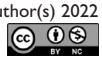
Research article

P | U | S

Public Understanding of Science
2023, Vol. 32(1) 88–102



DOI: 10.1177/09636625221122293
journals.sagepub.com/home/pus


Seduction, caution, fight: Media framing of research-based expertise in Norwegian print media coverage of low energy buildings (2005–2012)

Thomas Berker and Liana Müller
Norwegian University of Science and Technology, Norway

Abstract

In a little more than 10 years, Norway went from being a laggard in low energy construction to mandatory Passive House energy consumption levels for all new buildings. This is a remarkable story of expert-led sustainable change, in which considerable resistance had to be overcome. Based on a distant and a close reading of Norwegian print media coverage of low energy buildings between 2005 and 2012, we analyse one aspect of this success story: representations of research-based expert authority. Our empirical study is motivated by a concern for expert authority in conflicts that arise when sustainability policies are implemented. We found three distinct, but complementary groups of representations, cautious dissemination of research findings, open engagement in public controversies, and seductive 'home stories'. In a division of labour, we argue, they were able to assert research-based authority that persisted despite heated public controversies.

Keywords

low energy building, scientific citizenship, scientific controversies, sustainable development

1. Introduction

In times of urgent crises, modern societies turn to experts who study causes, likely developments and possible remedies. Recently a global pandemic has forced virologists and epidemiologists to give advice that they knew would – if followed by politicians – fundamentally transform the daily lives of whole populations and in many countries in fact have. The scientific community has risen to this challenge, and it has provided not only advice but also effective vaccines to save as many lives as possible. Environmental activists have compared the environmental crises of our time, above all climate change, to the pandemic: They argue that to implement scientifically sound

Corresponding author:
Thomas Berker, Department of Interdisciplinary Studies of Culture, Norwegian University of Science and Technology, 7491 Trondheim, Norway.
Email: thomas.berker@ntnu.no

measures, the declaration of a state of emergency is needed, which would give decisive powers to those who know how to deal with climate change.

In this article, we take a closer look at how the authority of research-based expertise can be performed *without* the declaration of a state of emergency, and within the due process of democratic societies. This means above all that scientists do not enjoy direct access to decision making, but have to rely on mediating institutions that are democratically legitimised. In history, sometimes, scientific expertise has prevailed, most prominently when emissions that threatened the ozone layer were phased out following the Montreal protocol. In other cases, experts have consistently been ignored. In the moment when solutions proposed by experts affect daily lives of powerful groups in the electorate, research-based expertise is likely to be disregarded silently – often after politicians have paid lip service to their environmental responsibilities. Unfortunately, in the case of climate change mitigation, after the low hanging fruits have been harvested, this kind of resistance against further measures can be expected. It is these instances, in which scientific advice is put aside or action is delayed, which motivate environmental activists to demand more action that is radical. Indeed, in the current situation – in which we can expect the proliferation of public controversies around sustainability transformations – we may no longer assume that framing advice as scientifically sound alone is enough to lead to sustainable policies (as was the case in relation to the Montreal protocol, see Albrecht and Parker, 2019) – no matter how much general trust a society places in its experts. Instead, it is necessary to ask *how* the authority of an expert consensus can and should be framed in public conversations.

In this article, we present results of a study of how experts were represented in print media during a societal controversy around a consequential sustainability policy in Norway: the introduction of mandatory, highly energy efficient building technologies in building regulations. Against widespread resistance, and without having to refer to the kind of state of emergency that is promoted by environmental activists, expert advice has prevailed in this case and has become binding national law.

Based on our observations, we answer two questions: First and most immediately, we analyse the ways scientific environmental expertise was framed when it came under pressure of public controversy. We answer this question empirically describing three bundles of representations that created very different images of research-based expertise: seduction, cautious engagement and fight. Second, we analyse how these three representations complemented each other forming a combined image of research-based expertise that was able to contribute to a fundamental legal change in support of climate change mitigation.

In relation to the comprehensive literature on media framing and debates on the meaningfulness of framing analyses (e.g. D'Angelo et al., 2019), in this article, we argue that an analysis of the framing of expert expertise allows us to shed light on the tensions between the authority of science and increasing demands to apply science to solve societal problems. The contribution of this article, thus, is a description of possible societal roles for research-based expertise in relation to questions that mobilise significant societal interest. Particularly in reaction to environmental crises, experts face expectations towards their readiness and ability to not only propose solutions but – if necessary – also participate in overcoming resistance against their implementation. At the same time, the experts' claim to be listened to is rooted in Mertonian ideals of disinterestedness and impartiality (Merton, 1938), which is threatened by experts' direct involvement in politics.

In the next two parts of the article, we describe in more depth the situation in which environmental experts with ambitions to avert environmental crises find themselves, first in more general terms related to experts' engagements with mediated publics and then in relation to the question of expert authority. The presentation of the empirical material is then introduced by a description of background and method. After a discussion of the dominant forms of successful performance of expert

authority encountered in the material, we conclude the article by describing promising options for experts that find themselves engulfed in controversial expert-driven sustainability policies.

2. From science distorted by media to routine engagement with media

It is not at all a new phenomenon that the authority of scientific expertise is contested. Gieryn (1983), in his classic study of boundary work performed by scientists, shows how much effort is invested by experts themselves in distinguishing between what should and should not be within the sphere of their autonomous power. Under boundary work, Gieryn (1983) subsumes the scientists' 'attribution of selected characteristics to the institution of science (i.e., to its practitioners, methods, stock of knowledge, values and work organization) for purposes of constructing a social boundary that distinguishes some intellectual activities as "non-science"' (p. 782). With science being a powerful force in modern societies, however, the boundary between science and non-science is constantly crossed – hence the need for explicit and declarative attributions. In what follows, we discuss science communication's role in the destabilisation of boundaries around research-based expertise, before we move on to the question of possible framings of expert authority and legitimacy in the next part.

Boundary crossings that are related to science communication have been described using different theoretical tools, which themselves engage in boundary work. First, there is an approach in which the underlying assumption is that forces from the outside distort science and technology. In its purest form in relation to science communication, this perspective was theorised by Weingart and his colleagues. Modern societies, they argue with Luhmann (1995), are differentiated in distinct social systems that are 'autonomous in the sense that they are defined by their respective operating codes, in the case of science it is truth' (Weingart, 2012: 25). Media is a system with a different operating code, which according to Luhmann (2000) is 'information/noninformation'. Once this fundamental difference is stated – the boundary is established – the 'resonances' and 'irritations' between the different 'codes' can be studied. Put into a historical frame, this perspective expects more resonance and irritation when media's impact on other 'subsystems' grows. Consequently, Rödder and Schäfer (2010: 251) refer to Weingart's (2012) diagnosis of a 'loss of distance' between science and society that is visible in the degree of scientists' work being mediatised. Studying particle physics and genome research, they found that especially during phases of routine operation, the formative influence of the media on science was weak and restricted to very few highly visible scientists.

A very different perspective on the crossings between expertise and what lies outside it in relation to science communication follows from a perspective on science in which an *a priori* boundary between science and society is rejected. Such a stance is for instance represented by Esa Väliverronnen (2001) – who based on his empirical study of scientists' various engagements with media – argues against the view that places media-related activities outside the 'actual' scientific work. Instead, he found different media-related roles for scientists, namely as populariser, interpreter, adviser/advocate, promoter/manager and critic. These roles, he maintains, are not to be understood as media trespassing into the domain of actual science but rather as part of science as social activity: an activity that is diverse and enacted using a wide array of media technologies.

One obvious difference between Rödder and Schäfer (2010), on one side, and Väliverronnen (2001), on the other side, is which kind of research-based expertise they study. Väliverronnen has interviewed environmental researchers that have already performed their expertise in 'hybrid fora' where concerned groups meet science (Callon et al., 2011; Yearley, 1991). Here,

boundaries between science and non-science have been porous from the start and empirical evidence suggests that scientists feel a personal responsibility towards contributing to mitigating measures, such as in the case of climate science (Getson et al., 2021). Rödder and Schäfer's physicists and genome researchers and their doings are traditionally hidden away in heavily guarded laboratories not only from journalists' eyes but also from everyone – at least during routine phases of scientific work. Environmental research has elevated the 'resonances' from something being outside routine science into an integrated part of research-based expertise, which poses completely different demands on experts' ability to perform their expertise. Väliverronnen found that scientists *themselves* draw a line between those communication activities in which they first represent their scientific expertise, for example, as popularisers and instances in which they perform media work as advocates. Thus, Gieryn's observations regarding the importance of boundary work for scientific expertise apply also here. At the same time, when asked about which roles the scientists in Väliverronnen's study preferred, they usually mentioned combinations. Thus, they embrace the need to draw boundaries between different roles as experts themselves on a case-by-case basis.

3. Media frames of the authority of research-based expertise

Despite their differences regarding assumptions about boundary work between expertise and non-expertise, Rödder and Schäfer (2010) and Väliverronnen (2001) share the perspective that engagement with media is related to a crisis of legitimacy of scientific expertise. Väliverronnen's environmental researchers are presented as being under heightened public scrutiny for receiving large sums of funding to solve a specific environmental problem. This underlying need to justify their work in front of the public corresponds to the shorter periods in which Rödder and Schäfer's particle physicists and genome researchers were forced to engage in 'crisis communication' to counter criticisms of their work.

Increased engagement with media as response to societal demands for justification – which is one of the six motivations for science communication gathered among scientists by Davies (2021) – introduces the topic of media framings into the larger question of the societal role of expert authority.

Classic science communication a la Bodmer report (The Royal Society 1985) assigned TV and radio central roles as channels that reaffirmed science's authority and benevolent influence on society. Tellingly, expert authority in these cases was more implicated than explicitly framed through academic title or institutional affiliation. Experts were framed as source of truth by the mere attribution of being a scientist.

Fast forward to the present, where media channels have proliferated, it is much more obvious that characteristics of the channels used will affect the authority of research-based expertise, and can both increase and decrease trust in science (Hmielowski et al., 2014). Drawing on the literature on media framing, we can distinguish among issue specific frames, that can only be found in specific controversies, for instance, framings that confirm or dispute climate scientists' credibility, and generic frames that present scientific expertise as more or less trustworthy (De Vreese, 2005). Research points to the existence of such generic framings on national levels, for example, related to general scientific literacy in the population (Noy and O'Brien, 2019). Indeed, a group of media recipients that was completely dismissive of the scientific evidence for climate change identified for the United States was not found in Germany (Metag et al., 2017). In addition to national contexts, Lachapelle et al. (2014) have found a connection between general world-views and how media messages on expert authority are received.

Given the reasonable assumption that scientists know their engagement in decision-making is risky, be it because of the existence of negative issue specific framings of their expertise or because of more generic framings, we could assume that they do not engage in situations of high potential conflict, which is exactly what Besley et al. (2018) have found. While this is also in line with how Rödder and Schäfer interpret their scientists' engagements, with the scientists described by Väliverronnen we meet another kind of expert who sees the skilful engagement also in highly polarised settings as part of their role as researcher. Correspondingly, Sharman and Howarth's (2017) climate scientists engaged in debates because of intrinsic motives such as a deeply felt desire to protect nature. These motivations were stronger than the fear of losing scientific legitimacy by engaging in public debate with non-experts who attack their scientific authority. This option, in which public engagement becomes one of the services scientists deliver to society as part of their academic citizenship (Macfarlane, 2007) is largely uncontroversial as long as it is understood as knowledge dissemination. It becomes much more demanding, the more polarised the debate around an issue is and can in the 'porous and fluid' spaces of current media landscapes (Bucchi, 2017) quickly turn against the scientist as person. Media framings of expertise and scientific authority in this context become a major problem for the individual scientist as well as for science as institution in society, and can – if sound solutions to problems are ignored – aggravate societal and environmental crises.

Summing up this and the previous part, we have seen that boundary work that establishes what accounts as scientific expertise is as old as scientific expertise itself. Scientific authority in this sense is always contested and precarious. Particularly in science that engages with environmental questions, this boundary work has from early on involved engagement with media as part of their routine work. This engagement, however, risks being subject to framings that are about the core of scientific practice: its claims of authority based on its superiority over other forms of knowledge production. Both in general political polarisation and in specific situations of societal controversy, this risk is particularly high leaving scientific expertise in a weak position. The question arising from this line of reasoning is: How can scientific expertise engage productively in controversies without weakening its very base?

Based on the assumption that trends described here will rather gain in strength than subside, in this article, we have analysed a specific example that presents options of the framing of expert authority asking:

> Which print media representations of research-based expertise were present in the expert-led, controversial and ultimately successful introduction of a strict energy standard in Norwegian building regulations?

Based on this case, in which research-based expertise has engaged in a public controversy without obvious damage to expert authority, we pursue two aims. First, we contribute to the discussion of the relation between science communication and the authority of research-based expertise. Second, we add a specific media frame of expertise, which we call 'home-story', to the toolbox of scientists who wish to perform their academic citizenship in relation to environmental solutions.

4. Background and method

In 2005, the first Passive House building – a building that in principle was so well insulated that it did not need active heating or cooling, hence 'passive' – was built in Norway. Soon after, the principles of Passive House construction caught the attention of building researchers and policy makers, as a cost-efficient solution to achieve greenhouse gas emission reductions (Müller and Berker, 2013). Already in January 2008, the so-called 'climate agreement' – a white paper put forward by

the government – proposed to make the Passive House standard the technical requirement for new dwellings by 2020, and in June 2009, the government's Low Energy Committee suggested an even earlier date. However, the focus on Passive Houses, that excluded different approaches from the table of negotiations, ended up in a heated debate targeting the robustness of the Passive House concept. In April 2012, a new white paper 'Norwegian Climate Policy' promised that the technical requirements attached to the building code would be sharpened to Passive House level by 2015 and to nearly zero energy building by 2020. The white paper encouraged in this way the early introduction of Passive House as technical requirement, but at the same time concessions were made to the opponents of the Passive House as preferred solution, by specifying that a Passive House 'level' should be reached, and not the Passive House 'standard'. In this way, alternative energy efficient solutions that achieve equal energy performance were still possible. In 2016, new energy demands for new buildings were made mandatory (after a grace period of 12 months) which translated the Passive House 'level' into the requirement of not surpassing the annual energy demand of a Passive House.

In 2005, Norway's political and scientific efforts to reduce building energy consumption through advanced building technologies and concepts trailed other countries, such as Sweden, Germany and Austria. At this time, energy efficiency in Norwegian homes was mainly a matter of water saving shower heads ('sparedusj') heavily promoted by the Norwegian state – without lasting effect, and of subsidies for (mostly air-to-air) heat pumps whose track record is doubtful (Halvorsen and Larsen, 2013). That a very ambitious building energy efficiency standard went from zero to law in 11 years is remarkable and is due to a large number of initiatives, both of individuals, environmental non-governmental organisations (NGOs) and public authorities. This transition is even more impressive if one knows that some of the first projects with high energy ambitions in Norway were not exactly successful – which is to be expected when solutions are implemented for the first time. Moreover, a public controversy around making Passive House levels mandatory erupted around 2010, after the plans to do so were published. The 5 years around this controversy are also the main time period where media coverage of low energy and Passive House buildings increased dramatically and which we have studied empirically.

The articles used in our analysis were published in Norwegian newspapers between 2005 and 2012 and collected through the online database Retriever. We selected the services provided by Retriever, which indexes the major Norwegian daily newspapers, regional newspapers and most magazines, journals and periodicals. It contains both online newspapers and printed issues as scans and in full text. We used the online archive to search the articles that address concepts of low energy building in all Norwegian publications indexed by Retriever.

Our search terms were 'lavenergi bygning' ('low energy building'), 'passivhus' ('passive house'), 'aktivhus' ('active house', which was presented as alternative to passive houses), 'plussenergihus' ('plus energy house'), 'nullenergihus' ('zero energy building'), 'nullutslippshus' ('zero emission building'), and 'BREEAM'.[1] These terms were extracted from experts' reports, policy makers' strategic plans and political programmes. They cover not only the Norwegian innovation strategy towards more sustainable buildings but also the European trend within the time period analysed. We left out other concepts, such as 'green building' or 'ecological building' that did not enjoy equally broad political support in Norway and were, thus, not part of the success story analysed here.

For our analysis of the concepts' treatment in online and printed media, we did not select specific newspapers as we lacked data on actual user engagement with the individual publications that could have been used to weight or select. In the resulting corpus, we found three kinds of publications: large general audience newspapers (such as Dagbladet), specialised publications (such as the publications circulated among professional organisations, e.g. Teknisk Ukeblad) and regional

newspapers (e.g. Adresseavisen). In the analysis, we did not differentiate between these types of publications even though they have different reach and audiences. Looking for different options for how expert authority can be framed in situations of societal controversy, we were less interested in distinguishing between different framings in specific media channels or in what they each do to Norwegian society, than in detecting the existence of different salient exemplars of framing and their relation to different images of scientific authority. In this sense, we address framings as networked (Borah, 2018) across the boundaries of specific media channels, which in one case even included a long-running semi-public email exchange between experts that entered the analysed material through a series of articles in different newspapers.

From the initial 2,338 articles, we deleted the articles that were obviously irrelevant and duplicates – which were also found across different newspapers, for example, marginally altered texts from news agencies and press releases. We then manually coded the remaining 1774 articles employing an open coding strategy and grouped the codes in larger categories. The codes developed during the analysis, in this way identifying the topics and actors as they appeared in the articles, but our focus was on 'the presence or absence of certain keywords, stock phrases, stereotyped images, sources of information and sentences that provide thematically reinforcing clusters of facts or judgments', which according to Entman's (1993: 52) frequently quoted description characterises media framings. Coding was conducted by the second author as part of her PhD thesis on sustainable buildings in Norway, who discussed the coding strategy extensively with the first author, who also acted as her PhD supervisor. While the material was in Norwegian, we used codes in English language, and when we present the findings below, we use our own translations.

In a first step, we analysed which actors were featured in the articles, which confirmed the paramount significance of scientific expertise in the media reporting. We then analysed the material through close readings that were aided by our codes using the tool QDA Miner. In this way, the link between the code and the actual text was kept intact at all times so that both authors could go back and forth between these two levels, confirming or adjusting the codes according to our discussions.

5. Findings

Following the research question, we focus in our presentation of observations on the ways that scientific expertise is framed in relation to the new technology and its potential benefits and problems.

Experts as pioneer users

The material analysed here extends over 8 years, and most of the technological solutions have an even longer history (the first Passive House was built in 1991 in Germany). However, in the analysed corpus, the solutions are exclusively presented as something very new, even revolutionary. Individual building projects, even if they might be considered use of mature technology in a European context, are labelled as 'pilot' or 'flagship'.

A series of newspapers, for instance, report on a building built close to Stavanger in 2011 using headlines that describe it as 'The building of the future that has already arrived'. Based on a feature article from the national press agency NTB (8 September 2012), these reports underline that this building 'can produce 17% of its energy consumption' and focus on the fact that the 'energy that the family does not use is sent directly on the open energy market to be sold'. As technical claim, in 2011, this is not an extraordinary achievement and could be seen as a distortion of scientific rationality as described earlier.

A closer look at the articles, however, presents a more nuanced picture. Far from being a scientific treatise, they rather bear traits of a 'home-story', presenting a regular family consisting of Oluf Langhelle, Trude Hammer Langhelle and their teenage children and their daily life in the 'futuristic' building, illustrated by visual material depicting the family engaged in interaction with the building. As such the mundane world of everyday domesticity in which the energy consumption is so much less present than, say, the immediate experience of a long, hot shower (Berker, 2013), is contrasted with the fantastic technology that they live in. The connection between 'everyday home' and 'groundbreaking innovation' is made directly in a quote by one of the occupants:

> We are very interested in questions related to the environment and we wanted to reduce our use of fossil energy. However, we do not have to give up something to live here. (Haugesunds Avis, 23 August 2012)

In fact, the person quoted here, Oluf Langhelle, is not only 'interested', he is a professor at the University of Stavanger with sustainable development as one of his main research topics and, thus, qualifies as an expert even though he is presented as regular – yet pioneering – home owner.

If we look at reports about other low energy buildings, the presentation of experts in 'home-stories' as regular users is common. Experts – often architects living in their own low energy building – are then typically presented with the whole family, engaged in cooking and relaxing and expressing emotions. The increased comfort, the environmental benefits and the cosiness, but also the reduced maintenance costs are a common thread in the stories told in conjunction with images of experts sitting in their sofas enjoying the comfort of their home.

Users of the new buildings are not always presented like this. There is also the sub-genre of disgruntled and disappointed victims of empty promises. If, however, the users are scientists or researchers, the pioneering aspect dominates the presentation. In these cases, the occupants are presented as pioneers who enjoy being surrounded by the new technology, and as able to easily master the 'buildings of the future'. The degree to which expert status is mentioned varies. The Langhelles, for instance, are introduced as a regular 'family of four'. However, if the experts are architects or engineers, we are usually informed that they have designed the buildings themselves. The most prominent example here is architect Stein Stoknes' home in Oslo, which generated a series of news stories from its inception to its use phase, which spans the whole period reported on here.

These accounts of users and user experiences with the various concepts of low energy buildings normalise the new home, the home of the future, presenting the concepts as already tested, already existing ('already here'). In these cases, the concepts are neither a cryptic technical standard supported or contested by occupants or experts nor a part of a policy initiative. The dwellings become homes with occupants willing to share their personal reasons and personal experiences.

Engagement in controversies

Despite the image created so far where experts as pioneering users evoke a largely unproblematic image of an exciting, but safe, new technology, in the analysed corpus there are voices that distrust the impact of the pilot projects, claiming that the increased investments do not lead to the expected results.

These stories in which research-based expertise intervenes in controversies fall into two categories: resistance against specific construction projects and general resistance against Passive House buildings. Two specific projects that feature in more than 100 newspaper articles[2] address both specific and more general questions related to their implementation.

Specific projects. Experts exposing themselves to become part of media framings of specific construction projects can expect to be drawn into larger public quarrels around architecture and urban planning – which is not uncommon at all in large, highly visible projects – be they sustainable or not (Yaneva, 2009). Two of the most widely covered projects within the material analysed here are Powerhouse One, which is now known as Powerhouse Brattørkaia, and the Brøset residential area, both located in Trondheim. Both involved researchers from NTNU and Sintef in central roles and both became object of a public and widely mediatised controversy.

Powerhouse One was planned as the world's northernmost zero emission building. Despite being backed by a partnering initiative, called Powerhouse Alliance, involving among others a large public property owner (Entra), one of Norway's most prominent architecture office (Snøhetta), a large construction firm (Skanska), an influential environmental NGO (Zero) and the central research institutions in Norway, the project was stopped in 2013 by the municipal government after growing political resistance against the specific shape of the building, its location (potentially blocking the view to the fjord) and particularly the fact that it was planned taller than allowed by local regulations for this particular area. Despite this episode, the consortium gathered enough political support to finish the project (see Berker and Larssæther, 2016).

The second case is the development of a low energy neighbourhood, the widely publicised Brøset project. Carried by a close collaboration between the municipality and a research project (Gansmo, 2012), Brøset was planned to involve low energy buildings, increased public transport, and experiments in sustainable lifestyles. Moreover, this project met broad resistance, with the main argument brought forward by politicians and real estate agents that the plans would lead to undesirable population density in the area and that the urgently needed development of new buildings should not be burdened by ambitious environmental goals.[3]

It was a clear characteristic for low energy building experts' involvement in both Powerhouse One and Brøset that they intervened only cautiously and if they entered the media then they preferred to have as much control over the framing as possible. In the material, we find two ways researchers achieved this. First, they chose frequently the genre 'kronikk'. A 'kronikk' bears traits of both the American op-ed and the feature story and is an open space reserved for a longer text often written by experts about their topic of expertise, which can be found in many Scandinavian newspapers. It is longer than the op-ed, but it shares the characteristic that it is written by someone outside the newspaper's staff (see also Howell, 2010: 272). A genre expectation for a 'kronikk' is that it refers to a topic relevant for current societal discussions, but that it shows clearly that it is rooted in research-based expertise. In line with this expectation, in our case the interventions were not necessarily always in favour of the projects. In the case of Powerhouse One, for instance, a professor employed at NTNU's architectural faculty but not involved directly in the work with this building argued using the site for an art museum instead (Adresseavisen, 27 April 2012). Arguing in favour of high environmental aims for the Brøset area, three university researchers wrote a 'kronikk' that directly addressed the critics of the project explicitly referring to their research (Adresseavisen, 9 November 2011). The other way of controlling the framing was particularly obvious in the case of Powerhouse One. As Berker and Larssæther (2016) show in detail, media framings were tightly controlled through a public relations (PR) strategy orchestrated by the Powerhouse Alliance in which scientists featured prominently.

Public controversy. Within a second kind of controversy, which is less bound to a specific construction project and more general in nature, we found that specific experts took sides also outside the protected space of a PR strategy or a 'kronikk'. One example from the material that represents this kind of expert involvement is a discussion around whether Passive House buildings are a good way forward given the harsh and moist Norwegian climate.

A widely reported case of research-based expertise in Norwegian newspapers had its roots in an expert discussion that originally was not performed publicly but through a series of emails – that later were compiled into a document and circulated widely. When this exchange started (30 April 2010), two of the participants published an article that was critical of Passive House buildings and their tightly insulated building envelope. They argued that a more holistic approach might very well show that many small improvements on traditional methods are superior in terms of the overall environmental impact than to roll out Passive House buildings on a grand scale (Miller and Nordby, 2012). This text was originally published in the journal of the National Association of Norwegian Architects, and 3 months later republished in abbreviated form in the form of a 'kronikk' in the weekly periodical Morgenbladet that addresses a broad (yet mostly academic) public. Another participant in the email exchange, a physician from the Norwegian Labour Inspection Authority (arbeidstilsynet), Jan Vilhelm Bakke, first appeared prominently as Passive House critic in an article published by Teknisk Ukeblad, the magazine of the biggest association of Norwegian engineers, and has since then been widely cited by regional and national press. His critique was less architectural and more directed towards unknown health effects of tight building envelopes – especially if moisture becomes a problem due to Norwegian craftsmen making mistakes. The original article sparking this part of the debate, which was published on 11 October 2010, was written by a journalist, Joachim Seehusen, who referred to the aforementioned semi-public email exchange as source. Among the defenders of the Passive House concept, the engineer Tor Helge Dokka took the lead. He was first quoted in Teknisk Ukeblad and then in almost every newspaper article that took up the topic. This engineer, who is the individual expert with the most mentions in our material, later moved from a research institute to a construction company, a move that was repeated by a small group of other highly visible researchers that feature in our material as ardent proponents of the Passive House buildings as the future of sustainable construction.[4]

This case exposes a pattern in which a dispute between experts is first started in a publication mostly read by experts from one discipline (i.e. the members of a professional association) and is then carried further to a broader audience. First, the scientific dispute crystallised in a semi-public forum (email discussion). Then, a journalist, who based on this created a story, led to the only instance in the material where sustainable buildings became close to be a major news story that was present in virtually all media outlets. The original article starting this process, written by Seehusen (Teknisk Ukeblad, 10 November 2010), was titled, 'Passive house is technological hubris' and starts with the ingress, 'It is maintained that passive houses are both bad for the occupants health and that they do not reduce CO2 emissions. New rules are criticized heavily [our translation]'. This was also how the majority of all the articles belonging to this set of observations were framed and show that the background of 'new rules' which alluded to 'Passive House levels' as part of the new building code created an image of the arrival of 'The building of the future' as something that was not as easily controlled as was presented in the reports of expert-users. In terms of framings of expertise, this part of the Norwegian Passive House story shows how scientific controversy gradually moved from fora in which building researchers controlled the framing into widely distributed print media, where the framing revolved around questions of trust in technology ('technological hubris') and health. Both topics were not at all within the expertise of the involved building researchers, and indeed, only a small subset of the experts participating in the original controversy persisted and fought for the scientific and practical soundness of Passive House buildings in Norway.

6. Discussion

The terms associated with low energy buildings in the time period studied here were in all instances framed by research-based expertise that referred to the future, that involved itself in public

controversies, that spoke on behalf of specific projects and that sought the controlled space of 'kronikk' to argue for research-based solutions. Based on the material, we do not know how the experts experienced these exposures. However, we are now able to describe the dominant ways in which research-based expertise was framed, answering this article's research question. In what follows, we discuss what we have learned about the different ways of framing expert authority on behalf of an environmentally friendly solution.

A first role for research-based expertise emerged in the cases of actual implementations of low energy buildings in building projects. The preference particularly among university researchers to choose a specific genre – the 'kronikk' – shows that in these cases the wish for control was particularly high, which is in line with Besley et al.'s (2018) findings. Of the three distinct forms of representation that were found, reasoning in the safe space of 'kronikker' was the one that was closest to traditional forms of expert-led dissemination of scientific findings. In terms of support for environmental technologies in polarised settings, however, the well-tempered reasoning of experts is in danger of being read as partisan intervention, which in turn would weaken expert authority.

The second group of representations of research-based expertise that was found was closest to the 'resonances' and 'irritations' described by Rödder and Schäfer (2010): some highly visible low energy building experts engaged actively in a public controversy. We have described the trajectory of this involvement, which started supported by the new porous and fluid media landscapes (Bucchi, 2017) in a semi-public email exchange between experts. It is notable that the experts who were most visible in this controversy and followed its trajectory from its semi-public start to national publicity were associated with applied forms of research. Later, that is, after the period reported on here, these experts moved from applied research to working for industry actors that benefitted from stricter mandatory energy demands in new buildings. This shows how close applied research in the cases described here was to industrial research, in which Mertonian norms are abandoned in favour of specific and proprietary problem solving (Ziman, 1987: 128, 2000: 78). It is a common sentiment in the 'close community' of Norwegian building research (Guy and Shove, 2000) that applied researchers like Tor Helge Dokka have performed a key role in the success story of radically reduced energy consumption levels in Norwegian buildings.

Finally, there was what could be called a 'fictive implementation' in 'home stories' in which experts featured as pioneering users. Here, we encountered experts from both applied and university research as popularisers and interpreters, very much in the sense of Väliverronnen (2001). Experts and their expertise played a key role in almost all newspaper representations of low energy buildings. When they were presented as users, however, they acquired framings that were not related to their primary expertise, which sometimes not even was mentioned. Media representations in these cases transformed them into peers of the audience. They were not presented as experts with distinct knowledge, but as 'one of us' transforming low energy buildings from the unknown to the known and familiar. The literature on domestication of technology (Berker et al., 2005; Silverstone and Haddon, 1996) has described how new technologies are embedded in everyday life through a gradual removal of their 'foreignness'. The 'home stories' found here clearly participate in such a domestication of a technology that initially threatens to transform people's homes. Representing an alternative to cautious engagement and fight, the seductive performance of research-based expertise in 'home stories' weakened boundaries between research-based expertise and non-expertise in a distinct way: It enrolled the evidence of an example (the home of the expert) to create common ground between experts and audience around the topic of the good domestic life of the future. In this way, not only the building became something to aspire to but also the life of the experts. Obviously, a carefully crafted home story hides as much as it reveals. As a form of framing of research-based expertise, however, this surprising appropriation of a genre, which is usually reserved for celebrities, was the ideal vehicle to convey that experts trust research to a degree that they are happy to expose themselves and their family to its outcomes.

This study has two important limitations. First, we only studied print media and their online media offers, and second, we did not follow the call for analysing production and reception of media frames (e.g. Hansen, 2011), for instance, by interviewing audience, experts or journalists.

The first limitation introduces a bias towards textual and publicly accessible representation in one-to-many publications. This bias is somewhat moderated by the part of our analysis in which we conducted close readings of articles which included the interpretation of images. Still, like in other instances of studies of public representation of science (e.g. Schäfer, 2012), the bias exists and is reinforced by our mode of analysis.

The second limitation – the focus on the representation instead of the processes that lead to the representation and are influenced by it – does not introduce a bias, but it restricts the scope of our account to leave out what scientists do when they navigate polarised issues. We have no information about how the texts came to be, nor do we have information on how they are read and what they then 'do'. What remains is a focus on the representations themselves – the low energy buildings and their experts that exist as stories, descriptions, images or conspicuous absences in Norwegian print media between 2005 and 2012. It is reasonable to assume that the frequent use of scientific experts as source of the articles – which in itself represents a framing by frequency – allows journalists to cover a topic that they themselves know little about but which they assume is relevant for their audiences. Such constraints and mechanisms of daily text production, which it has been argued are important drivers for media framing (Gitlin, 1980), are outside the scope of the analysis. Instead, the framings as such are made relevant by the fact that they were part of an instance where environmental expert advice despite considerable societal controversy in fact led to strict and binding laws affecting virtually every Norwegian.

7. Conclusion

The success of Passive House energy performance levels becoming the law for new buildings in Norway depended on many factors. Norway scores consistently high in measures of trust in government (Organisation for Economic Co-operation and Development (OECD), 2022), and regularly comes out at the top in the UNDP (2020) human development index, which includes among many others indicators relating to literacy and education. Measures like these describe an environment which can be expected to provide support for research and its contribution to society. In the specific case of strict energy demands in a new building code, research-based expertise was involved on many levels. Researchers and scientists wrote standards, developed and tested solutions, and tried actively to convince stakeholders and decision makers of the feasibility of radically reduced energy consumption. Based on the newspaper reporting, we found no single, skilful reassertion of expertise when Passive House buildings became object of a societal controversy. However, in the combination of cautious reasoning, fighting and seduction with a division of labour between different kinds of research-based expertise, an array of media framings was present in the material that arguably contributed to this sustainable change. Of these three options, the 'home story' kind of seduction stands out as a representation of research-based expertise that has not been described in research on science communication so far. Presentation of hero-scientists in media is by no means new, as for example the annual rituals around the Nobel Prize show (Fahy, 2018). In the instances encountered here, building experts were part of a more humble but still attractive package. This indirect framing of expert authority, which complemented the other forms of representation, should also be possible in other areas of expert-led environmental policy, particularly if it involves changes to everyday practices. It presupposes that experts not only are ready to present themselves as living what they preach but also that they are recognisable as 'one of us', that is, the distance between the carriers of research-based expertise and the rest of society does not

become impossible to bridge. The potential of this form of representation, thus, is that it presents not only environmental solutions as feasible and trustworthy but also the experts themselves who produce research that leads to these solutions.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors received financial support for research, authorship and publication of this article from The Norwegian Research Centre on Zero Emission Buildings (ZEB) and the FME Research Centre on Zero Emission Neighbourhoods in Smart Cities (FME ZEN).

ORCID iDs

Thomas Berker https://orcid.org/0000-0002-8117-0700
Liana Müller https://orcid.org/0000-0003-4571-7593

Notes

1. The sustainable building standard that has been adopted by the Norwegian construction industry as BREEAM-NOR.
2. There were two more projects that were mentioned in more than 100 articles, but their coverage was either unrelated to their environmental ambitions (Vestre Goa) or they did not mention expert-based expertise (Skadbergbakken).
3. In 2020, it became clear that the project would be never realised as an environmental pilot project, mainly because the property owners – despite being public entities – could not agree on support for the planned environmental ambitions.
4. These researchers were also involved in other related controversies, for example, the question of the additional cost caused by Passive House construction and a discussion of the feasibility of new district heating networks when buildings dramatically reduce their heating demand.

References

Albrecht F and Parker CF (2019) Healing the ozone layer: The Montreal protocol and the lessons and limits of a global governance success story. In: 't Hart P and Compton M (eds) *Great Policy Successes*. Oxford: Oxford University Press, pp. 304–322.

Berker T (2013) 'In the morning I just need a long, hot shower': A sociological exploration of energy sensibilities in Norwegian bathrooms. *Sustainability: Science, Practice, & Policy* 9: 57–63.

Berker T and Larssæther S (2016) Two exemplar green developments in Norway: Tales of qualculation and nonqualculation. In: Rydin Y and Tate L (eds) *Actor Networks of Planning*. London and New York, NY: Routledge, pp. 95–110.

Berker T, Hartmann M, Punie Y and Ward K (2005) *Domestication of Media and Technology*. London: Open University Press.

Besley JC, Dudo A, Yuan S and Lawrence F (2018) Understanding scientists' willingness to engage. *Science Communication* 40(5): 559–590.

Borah P (2018) Addressing theoretical and methodological challenges of doing news framing analysis in the contemporary media landscape. In: D'Angelo P (ed.) *Doing News Framing Analysis II*. New York, NY: Routledge, pp. 168–188.

Bucchi M (2017) Credibility, expertise and the challenges of science communication 2.0. *Public Understanding of Science* 26(8): 890–893.

Callon M, Lascoumes P and Barthe Y (2011) *Acting in an Uncertain World: An Essay on Technical Democracy (Inside Technology)*. Cambridge, MA: MIT Press.

D'Angelo P, Lule J, Neuman WR, Rodriguez L, Dimitrova DV and Carragee KM (2019) Beyond framing: A forum for framing researchers. *Journalism & Mass Communication Quarterly* 96(1): 12–30.

Davies SR (2021) An empirical and conceptual note on science communication's role in society. *Science Communication* 43(1): 116–133.
De Vreese CH (2005) News framing: Theory and typology. *Information Design Journal* 13(1): 51–62.
Entman RM (1993) Framing: Toward clarification of a Fractured paradigm. *Journal of Communication* 43(4): 51–58.
Fahy D (2018) The Laureate as celebrity genius: How scientific American's John Horgan profiled Nobel prize winners. *Public Understanding of Science* 27(4): 433–445.
Gansmo HJ (2012) Municipal planning of a sustainable neighbourhood: Action research and stakeholder dialogue. *Building Research & Information* 40(4): 493–503.
Getson JM, Sjöstrand AE, Church SP, Weiner R, Hatfield JL and Prokopy LS (2021) Do scientists have a responsibility to provide climate change expertise to mitigation and adaptation strategies? Perspectives from climate professionals. *Public Understanding of Science* 30(2): 169–178.
Gieryn TF (1983) Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists. *American Sociological Review* 48(6): 781–795.
Gitlin T (1980) *The Whole World Is Watching: Mass Media in the Making and Unmaking of the New Left*. Berkeley, CA: The University of California Press.
Guy S and Shove E (2000) *The Sociology of Energy, Buildings and the Environment: Constructing Knowledge, Designing Practice*. London: Routledge.
Halvorsen B and Larsen B (2013) *'Hvem eier varmepumpe og hva gjør det med energiforbruket?' [Who owns a heat pump and how does ownership affect energy consumption?] 2/2013 Økonomiske Analyser*. Oslo: SSB.
Hansen A (2011) Communication, media and environment: Towards reconnecting research on the production, content and social implications of environmental communication. *International Communication Gazette* 73(1–2): 7–25.
Hmielowski JD, Feldman L, Myers TA, Leiserowitz A and Maibach E (2014) An attack on science? Media use, trust in scientists, and perceptions of global warming. *Public Understanding of Science* 23(7): 866–883.
Howell S (2010) Norwegian academic anthropologists in public spaces. *Current Anthropology* 51(Suppl. 2): 269–277.
Lachapelle E, Montpetit É and Gauvin J-P (2014) Public perceptions of expert credibility on policy issues: The role of expert framing and political worldviews. *Policy Studies Journal* 42(4): 674–697.
Luhmann N (1995) *Social Systems*. Stanford, CA: Stanford University Press.
Luhmann N (2000) *The Reality of the Mass Media*. Stanford, CA: Stanford University Press.
Macfarlane B (2007) Defining and rewarding academic citizenship: The implications for university promotions policy. *Journal of Higher Education Policy and Management* 29(3): 261–273.
Merton RK (1938) Science and the social order. *Philosophy of Science* 5(3): 321–337.
Metag J, Füchslin T and Schäfer MS (2017) Global Warming's Five Germanys: A typology of Germans' views on climate change and patterns of media use and information. *Public Understanding of Science* 26(4): 434–451.
Miller F and Nordby AS (2012) Miljøparadokser i Byggebransjen. *Arkitektur N* 3: 34–39.
Müller L and Berker T (2013) Passive house at the crossroads: The past and the present of a voluntary standard that managed to bridge the energy efficiency gap. *Energy Policy* 60: 586–593.
Noy S and O'Brien TL (2019) Science for good? The effects of education and national context on perceptions of science. *Public Understanding of Science* 28(8): 897–916.
Organisation for Economic Co-operation and Development (OECD) (2022) Trust in government (indicator). Available at: https://data.oecd.org/gga/trust-in-government.htm (accessed 9 February 2022).
Rödder S and Schäfer MS (2010) Repercussion and resistance: An empirical study on the interrelation between science and mass media. *Communications* 35(3): 249–267.
Schäfer MS (2012) Taking stock: A meta-analysis of studies on the media's coverage of science. *Public Understanding of Science* 21(6): 650–663.
Sharman A and Howarth C (2017) Climate stories: Why do climate scientists and sceptical voices participate in the climate debate? *Public Understanding of Science* 26(7): 826–842.

Silverstone R and Haddon L (1996) Design and the domestication of information and communication technologies: Technical change and everyday life. In: Mansell R and Silverstone R (eds) *Communication by Design: The Politics of Information and Communication Technologies*. Oxford: Oxford University Press, pp. 44–74.

The Royal Society (1985) *The Public Understanding of Science*. London: The Royal Society.

UNDP (2020) The 2020 human development report. Available at: https://hdr.undp.org/sites/default/files/hdr2020.pdf (accessed 9 February 2022).

Väliverronnen E (2001) Popularisers, interpreters, advocates, managers and critics: Framing science and scientists in the media. *Nordicon Review* 22(2): 39–48.

Weingart P (2012) The lure of the mass media and its repercussions on science. In: Rödder S, Franzen M and Weingart P (eds) *The Sciences' Media Connection – Public Communication and Its Repercussions*. New York, NY: Springer, pp. 17–32.

Yaneva A (2009) *The Making of a Building: A Pragmatist Approach to Architecture*. Bern: Peter Lang.

Yearley S (1991) *The Green Case: A Sociology of Environmental Issues, Arguments, and Politics*. New York, NY: HarperCollins Academic.

Ziman JM (1987) *An Introduction to Science Studies: The Philosophical and Social Aspects of Science and Technology*. Cambridge: Cambridge University Press.

Ziman JM (2000) *Real Science What It Is and What It Means*, 1st edn. Cambridge: Cambridge University Press.

Author biographies

Thomas Berker is a professor in science and technology studies. His main research area is social studies of technology use and sustainable innovation.

Liana Müller was a PhD student funded by the Norwegian Research Centre on Zero Emission Buildings until 2014. Her research interests are sustainability in buildings, building laws and regulations, and media communication of technology.