers (Hasler et al., 2022).

4.6. Analysis of steering capacity

According to our initial presumptions, the state's steering capacity to foster 'green innovation' depends both on how 'green' issues are being prioritized in the overall national policy and specific program goals, and on how these goals are operationalized into administrative processes including the selection of criteria for funding. In addition, the reporting of results is essential to allow for evaluation and feedback on the extent to which 'green innovation' initiatives are working and make societal impact, or whether programmatic amendments are needed to improve their effectiveness.

Given the different innovation framings (Schot and Steinmueller, 2018), it is central to understand how the state manages the potential trade-offs between prioritizing on the one hand innovations for improved growth and competitiveness, as in framing one and two and environment and sustainability as in framing three on the other. The Swedish Board of Agriculture tries to balance both economic and environmental goals through a ranking system, where six criteria are given different points. Implicitly, the idea is that an innovation that scores high on competitiveness and the environment will be able to achieve both goals. However, a consequence of the system is still that competitiveness has much greater weight and environmental aspects less so. Furthermore, no analysis is made of possible goal conflicts that could arise. The possibility of handling trade-offs in an insightful manner is therefore lacking. More in-depth analysis of combined goals where environmental aspects might be promoted in parallel with 'competitiveness' is rendered impossible since the classification of OGs in the Swedish database is too coarse. An example was nevertheless mentioned in one of our interviews with a member of the Advisory Committee:

"It has become so that the innovation [as such] has become the most important [in the selection process], but if it does not reach a market... [then]. The digitalisation of different activities has quite often become granted...and digitalisation can [also] be positive for climate and environment" (Interview 17 April 2020).

Over time, emphasis on preparedness to reach the market has increased in the Swedish implementation of EIP-AGRI. However, this can be questioned from the perspective of focusing on environment and climate. As the officer in charge of the EIP-AGRI in Brussels put it: "We speak about end users rather than the market. Market means that you need a profit, but many societal challenges do not have a market. Ok if you see market as a broad concept, but it is a missed opportunity if you limit it to competitiveness." (Interview 22 April 2020)

Indeed, we find that the strong emphasis on competitiveness tends to rule out many innovation initiatives that are primarily geared towards the new social, organizational and process-orientated ideas such as those that primarily promote environmental values rather than improved value on a market.

In essence, the Swedish Board of Agriculture lacks steering capacity to achieve sustainability because they are stuck in old framings of innovation, focused on growth and competitiveness. These frames are strengthened by the Board liaising mostly with their traditional (agricultural policy) networks with insufficient knowledge about how innovations may contribute to sustainability transition.

From the top, both at national and EU level, there are many policies that talk about innovation and rural development, raising high expectations on what specific programs such as the RDP and EIP-AGRI should, or could, achieve to foster competitiveness, sustainability, and equitable progress. Several of these goals are reiterated, but quite vaguely formulated, in the Swedish EIP-AGRI regulation. The vagueness contributes to varying interpretations of what is really to be achieved, and how. Our interviews with officers at the Ministry of Enterprise and Innovation as well as the Swedish Board of Agriculture suggest that the competitiveness goals in EIP-AGRI are at the heart of the program, rather than promoting 'green' aspects of innovation. Still, the concept of 'competitiveness' is never explained in any detail. It has a positive connotation but how to measure and evaluate it is quite another thing. As we have shown it is largely up to the experts in the Advisory Committee during the selection process. Similarly, promoting environment and climate goals is not sufficiently specified as to which kinds of improvements are expected, neither in qualitative nor quantitative terms. At the same time, these different goals are not always compatible, and there is no explicit prioritization of what is most important in the many different policy texts. For example, the policy documents do not problematize whether the 'green' environment and climate goals form a necessary foundation for increased competitiveness on the market, or whether they might be needed for promoting more equitable rural development. And since 'competitiveness' in practice is spelled out as the first and second Focus Areas, with environment and climate only thereafter (Swedish Board of Agriculture, 2018, pp. 39–40), it is fair to presume that resulting economic progress from an

innovation, with accompanying expectations of increased market shares, is implicitly prioritized above the 'green' innovation measures as such.

This assumption becomes even clearer when we examined the selection process for the applied OGs. We found that the 'green' aspects, including a wide range of 'green' Focus Areas within the RDP goals, made up only one fifth of the OG measures. This result is not surprising given the selection process that diminishes the weight of 'green innovation' in comparison with the two competitiveness criteria when adding up the total ranking points for each OG.

Compared with how EIP-AGRI is being conceived and implemented in other EU member states, Sweden stands out as prioritizing high level of innovation features rather than environment and climate measures. Most of the OGs across Europe are focused on innovative solutions in view of environment and climate problems (EIP-AGRI Service Point 2020). "We were quite surprised to see that already 65% of our OGs are doing environmental projects" said the officer in charge of EIP-AGRI in Brussels, in our interview (22 April 2020). Possibly, the lower weight to such 'green innovation' in Sweden could also be explained by the fact that according to our commissioned evaluation, the majority of funded CGs and OGs in Sweden concerned technical innovations rather than organizational or social innovations (Eckerberg et al., 2021). In other European member states this is not the case, as EIP-AGRI measures are more often social and/or organizational in character, supporting cooperation and synergies between rural actors rather than specific innovation technology (European Commission, 2016, 2020). For example, in Ireland EIP-AGRI is explicitly used to promote environment and climate related initiatives in collaboration with the National Parks and Wildlife Service, such as the Hen Harrier and Pearl Mussel projects that serve to improve the habitats for those two threatened species (Interview 22 April 2020, EU EIP-AGRI Officer). Similar great variation is also found in how different EU member states have implemented eco-scheme measures in CAP (Runge et al., 2022), which suggests that each country adapts the CAP to their own priorities.

5. Conclusions

In this article, we wanted to critically assess the steering capacity of the state to promote innovation for sustainability, through a government program as part of the European Green Deal and the urgent quest for speedy 'green innovation' initiatives. We used the EIP-AGRI program in Sweden as our case study, representing a government support towards innovation measures within the RDP and agriculture, horticulture, and reindeer husbandry. Our study shows that despite explicit 'green' policy goals at both overall policy level and in the EIP-AGRI regulation, 'green innovation' is only marginally implemented amongst the funded OGs in practice. Potential societal as well as sustainability effects of the EIP-AGRI program as well as of the individual OGs is expressed in only very general terms.

We found that the implementation of the EIP-AGRI is left to bottom-up interpretation of the desired innovation profile, with competitiveness and novelty of the innovation as prime factors in the ranking and selection procedure. Thereby, EIP-AGRI is largely implemented as a general support to new technical ideas being realized within agriculture, horticulture, and reindeer husbandry but there are few signs of tangible environmental and climate benefits. The Swedish Board of Agriculture officers, and their design of selection criteria, tend to put most emphasis on the competitiveness aspects of innovation rather than their prospects to contribute to improved environment and climate effects, i.e., an example of 'fit-and-conform' transition to sustainability (Smith and Raven, 2012). Even if the RDP Focus Areas are considerably more specified than the overall policy goals, these Focus Areas are not actively used to promote sustainability aspects in the funding allocation and selection processes. They serve to report back to the national level and Brussels (see Jensen, 2022), but the Board of Agriculture has so far not drawn any lessons from the rather skewed prioritization patterns against the policy goals. Furthermore, we discovered that technical innovations have had precedence and that few innovation projects were geared towards social and/or organizational aspects. All of this seems to create a bias towards those OG innovation projects that are perceived as contributing the most to technical progress and competitiveness on the market. Its framing of innovation is thus in practice dominated by traditional beliefs that improved technology will lead to growth and increased competitiveness rather than pursuing innovation to promote pathways to sustainability transition (Schot and Steinmueller, 2018; Smith and Raven, 2012).

Amongst the various actors engaged in EIP-AGRI there was remarkable unclarity and divergent opinions about what 'innovation' really implies and how it should be measured. Instead of taking in expertise representing profound knowledge in the fields of 'green innovation' and sustainability in the implementation of EIP-AGRI and learning from parallel initiatives such as within Vinnova and other national agencies working with 'green innovation', the program administration has continued to draw from their own compartmentalized networks within the agricultural sector.

Also, the Swedish Board of Agriculture has left much room for applicants to define what is 'green' as applicants have not been required to provide detailed descriptions of how their innovation may lead to substantial environmental improvements. We do not have the capacity to assess what environmental and sustainability effects these innovations might have. We found, however, that the descriptions of effects vary greatly and that there is not sufficient information to subsequently review and assess possible goal fulfilment. This ambiguity makes it difficult both for the Swedish Board of Agriculture to use EIP-Agri to steer towards sustainability transition and for citizens to demand accountability in achievement of policy goals.

The results indicate that the state's steering capacity to promote sustainability goals through 'green innovation' programs meets several obstacles: the overall goals from the top tend to be both too many and too vague, leaving it to the administration to interpret what kinds of features should be prioritized from below. Since the policy networks that are present in EIP-AGRI apparently do not place sustainability as high priority, there is little chance that weak policy instruments from the state can be compensated by high capacity by interest groups to promote policy performance, as Daugbjerg (2022) found to be the case in promoting sustainable food in Denmark. Rather, our results are in line with the closed network structure of the emerging Swedish and German bioeconomy (Holmgren et al., 2022; Bogner and Dahlke 2022). As shown by our analysis, the state's steering in the case of EIP-AGRI relies mostly on internal

agricultural expertise emphasising other values than ‘green’ innovation. Thus, the agricultural sector has not succeeded to open for new actors promoting sustainability, quite contrary to the expectations from earlier research (Daugbjerg, 2012; Daugbjerg and Feindt, 2017).

This article contributes to the literature on sustainability transition by stressing the importance of analysing the state’s steering capacity as such and how policy goals become operationalised and managed by the state’s administration in practice. Our conclusion is that aspirations to promote environmental and climate measures within existing government programs requires careful (re)thinking, otherwise it risks becoming just symbolic policy making – to please all interests. Not only is there a need for the government to prioritize amongst the societal goals to solicit which of those are necessary to fulfil, and which are complementary. The goal hierarchy must be crystal clear to all relevant actors, even if different interpretations could be allowed along the way due to new political prioritization. However, leaving such specifications to the bureaucracy is a dubious enterprise, especially when – as in the case of EIP-AGRI in Sweden – the implementing agency is new to the innovation policy area and its administrative culture is impregnated with other (traditionally economic-orientated) priorities. With all government funding programs, it is further essential to design appropriate evaluation systems *beforehand*, identifying what different steps or factors are required to spur tangible ‘green innovation’ results at the end (Mickwitz, 2002) by developing an explicit intervention logic (theory of change), so that progress can be monitored, and deviances rectified in a formative learning process. Distinguishing between the EU’s auditing and monitoring of programs aiming to assess compliance and effectiveness and its policy evaluation mechanisms for studying policy outputs to improve the intervention logic and foster policy learning is important in this respect (Smismans, 2015). We have found that in reality systematic feedback to the politicians (and the taxpayers) is rarely happening in the case of the EIP-AGRI program other than in terms of auditing and monitoring. This monitoring tends to be geared towards budgetary reporting rather than measuring effects and outcomes, and the intervention logic is neither made explicit nor analysed with an aim to improve policy implementation and assess its outputs and outcomes. Interestingly, Hasler et al. (2022) draw similar conclusions about the lack of systematic impact evaluation methodologies within the EU’s agri-environmental schemes which suggests that our findings might apply beyond the implementation of EIP-AGRI. If there is no theory about how the financial inputs will spur environmentally beneficial results, little if any steering towards sustainability concerns exists along the way and few resources are present to monitor, evaluate and feed back to society on what is achieved, then ‘green innovation’ policy is deemed to fail.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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