

Article

Policy Mix for a Transition to Sustainability: Green Buildings in Norway

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Abstract: A transition to sustainability is a systemic shift in the way buildings are procured, produced and used, as well as how the built environment connects to the energy and mobility systems. This study focuses on the role of policy and assesses how the policy mix affects transition to green buildings. The case of the Norwegian construction industry is analyzed through a theoretical framework that cuts across policy domains, it includes a mix of policy instruments, as well as rationales for policy. Results show that the instrument mix is relatively consistent and there is a powerful self-reinforcing dynamic among financial, regulative, and information-based instruments. A small fraction of the industry drives innovation, and policy instruments target different segments of the industry accordingly. The synergies between instruments create a dynamic where policy aimed at the elite and policy aimed at lifting the bottom reinforce each other. This policy dynamic supports a transition by allowing the industry to change through cumulative incremental changes. At the same time there is a need for coordination between policy domains and different levels of governance. Conflicts arise from differences in goals and styles of governance in different policy domains. Findings show that inconsistencies and conflicts are inevitable, these aspects can be counterbalanced by consistency in implementation and by credibility and clear communication from policy makers.

Keywords: transitions to sustainability; policy mix; green building; innovation policy; energy efficiency

1. Introduction

The construction sector is in a unique position to reduce CO₂ emissions because of both the potential energy saving and the significant potential for renewable energy production in buildings. A transition to sustainability is understood as a systemic shift to sustainable systems of consumption and production. Shifts are required across sectors such as energy, mobility, housing, and food in order to avoid the negative consequences of climate change [1,2]. Understanding how sustainability transitions can be navigated and accelerated through policy is important to the continued usefulness of the transitions framework [1,3,4]. To reach policy goals we need to introduce multiple policy instruments, yet at the same time we experience difficulties fully understanding policy mixes. Policies for greening the building industry have developed over the past 15 to 20 years and understanding the policy mix is therefore a vital part of understanding the transition.

The notion of a policy mix is recent in innovation studies [5–13], but the concept has been used in environmental studies for some time [14]. Recently studies have addressed policy mixes for transitions to sustainability, referring to the complex impact of many different policy interventions in order to enable transitions [3,8,13,15–17]. See also Kern et al. [13] for an overview of the literature on policy mixes in innovation studies. This study contributes to this literature by applying the policy mix concept to the case of green building and an ongoing transition in the construction industry. Transition studies have mainly addressed policies thought to be suitable to induce transitions, and not so much

existing policies; as a consequence, there has been a relative lack of studies of real world policies [10,12]. This paper addresses this gap. A policy mix, understood as a mix of different policy instruments from a variety of policy domains originating at different levels of governance, can incentivize and give direction to a transition to sustainability. By examining the characteristics of the policy mix for green buildings we can ascertain the nature of the policy mix and how it impacts transition efforts in the industry.

In studies of innovation policy, policy fragmentation is identified as problematic and coordination is often called for [18–22]. This study develops a framework in which to study the characteristics of a policy mix beyond the need for coordination. In order to increase understanding of the policy mix beyond the interaction between two instruments, there is a need to understand how and why synergies and conflicts arise. Policy synergy can be found when instruments reinforce each other, while inconsistency and lack of credibility negatively impact the policy mix. Understanding the nature of the policy mix can help explain the status and direction of transitions. This study explores the role of existing policy impinging on a transition to sustainability, by posing the following overarching research question: *What are the central characteristics, dimensions and impact of a policy mix?*

The case in this paper highlights the synergies between policy instruments, but also tensions that arise from differences in policy domains and different levels of governance. Innovation studies frequently confine its field of interest strictly to innovation policy measures [23,24]. The case here is not limited to innovation policy but includes a wider range of policies affecting innovation and transition efforts in the construction sector. Policy mixes, which exhibit synergies and few conflicts, are often characterized as coherent or consistent. Understanding the evolution and the characteristics of the policy mix can help explain the strength and direction of transition efforts.

These initial deliberations lead to the following more specific research questions: *What are the principal parts of the policy mix for green buildings in Norway? How does the policy mix influence the transition effort in the construction sector?*

Several studies have addressed policies for green building, some from a transitions perspective. Greenwood's [22] study of policy for zero-carbon homes in the United Kingdom highlighted the need for vertically and horizontally integrated policy in order to stimulate transitions. In a study of the green building sector in England and Wales, O'Neill and Gibbs [25] argued that the regulatory framework is essential to promote a transition. Berry et al. [26] showed how one demonstration project spurred regulatory changes because it provided policy actors with the confidence to implement stricter regulation. Other studies have analysed instrument mixes directly. Oikonomou and van der Gaast [27], and Rosenow et al. [28] both studied policy mixes for energy efficiency in buildings, however, both studies are limited to examining interactions between pairs of instruments and say little about the totality of a complex policy mix. This paper addresses the policy mix as a whole, which few studies have done except Van der Heijden [29], who reviewed new governance instruments to prompt a transition in several countries. It was found that such instruments had most success in the high end of the market and should be used in combination with traditional regulatory instruments. The case in point here is the ongoing transition to sustainability in Norwegian construction. Previous studies have pointed to policy not as the single driver, but as a key element in the transition [30]. In the next sections, literature on transitions and the role of policy is discussed, followed by a review of the literature on policy mixes and a discussion of what a policy mix contains. Section 3 deals with the methods of the case study, which is analysed in Section 4, followed by conclusions in Section 5.

2. Theoretical Framework

2.1. Transitions and the Role of Policy

Transition literature addresses large-scale changes to sustainable socio-technical systems such as energy, transport, food, and housing. In the transitions literature, informing policy makers is often stated as motivation for research and results are often expected to inform policy makers or identify

policy problems [31–38]. Transitions perspectives have been criticized for a tendency to assume that once policy makers are informed they will design policy accordingly [12,39]. Policy recommendations generated from transition studies focus on how to facilitate the emergence of new industries [40] and the transformation (destabilization) of existing industries [41].

The idea of policy makers being equipped with a repertoire of instruments and the ability to design and apply the optimal policy mix fails to consider the innate complexity of the policy process [12]. Limitations on resources such as credibility and legitimacy may hinder some courses of action, as can fiscal limitations and lack of organizational capacity [42]. Policy emerges from many different actors, inside and outside of government, on regional, local, and supra-national levels who make decisions that influence each other. Statements about what policy makers should be doing therefore fail to recognize the limitations policy makers face [12,42,43]. Furthermore, existing policy is an innate part of the analysis of a transition dynamic [2,44–47]. It seems that the transition to sustainability in the construction industry is to a large degree policy-driven [22,25,26,48,49].

2.2. Policy Mix

A policy mix concerns interaction between policy instruments based on the assumption that the totality of instruments is more than the sum of the parts. A mix is thus expected to be able to have synergetic effects or instruments in the mix may be incompatible, and effects will be less than hoped for. A policy mix emerges over time; it may be the result of a coherent design but more likely the result of many layers of policy added little by little [50].

There are ongoing debates about how to operationalize policy mix; several suggestions have been made as to what the constituent elements in a policy mix are. Some, like Kivimaa and Kern [8], limit their analysis to policy instrument mixes, and disregard other dimensions such as the mix of policy domains, policy rationales, and policy strategy. Other studies argue for a more wide-ranging understanding of the concept. Flanagan et al. [12] sketch a model of policy mix analysis that includes consideration of the policy life cycle with emphasis on agenda setting and the genesis of policy. They also specify three kinds of interaction, and suggest three sources of conflicts in the policy mix—conflicting rationales, conflicting goals, and conflicting implementation approaches. Magro and Wilson [7] propose the term innovation policy system to describe the policy mix affecting innovation in the Basque region. They include different levels of governance, mix of policy rationales, mix of policy domains as well as the interaction between policy instruments. Reichardt and Rogge [9] argue for a comprehensive analysis including policy strategy and instrument design features. Rogge and Reichardt [3] explicate their conceptual model in three building blocks. Building block one includes policy strategy and instrument types and instrument design, block two describes the policy process, while block three concerns characteristics of the policy mix—in terms of consistency of instrument mix, coherence of policy process, and credibility and comprehensiveness of the mix.

Cohesion or lack of cohesion is often used to assess consistency in policy mixes [9,10,12,50]. In a situation of consistency, policy instruments complement one another and may display synergies, while in the opposite situation tensions between instruments make it more difficult to reach overarching goals. Lack of consistency may be found between different types of instruments, between policy goals and between policy domains. Inconsistencies in the policy mix are not necessarily problematic for policy implementation, but policy consistency affects how policy intentions are signalled and received [51]. In a study of the policy mix affecting German offshore wind, Reichardt and Rogge (2015) find that the credibility and stability in the mix can partly ameliorate some inconsistencies in the mix [9].

The choice of what to include and how to operationalize a policy mix also depends on the scope of the study and the object of analysis [3,12] such as policy space, governance level, geographical space, and time. The object of analysis in this paper is the policy mix affecting a transition to green building. The case is limited by looking at a time period of around 15 years, it is focused on one problem area (transition to green building) and it is limited geographically to Norway. It covers several levels of governance. Policies or instruments in the mix originate from different administrative levels and

different policy domains: supranational such as the EU (European Union), national where ministries and associated agencies operate, and the local levels where decisions about planning and building permit are made.

The policy mix concept adopted in this paper builds on the notions of a comprehensive policy mix [3,9], and innovation policy system [7], and a policy regime [52]. A policy regime denotes a multitude of policies from different domains that impinge on a given set of problems [53]. The complex nature of a transition and the discussion above indicate that the object of study is what [54] would label a complex multilevel policy mix. In the following the analysis of the policy mix for greener construction is analysed in terms of coherence and policy synergies and in terms of policy conflicts and fragmentation.

The study set out to understand the principal parts of the policy mix for green buildings. Following that, the study operationalized the policy mix concept as cutting through a mix of policy domains that are subject to different policy rationales in addition to the mix of specific policy instruments. The mix also operates on different administrative levels. This understanding is depicted in Figure 1.

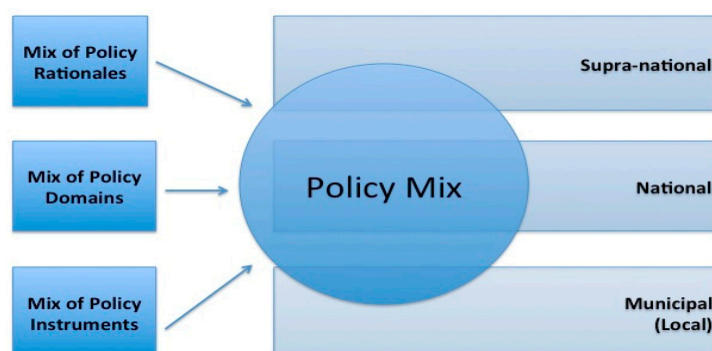


Figure 1. Framework for analysis policy mix.

2.3. Operationalizing the Policy Mix Concept

Policy domains are established coalitions of actors who propose ideas, define problems and solutions to problems about issues. Each domain displays some embedded inertia, and shapes the problem definitions and policy response in distinct ways. Industrial policy, innovation policy and environmental policy are in most ways separate areas, but they all interact in policy mixes for transitions [55,56]. Domains contain different goals, different understandings of the appropriate way to reach those goals, and different rationales for policy. Seemingly unrelated domains can affect the same policy mix. Within each policy domain, different types of instruments are found, based on different rationales for government intervention. The different domains have distinct goals such as industrial development, environmental protection, innovation, urban development, work safety, CO₂ reductions. The differences in rationales, goals and policy styles between the domains may cause conflicts or inconsistencies in the policy mix. Each policy domain has established practices, an established understanding of problems and of what passes as acceptable solutions, which can be used to explain inertia and myopic behavior. The notion of a policy mix cuts across different domains, therefore making it possible to identify and address conflicts between policy domains [52].

Policy rationales can be explained as related to policy actors' disagreement on problem definitions and on which tools are best suited to deal with the problems. Agreeing on what constitutes a problem and what an appropriate solution looks like depends on the actors' frames of mind, ideas, norms, and principles [42,43]. Common frames of minds or packages of ideas and accompanying solutions are often referred to as a policy paradigm or meta-rationales [12]. Conflicting rationales for government intervention can exist side by side in the policy regime. Two theoretical rationales are often discussed in innovation policy literature—market failure and systems failure that provide different motives for

policy intervention. Conflicting rationales cause conflicting ways to define and solve problems, and consequently underpin different styles of policy design [34].

Policy instruments are techniques or tools of government; they are the means through which states try to achieve goals [57]. They originate in different policy domains and are shaped by different policy rationales. A common distinction is made between regulatory instruments, financial instruments, and soft information/network instruments [6,58]. The threefold classification is based on an underlying categorization of power and resources at the government's disposal, they correspond to the wielding of cohesive power in the case of regulatory instruments, remunerative power in economic instruments, and normative power in information or network-type instruments. As a consequence, each type of instrument represents a different degree of government intervention, from cohesive to voluntary [58]. Rogge and Reichardt [3] define instruments according to type and design features. Design features describe how instruments are supposed to work, the instruments' objective, whether they are rigid or flexible, and whether they are general or specific.

3. Materials and Methods

The aim has been to study the policy mix and the interaction of policy instruments. Case studies are appropriate to study phenomena in context, to capture relations between parts of a phenomenon, and in order to study dynamics and change [59–61]. Transition processes and the emergence of corresponding policy mixes are path dependent processes that involve complex interactions. A single case design therefore lends itself well to capture depth and comprehensiveness. Because of the scale and complexity of the research object a single case design was deemed suitable [62–64].

The analysis is based on several kinds of data. The first is a review of policy documents including white papers, commissioned reports, and environmental action plans, which have been used to compile an overview of instruments affecting green building (Table A1). Records from parliamentary hearings add to insights about the variety of stakeholders, policy debates, and agenda setting. Policy documents were used to review policy goals and strategy. The Norwegian news archive was used to document responses to policy initiatives. The document analysis primarily provides a snapshot view of the policy mix. It is difficult to uncover the effects of policy instruments because documents only state intentions and not effects. This shortcoming was mediated with data from interviews.

A total of 32 interviews were conducted with construction industry professionals and institutional actors between 2011 and 2015 (Table A2). Industry professionals include architects, consultants on energy and building physics, property developers and builders. The participating industry professionals were chosen and recruited because they had been part of the design team in one of three construction projects. The three projects were chosen because at the time they were widely considered the best practice cases by the Norwegian association of architects. Further informants were recruited through a snowballing logic where interviewees made suggestions as to whom to speak to next. Institutional actors include policymakers, bureaucrats, trade associations and researchers in the field. The interviews were semi-structured, which means certain topics were covered every time, but I let the conversation flow as freely as possible. Interviewees were asked about perceived conflicts in the policy regime and about changes, credibility, and stability in the policy mix. The interviews lasted 40–80 min and were transcribed verbatim. The data was coded in several stages using NVivo software Version 10 (QSR International Pty Ltd., Doncaster, Australia). The research was to a large degree exploratory, and the initial coding lumped together everything related to policy; it included everything from political frames of mind, to particular policy instruments, and reactions to policy changes. The policy node was gradually broken down into different dimensions that were deducted from theoretical concepts such as the three policy instrument types (regulatory, financial, and information-based instruments). As the analysis progressed codes emerged inductively from the data material. Analytical frames were deducted from theory at the same time, as data interpretation was refined inductively [65–67].

4. Principal Parts of the Policy Mix

The next sections answer the first research question: *What are the principal parts of the policy mix for green buildings in Norway?* Section 4 outlines the different dimensions of the policy mix, as it was discussed in Section 2.3. It includes the mix of different types of instruments, the mix of policy domains affecting the problem area, including different rationales for policy in each domain, and the mix of governance levels [3,7,9,12].

4.1. Instrument Mix

The next section reviews the various policy instruments that impact the transition to sustainability in construction. The instruments are listed in Table 1.

Regulative instruments can be mapped by the degree of control they pose. The least cohesive would be an obligation to notify, followed by need to apply for permission—for example, anyone wishing to produce and sell electricity in Norway will have to apply for permission from the Norwegian Water Resources and Energy Directorate. The next level of cohesion is the possibility of exemption from a regulation to an absolute rule [58].

The central regulative instrument affecting energy use in buildings is the building codes, which are the technical specification of the Plan and Building Act. In the current building codes there is a choice between net energy performances goals—calculating the total energy need for the building—or to adhere to specific measurements for heat loss, insulation thickness, etc. Energy performance was introduced in order to stimulate innovation and creativity, through more freedom of choice in selecting types of energy solutions. This is an example of a new instrument design—moving from specific energy demands, to energy performance—where the increased flexibility of solutions is thought to promote innovation. When energy performance was introduced in the building codes in 2007 they had not been updated in 10 years. Up until then the building codes said little about buildings' energy use, while after 2007 it was decided they should be updated at regular intervals. The 2015 update conforms to a passive house level, mandatory from January 2016. The building codes and the increased demand on energy efficiency have caused some discontent in the industry. Most interviewees said that as long as the rules are the same for everyone it does not really matter. The homebuilding industry has voiced opposition, claiming that stricter code requirements make housing unaffordable, and that there is little demand for sustainable homes. This resonates with Shapiros's [68] assertion that homebuilders in particular have vested interests in slack regulation and will lobby against energy efficiency measures. The building codes were frequently talked about in the interviews as a baseline, representing the minimum requirements.

Area plans and zoning regulation were seen as a barrier to innovation—described as a hurdle in every project. Frequently heard phrases like “stuck in regulation” or “standing still somewhere in the bureaucracy” referred to the municipal handling of the Plan and Building Act.

Economic instruments essentially make it less or more expensive to undertake an action. They include grants, subsidies, loans, tax benefits, and so on, to incentivize wanted behavior. There are two organizations that provide financial incentives for energy measures in buildings—Enova and the Norwegian State Housing Bank. Enova subsidizes up to 50% of the extra cost if the building project goes beyond the minimum standard specified in the building codes. The Norwegian State Housing Bank manages inexpensive loans and project-development subsidies to building projects that display particular sustainability ambitions. Innovation Norway provides financial incentives for firms to cooperate with public actors in particularly innovative projects.

One policy interviewee claimed that: *“One of the powerful policy instruments at our disposal is the use of public procurement—to use public clients as role models.”* However, in other interviews many expressed disappointments with public actors, claiming that public procurement had been unambitious in terms of energy. One industry professional explained: *“You’d think the government would lead the way in this, but it does not seem as if they do. It is a missed opportunity. There are good public clients, and they do good stuff, but they could have done more, and it would have been easy for the industry to follow suit.”* To some extent

public buildings have been built as demonstration projects, for instance, a number of passive house schools and kindergartens. Laws about public procurement and tendering procedures limit public procurement options and demand specific competencies for procurement of green buildings.

Information or network instruments are often thought of as soft instruments because they involve neither coercion nor economic incentives. Instruments are often aimed at providing information, facilitating cooperation and learning, and creating networks, where the logic is to stimulate idea generation, demonstration projects, and knowledge exchange. Examples of soft policy instruments are environmental management systems, environmental labelling, and sharing best practice cases and voluntary certification schemes.

Standards and voluntary certification are used to indicate quality when exceeding the minimum requirement. In relation to sustainability there are two relevant standards. They describe energy calculation methods for buildings such as passive houses and low energy buildings with one standard for commercial buildings and another for residential. The low energy and passive house standards are not mandatory, they do however relate directly to financial incentives provided by Enova. Also they provide a target for coming updates of the building codes. Voluntary certification schemes such as BREEAM (Building Research Establishment Environmental Assessment Method) have flourished since the Norwegian version of BREEAM was launched in 2011. Voluntary instruments may be independent of government agencies, but they are still part of the mix.

Research funding and education may be seen as both information/network instruments and financial instruments. Industrially relevant research has been funded through supranational institutions such as the International energy Agency (IEA) and the European Union, but mostly through the Research Council of Norway (RCN). Education has changed in response to the increased demand for green buildings. There is new knowledge of energy efficiency for instance coming into the industry with newer generations of engineers and architects. Curricula have changed reflecting the energy efficiency and renewable energy production. There has also been a large-scale emphasis on continued education.

Several network instruments are collaborations between government actors and industry actors resulting in demonstration projects. Demonstration projects have a double logic—the obvious benefit is of course to demonstrate practical opportunities. One architect explained a demonstration project:

“Constantly sending people to Freiburg for inspiration is not working, it is not getting the message across, but Powerhouse is. It is instantly understandable to people, they are like, wow—solar panels in Oslo? Really, was it expensive? —no not really. Did you do anything special? No, they are just sitting up on the roof on a rack. And they go—oh okay. It really does not take more for people to see that it works here.”

Many informants talked about demonstration projects as if the effect is linear—if only actors are shown that it is possible, they would do it. But it is not as if lack of knowledge about energy efficient options is the only thing keeping the industry from building greener. The benefit of demonstrating possibilities is complex and tied to legitimization of innovations. Successful demonstration projects have also shown policy actors what is possible, and indirectly legitimized stricter minimum requirements in the building codes.

Effect or success of network instruments is difficult to measure. One dimension of networked instruments is the collaboration between policy actors and the industry. Collective decision-making and the process of involving industry are thought to induce feelings of ownership over the regulation and industry goals.

Table 1. List of policy instruments.

Type	Instrument	Content (Goal)	Who (Level)
Regulative	Plan and building act	The law regulates both planning and building processes. In terms of planning the law also regulates other environmental issues, such as conservation and waste. In terms of energy the goal is to establish minimum standards	Ministry of local Government and Regional Development/Ministry of Environment (National)
Regulative	Building codes (TEK07) (TEK 10) (TEK 15)	Specifies the technical requirements necessary to fulfill the demands of the plan and building act	Directorate for building quality (National) Agency for planning and building service (Municipal)
Regulative	Zoning plans	Zoning plans regulate where and what can be built as well as mandatory district heating in some areas	Agency for planning and building service (Municipal)
Regulative/ Information	Mandatory energy labelling system (Eco-design directive)	All buildings for sale or for rent must be labelled on a scale from A to F, according to energy efficiency. The goal is to create a market incentive for energy efficiency	Ministry of Petroleum and Energy/Norwegian Water Resource and Energy Directorate (National/EU)
Financial	Subsidies for energy efficiency measures in buildings	Goal is to stimulate demand and create market	Enova (National)
Financial	Grants for knowledge development for energy efficiency concepts	Grants for ambitious projects that can serve as demonstration projects. Goal is demonstrating opportunity and to contribute to knowledge development in the field	Norwegian state housing bank (National)
Financial	Inexpensive building loans	Encourage projects to go beyond minimum environmental standards	Norwegian state housing bank (National)
Financial	Procurement	Public procurement	National and municipal
Financial	IFU/OFU contracts	Subsidies (matching funding) for innovative projects that have a lead customer in either the private (IFU) or public (OFU) sector	Innovation Norway (National)
Financial	Research funding	For example, the Zero Emission Building Centre, whose mission is to provide research, technology development and other useful services to the construction industry. There is also research on topics such as new materials and management systems.	Research council of Norway (National)
Network/Information	Bygg21	Public–private strategic partnership platform. Goal is to establish and document best practice cases	Collaboration between industry actors and state and public actors. (National)
Network/Information	Build Up Skills	Continued education	EU
Network/Information	Low-Energy programme	Goal is to disseminate information about low energy solutions by running a website with information, as well as public speaking, courses across the country for planners, architects and builders.	Collaboration between industry actors and state and public actors. (National)
Network/Information	Futurebuilt (Future cities)	Architectural exhibition focusing on demonstration projects showcasing excellence in energy efficiency or environmental qualities.	Collaboration between industry actors and state and public actors. (National)
Network/Information	Energy consultancy for property developers	Energy consultancy service (sourced from technical consultancy firm Asplan Viak) to project managers/owners interested in energy efficiency.	Enova (National)

4.2. Mix of Policy Domains

Policy domains have different and sometimes conflicting goals, and often different styles of policy, for example, different rationales for policy and different preferences for regulative, financial, and information-based instruments. Policy domains deal with particular policy goals, defining

problems, and solutions to problems about particular issues. The policy domain may display some embedded inertia and shapes the problem definitions and policy response in its distinctive way [52,69].

There are five ministries with underlying agencies that influence the construction industry. The Ministry of Local Government and Modernization is responsible for housing policy as well as the Planning and Building Act. Two independent agencies are organized under this ministry. The Ministry of Petroleum and Energy is responsible for coordination of energy policy, and coordinates two underlying agencies: the state-owned enterprise Enova, and the Norwegian Water Resources and Energy Directorate (NVE). The Ministry of Climate and Environment has particular responsibility for environmental policies. Two relevant agencies belong here: the Directorate for Cultural Heritage and the Norwegian Environment Agency. Two additional ministries play important roles for green innovation in construction. The Ministry of Trade, Industry and Fisheries is responsible for coordination of innovation policy. Finally, the Ministry of Education and Research is responsible for the Research Council of Norway that also has a large industry-oriented innovation division.

4.3. Mix of Rationales

The policy domains contain different rationales—common frames of mind and understandings of policy problems and appropriate solutions [42,43]. As pointed out in Section 2.3, innovation studies often separate between neoclassic conceptions of market failure and evolutionary concepts of systemic instruments or system failures as rationales for policy intervention [24,34]. Market failure and system failure logics exist side by side in the policy mix.

An illustrative example can be found in the different styles in the Ministry of Petroleum and Energy, and the Ministry of Local Government and Modernization. The Ministry for Petroleum and Energy employs market-failure logic to their subsidy program through Enova. Enova's success is measured in terms of kilowatt hours saved—and they are explicitly instructed to pick technologies and stimulate close to the market. Instruments provided by the state housing bank, which is under the Ministry of Local Government and Modernization, are on the other hand based more on a systemic logic, aiming to generate knowledge through research, education and continued education, testing and experimenting with technologies and so on. The mix of instruments thus incorporates multiple rationales, based on the different ideas and styles embedded in the different policy domains.

4.4. Levels of Governance

Three levels of governance are identified, supranational (primarily EU), national and local. EU directives are incorporated in the Norwegian policy system. The European Parliament Building Directive and the recast in 2002 of the same directive were incorporated into Norwegian policy.

The ministries described above have overall responsibility for their fields, but the day-to-day business of building permits and detailed planning is carried out at the local level. Every municipality has a local agency for planning and building services that makes decisions about the use of particular areas, designs development plans, and grants building permissions. The Planning and Building Office is responsible for land use, transport, and local plans, as well as for environmental impact analyses. At the national level, policy areas are neatly separated, however in the municipalities the decisions have to be made about concrete building projects according to area plans and transportation plans, balancing various interests. One ministry interviewee explained:

“We do tend to think about things in boxes—particularly at the national level. We are responsible for this and they are responsible for that. We do not deal with traffic, or area plans, so we'll stay out of that because it belongs to someone else. (. . .) We definitely need the municipalities to see the links between transport, energy and area development, even though the national government does not. The state is more sectoral.”

As the informant points out, a large responsibility is placed on the municipalities to deal with the difficult task of balancing the input of many state agencies, whose mandates and policy goals are different from each other.

5. Policy Mix Influence on Transition

The second research question concerns the degree to which a transition is helped or hindered by policy. In the introduction I asked: *How does the policy mix influence the transition effort in the construction sector?* The framework presented here suggests that positive synergies between instruments are beneficial to the transition, while conflicting policy instruments, or inconsistencies in the policy mix will hold back or hinder change. The mix of policy instruments plays a key role in the transition because it is both part of the regime structuring, but also an agent of change.

5.1. Synergies in the Mix

Many interviewees made the distinction between an innovative elite and the rest of the industry. A policy informant explained:

“Put simply, there are a few actors who are frontrunners, the innovators that drive development. And then there is a whole bunch of other actors, who at best will follow the law and the minimum requirements. One part of the market is creative and innovative and willing to create something better, while the rest insists on being deliberately backwards.”

This notion of elite and mainstream industry actors is corroborated across interviews. A small segment of the industry drives innovation, and policy instruments target different segments of the industry accordingly. Subsidies and financial incentives together with knowledge development aim to support and encourage innovation. Increasingly strict regulation and energy performance demands make sure the rest can follow. The synergies between instruments create a dynamic where policy aimed at the elite and policy aimed at lifting the bottom reinforces each other. One policy actor elaborated:

“What we have worked for is to force the bottom segment towards the top. And many in the industry will argue that we need to make demands because they will not do anything before it is a legal requirement. We will continue with the minimum standards of course, but we are also working towards the top, with the ones who actually wants to do something—the innovators. We believe that by lifting and supporting the best, we will at the same time raise the bottom segment, the followers.”

Stimulating innovation happens through a mix of information/network types of instruments and financial support. Policy instruments aimed at the top tier of the industry include research grants, grants for development of innovative projects, and network instruments creating meeting spaces for innovative actors. Lifting the bottom is done through increasingly stricter regulation in the building codes. Policy measures aimed at lifting the bottom include building code technical specifications and continued education. Demonstration projects resulting from grants and research efforts involving industry partners are used to legitimize increasingly stricter building codes. This echoes Berry et al. [26] finding that successful demonstration projects can give policy actors the confidence to implement stricter minimum requirements. The findings are interpreted as an indication of significant consistency in the mix.

Synergistic relationships between several policy instruments have been outlined and the mix can be characterized as relatively consistent. But when asked about the totality of policy measures, industry interviewees suggested *“the right hand might not always know what the left hand is doing”* and that policy instruments may compete or cancel each other out.

5.2. Conflicts in the Mix

Two major conflicts are identified. First, conflict appears as a result of different levels of governance in combination with conflicting goals. One frustration commonly expressed in the interviews is that

the municipal planning and zoning offices show little understanding or discretionary assessments of innovation projects. A case in point is building height—zoning plans usually include limitations to number of floors. However, severely limiting the number of floors limits the possibilities for integrating photovoltaic elements on roofs and walls. Conflicts like this arise from different levels of governance and different policy domains. This is the case in an upcoming innovation project, and the architect summarized:

“We have spent two years now back and forth with the zoning committee. In this case we are butting against a zoning plan. Had we not had research council backing on this, we would have given up long ago. . . . This is about knowledge, it is not that difficult really, if everyone had a platform of knowledge of the importance of considering energy in these matters, then all the case workers in all the municipalities would listen to rational arguments for tilting a roof for photovoltaic panels, or move buildings around on a lot in order to maximize sunlight, or move a bus stop 100 m in order to facilitate flow of people.”

The quote highlights the lack of guidance given local administrators in terms of prioritizing between policy goals. On the national level the agencies dealing with one policy domain are closed off from agencies dealing with different domains, which becomes a source of tension between goals on the local level. Caseworkers in the municipal office responsible for zoning and building permits have to consider trade-offs and make decisions. He or she must then weigh different policy goals against each other and decide what can be built where, and, by extension, what is more important, for example between a cultural heritage concern, species conservation, or the construction of energy efficient buildings.

The second major conflict is about energy production, which is a result of different ideas of acceptable solutions in different domains. A central conflict is between district heating and passive house principles. When constructing a new building it is mandatory to connect to the district heating grid in many areas. Mandatory connection to the district heating grid is supposed to promote district heating and to share the cost of building the district heating grid, and ultimately to reduce CO₂ emissions. However, connecting to district heating is counterproductive for energy efficient buildings—the ultimate goal of which is also to reduce CO₂ emissions. Applying for an exemption is possible, but it is up to the municipalities to grant it, and the practice differs between municipalities, which is a source of uncertainty for the construction industry.

Similarly, there are conflicts related to who should be allowed to supply electricity to the grid or heat to the district heating grid. The few plus-energy buildings that produce more than they consume have not been able to profitably sell electricity to the net because it infringes on a different policy domain—energy production. It would imply a move from a centralized energy production system towards decentralized energy production, which is a contested political decision. A ministry representative explained: “Buildings are part of the energy policy now—it is a pretty big shift. The public interest in the energy demands in the building codes is enormous. It has become a field for lobbyists—that is completely new.” This renewed interest in the construction industry implies a further complication of the policy mix because of new types of actors such as lobbyists and interest from policy domains like climate and energy policy. It also indicates an issue for a transition to green building—as the energy system is notoriously difficult to transform because of powerful vested interests and locked in mechanisms [35].

6. Conclusions

The starting point for this paper was to explore the role of policy in transitions to sustainability, emphasizing the characteristics of the policy mix. The paper’s framework is based on literature on transitions to sustainability in combination with policy perspectives. The aim of the research was to explore how multiple policy instruments have been complementary or in conflict over a period of time. The notion of a policy mix in this case includes the instrument mix as well as the mix of policy

domains and a mix of governance levels in order to analyse the characteristics of the policy mix for green buildings in Norway, and how the policy mix impacts on green innovation and transition efforts in the construction sector.

Characterizing the policy mix is important in order to understand which features of policy mixes may be conducive to transitions. Based on Rogge and Reichardt [3], the following characteristics are discussed—consistency, conflicts and credibility. Synergy and lack of inconsistency between policy instruments are considered beneficial for transition, and conflicts and lack of credibility can force trade-offs and negatively impact a transition.

The case shows a distinct mix of regulative, financial, and information-based instruments. The positive interaction between successful demonstration projects spurred by knowledge development, research and innovation incentives—and recurring tightening of the minimum requirements in the building codes—have been a motor of change in the industry. The interplay between radical innovation projects and increasingly strict regulation and minimum requirements is made possible because the frontrunners provide legitimacy and credibility to building code requirements. There is one important caveat to this dynamic: the positive interaction depends on the existence of intermediary projects, i.e., projects in which industry actors can experiment and learn about niche technologies. The policy implication of which is to incentivize experimentation. The positive dynamics between regulative, financial and information-based instruments, indicates consistency in the instrument mix. The sequencing of policy instruments also speaks of consistency; initial support for innovation, followed by communication and information about both innovation and upcoming minimum requirements, followed by regulation has been successful.

Different levels of governance as well as different goals and styles of governance from different policy domains are sources of conflict in the mix. The complexity of the local decisions about zoning and planning reflect the nature of policy making, that it is a trade-off between different considerations, and interviewees express annoyance but also understanding of the nature of trade-offs between for example building height interfering with cultural heritage, or species conservation conflicting with new builds.

Some degree of conflict and inconsistencies in the mix is to be expected, and all stakeholders believe conflicts, such as between mandatory connection to the district-heating grid and passive buildings, will be resolved. Predictability and credibility about policy goal and strategy to achieve zero energy by 2020 have been achieved through clear and consistent information and actions the past years. Proliferation of demonstration projects and innovation has provided legitimacy and opportunity to further strengthen minimum requirements at regular intervals. Following through on the long-term strategy to reach zero emission building by 2020 has been important to credibility of the mix. Stating the long term goals had the effect of pushing industry actors into trying out new technologies and testing voluntary standards—because it was a matter of time before they became part of the minimum requirements, indicating coherency in the policy process.

The findings second those of [9], that inconsistencies in the mix can be counterbalanced by creating credibility by sending consistent signals about policy goals. The intention to increase demands in the building codes has been communicated clearly, and the actual changes have been implemented in a stepwise process. Credibility may also partially be credited to the network instruments facilitating extensive involvement of industry actors in policy processes. By consistently repeating the sustainability goals, a change in attitudes towards energy efficiency is clearly observable in the industry. Learning to build more efficiently is increasingly required, and the notion is that “greener is inevitable” because the minimum requirements in the building codes will only increase in the future. This dynamic can be seen as a central mechanism of change, and an indication of the ongoing transition to sustainability.

The study has implications for theory. It develops a framework in which to study policy mixes and how a particular mix of instruments impacts on a transition process. Transition studies have been criticized for not fully engaging with policy, and underestimating the role of policy and the nature of policymaking. One of the merits of the transitions framework is the ability to examine

changes across societal spheres—concurrent economic change, social change, and political change. As such the framework developed here can be used in studies of the role of policy in transitions to sustainability. It is important to note that transitions cannot be prescribed or driven by policy alone, however, the policy mix governing a transition is an important analytical dimension of a transition study because transitions are multi-dimensional and require coordination across political domains. I argue here that policy in a transition spans governance levels and it spans policy domains with different inherent logics and rationales. Bringing a more nuanced view of the various policy efforts impacting a field enriches the transitions perspective because new analytical dimensions help understand how transitions can be guided in a given direction. The policy mix can be simultaneously a conservative force favouring existing regime through path dependency, or policy can provide the impetus for change by setting standards.

The findings also have implications for policy. The study shows that the mix of instruments works despite the presence of inconsistencies and conflicts. As a means of coordination: consistency and predictability in implementation of changes as well as involvement of industry stakeholders has a positive impact on dealing with inconsistencies in the policy mix.

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Appendix A

Table A1. List of Documents.

Document Title	Type of Report	Published by
White paper: Norwegian Climate Policy	Report to Storting no. 21 (2011–2012)	Ministry of the Environment
White paper: Good buildings for a better society	Report to Storting no. 28 (2011–2012)	Ministry of local government and regional development
Energy efficiency in buildings	Final report from working group on energy efficiency in buildings (2010)	Independent commission, reporting to ministry of local government and regional development
Building for the future. Environmental action plan for the housing and building sector	Action Plan (2009–2012)	Ministry of local government and regional development
White paper: An innovative and sustainable Norway	Report to Storting no. 7 (2008–2009)	Norwegian ministry of trade and industry
Low-energy Commission: Energy efficiency	Final report from working group on energy efficiency in buildings (2010)	Low energy commission, reporting to ministry of petroleum and energy

Appendix B

Table A2. List of interviews.

1	Senior advisor, Statsbygg
2	Consultant/board member, Faveo/Powerhouse
3	Head of research, Sintef Building and Infrastructure
4	Senior consultant, Skanska/Powerhouse
5	Director general, Bygg21
6	Senior researcher, Norwegian University of Science and Technology
7	Director general, Norwegian Association of Architects
8	Senior advisor 1, Enova
9	Senior advisor 2, Enova
10	Head of program, Ministry of environment
11	Deputy director general, Ministry of local government and modernization
12	Head of department, Ministry of local government and modernization
13	Senior advisor 1, Ministry of local government and modernization
14	Senior executive officer, Ministry of local government and modernization
15	Senior advisor 2, Ministry of local government and modernization
16	Director, Futurebuilt
17	Head of market, Standard Norway
18	Chair of committee, Standard Norway
19	Head of communication, Standard Norway
20	Former Director general, Green Building Alliance/Norwegian Green Building Council
21	Director general, Green Building Alliance/Norwegian Green Building Council
22	CEO, Entra (Powerhouse)
23	Senior Architect, Snøhetta (Powerhouse)
24	CEO, Bybo (Løvåshagen)
25	Senior architect, ABO (Løvåshagen)
26	Energy advisor, Norwegian State Housing Bank (Løvåshagen)
27	Architect, AMB (Fornebu S)
28	Senior architect, AMB (Fornebu S)
29	Project manager, KLP (Fornebu S)
30	Design team manager, Skanska (Fornebu S)
31	CEO/board member, OSU (Powerhouse)
32	Director general, Directorate of building quality

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