

NORDIC BUILT

ACTIVE ROOFS AND FACADES IN SUSTAINABLE RENOVATION

INTERVIEW REPORT

GREEN BUILDING CERTIFICATION SYSTEM IN THE NORDICS

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Gate 21

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Active Roofs and Facades in Sustainable Renovation



Work Plan 2: Evaluation methods for sustainable renovation

Task 1: Interviews - green building certification systems in the Nordics

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1 Background

This subsection of the report includes interviews with relevant stakeholders in the Nordic building industry to determine the current state of the market, including:

- Understanding the stakeholders' challenges, goals, and driving values with respect to green building certifications.
- Interviewees should also be asked about specific green building strategies that they think work best in their country, and which ones are not well suited. This will help inform our compliance strategy for each country.
- Summarize the key goals, values, barriers, and overall impressions about certifications, from the perspective of the builders and property owners interviewed. Including discussions of renovation projects.

2 Interview Questions

The interviewer (Emma Liisberg of Gate 21) guided the discussion / interview. The following questions were used, where appropriate. They were revised or augmented as required to maximize the information and value obtained. Not every question was asked in each interview, since in some cases certain questions may have already been answered in a previous response.

1. Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovation projects (The primary and secondary certification systems will all be listed, and a scale will be presented so that the interviewee can select their experience level for each).
2. What is your assessment of specific certification systems' strengths and weaknesses in your specific case?
3. What kind of support or tools would make it easier for you to meet the requirements of certifications?
4. How did the choice between certification systems come about?
5. What were your goals and purposes of choosing a specific certification system?
6. Are there specific conditions in your country that had influence on your choice?
7. Are there specific green building strategies that you think work well in your country? Or others that don't work well? And Why?

3 Interviewees (interviewed stakeholders)

The following persons have been selected for interviews:

Country	Interviewee, position, and organization
Sweden	<ul style="list-style-type: none"> - Emma Karlsson, WSP. - Olof Andersson, a smaller private property owner. - Susanne Rickardsson, head of the property owners' organization (http://www.fastighetsagarna.se/syd).
Iceland	Hákon Örn Arnþórsson, Director for Student Housing (FS) in Reykjavik, Iceland. Student Housing (FS) in Reykjavik works with: Student houses, book stores, restaurants, kindergartens. www.fs.is
Denmark	Pernille Egelund Johansen, KAB (Housing association).
Finland	Virve Valonen Concept Development & Sustainability Manager, Technopolis PLC
Norway	Ellen M Devold, Avdelingsleder, Høyer Finseth Rådgivende Ingeniører

4 Summary of Key Findings

Sweden

In Sweden there is a lack of incentives to conduct energy renovation of residential buildings. This is due to different barriers ranging from a high quality of the existing building stock to how you set the rent in rental housing. It is therefore not a good business case to refurbish the existing building stock. Miljöbyggnad is the most relevant of the mentioned certification systems and the interview persons confirm, that a tool or checklist that could promote dialogue between owner and tenants might be useful, but it is more important to promote energy renovation through economic incentives.

Iceland

FS in Iceland has primarily worked with the principles of BREEAM. This is due to its English affiliation that fits the Icelandic system better. Iceland has furthermore some special conditions that make the needs and drivers for sustainable building different from other Nordic countries. This is especially the energy and water system, the higher risk of earthquakes and the needs of importing goods.

Denmark

KAB in Denmark has good experience working with the NB charter. The charter is used in the dialogue with the residents of the buildings and supports the decision making process. Certifications systems like LEED, BREEAM and DGNB is not considered relevant since it is expensive to get certified and not in the interest of the residents, and there is no need to create additional demand for social housing via a certification. A mix of the NB charter and the DGNB checklist would be useful in the dialogue with the residents.

Finland

Technopolis in Finland has worked with both LEED and BREEAM in connection with construction and refurbishment of commercial buildings. LEED is the preferred system due to a cheaper and more efficient certification process. The competitiveness is highlighted as an important reason why to get certified.

The Finnish system “Promise” and WWF’s “Green office” are mentioned as other certification systems with relevance to commercial buildings.

Norway

Høyer Finseth works primarily with BREEAM NOR which works well as a system contributing to a holistic handling of environmental concerns. The system covers a range of environmental and managerial themes. The system is weaker on ambitious follow-up on climate gas emissions, but nevertheless it gives a good grasp on emissions from materials where BREEAM NOR has stricter demands than the demands of Statsbygg (Statsbygg is a Norwegian public sector administration company responsible to the Ministry of Local Government and Modernisation) or the demands of Futurebuilt.

5 Detailed Responses

5.1 Sweden

Interviewees:

- Emma Karlsson, WSP
- Olof Andersson, a smaller private property owner.
- Susanne Rickardsson, head of the property owners' organization (<http://www.fastighetsagarna.se/syd>).

Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovations.

Note: questionnaire was only answered by WSP. Other interview answers are from a combination of all three interviewees.

Which certification system(s) have you worked with?		
Certification System	My organization has worked with	I am familiar with this system
BREEAM	Yes	I am familiar with
LEED	Yes	I am familiar with
DGNB	No	I am not familiar with
Active house	No	I am not familiar with
Nordic Built	No	I am not familiar with
Nordic Swan	No	I am familiar with
Miljöbyggnad	Yes	I am familiar with
Other	Passive House Criteria (PH? and the Swedish Feby)	
In how many cases have you worked with the above-mentioned certification system(s)?		
WSP has worked with a large number of projects in BREEAM, LEED and Miljöbyggnad, that I have been involved with. WSP also has accredited Nordic Swan-personnel.		
Did your buildings get certified? To what level?		
Miljöbyggnad Bronze, Silver, Gold BREEAM (certification level not remembered)		

What would be your goals and purposes of choosing a specific certification system?

- What is needed is incentives to make it profitable to conduct deep energy renovation. The situation now is that it is not a good business case to renovate the residential apartments.
- Something that could increase/highlight the profitability of refurbishment/energy renovations.

Are there specific conditions in your country that influence the incentives to use building certification systems?

- High demand on housing (apartments) in the bigger cities means that incentives to improve buildings are low.
- Building standards in Sweden are in general high – the incentives to conduct energy renovations are therefore lower.
- Sweden is very regulated. National regulations state what you need to do concerning buildings.
- Rent needs to be negotiated with renters' organisation. Makes it difficult to agree on a higher rent due to energy renovations.

Are there specific green building strategies that you think work well in your country? Or others that don't work well? And Why?

- Miljöbyggnad (GBC SE) works better since it is adapted to Swedish conditions. BREEAM and LEED are also used, though only relevant for new buildings and not refurbishment of the existing building stock.

(ZED Consulting Note: Both BREEAM and LEED have systems that are applicable to building renovations, and ongoing operation of buildings).

What is your assessment of the specific certification systems' strengths and weaknesses in Sweden?

- Very expensive to get BREEAM or LEED certified. There is no incentive to certify existing residential buildings.

What kind of support or tools would make it easier for you to meet the requirements of certifications?

- Something that could highlight the profitability of energy renovations.
- A tool/checklist to ensure a better dialogue between building owner and tenants might be useful but it is already something that is taken good care of.
- The Nordic Built principles might be useful but it is important that the dialogue happens between owners and tenants and that you don't bring in a third party in the dialogue. Focus should be on local and concrete issues. The NB charter is very broad and unspecific; it would need an adaption to the local context. A checklist inspired by NB but adapted to local conditions would be relevant to promote the good dialogue between building owners and tenants.

What kind of national incentives could promote energy renovations?

- Education and incentives to promote *why* to certify/renovate – e.g. lower taxes or other economic incentives.
- Change the law on how you set the rent.

5.2 Iceland

Interviewee: Hákon Örn Arnþórsson, Director for Student Housing (FS) in Reykjavik, Iceland.

Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovations.

Which certification system(s) have you worked with?		
Certification System	My organization has worked with	I am familiar with this system
BREEAM	No	I am familiar with
LEED	No	I am not familiar with
DGNB	No	I am not familiar with
Active house	No	I am not familiar with
Nordic Built	No	I am not familiar with
Nordic Swan	No	I am familiar with
Miljöbyggnad	No	I am not familiar with
Other		
In how many cases have you worked with the above-mentioned certification system(s)?		
<p>Only in one case have we looked to BREEAM but not applied for certification since we did not follow the whole standard.</p> <p>In Iceland we have a high capacity in eco energy e.g. electricity from hydropower and geothermal energy.</p> <p>We heat up our houses with warm thermal water and all material used in concrete comes from our own mines. Transportation cost is therefore minimal.</p>		
Did your buildings get certified? To what level?		
No		

Opening Comments

- FS does not have any big renovation projects where they demand certifications.
- FS builds student houses and owns 1100 apartments for 1-2 persons. 156 of those have been built recently and are single rooms apartments with personal showers and shared kitchens. In these apartments FS has been looking to the BREEAM concept and worked with parts of the program. The architect behind the buildings knows BREEAM very well. It is very expensive to get started with BREEAM.
- Their waste handling system fulfils the demands from BREEAM and could be certified. The energy system in Iceland is based on renewable energy, this is an important advantage for the Icelandic building stock and helpful if you want a certification.

How did the choice between certification systems come about?

- BREEAM has been chosen because of its English affiliation. It is closer to the Icelandic system than other certification systems.

Are there specific conditions in your country that had influence on your choice?

- Iceland is, when it comes to resources, in a better situation than many other countries. Electricity and heating is 100 percent renewable energy. This puts the construction sector in a different situation from other Nordic countries. This means completely different business cases.

- One of their disadvantages is their [the construction sector] import needs. Materials must be transported a long distance and fuel cost and pollution is therefore an important factor.
- The incentives to build sustainable in Iceland are: Fixtures, waste, imported goods, building materials and resources. Not energy and heating.
- There is a cradle to cradle thinking concerning building.
- Demands on tendering of paint, covers and indoor materials.
- There are other requirements concerning fire regulations and carrying capacity because of the higher risk of earthquakes. Carrying capacity must be 1,5-1,7 in Iceland. In comparison the demand is only 1,2-1,3 in other countries.
- The building culture in Iceland is very conservative.

Are there specific green building strategies that you think work well in your country? Or others that don't work well? And Why?

- Iceland is not as advanced as many European countries. Icelandic government are already making demands to some points but mostly regarding quality control in bigger projects and in some cases the BREEAM standard.
- The public sector is working with BREEAM. The university is building a language centre that should be BREEAM certified.
- If the building sector in Iceland were to be more sustainable the building regulations should define some guidelines. But it can be hard to get through with that because of both cultural and regulative barriers.

Further comments

- In the last 30-50 years many buildings in Iceland have been built in imported reinforced concrete. Some cases of torn down buildings filled with asbestos.
- Steel is not very common in Iceland. Iceland is not good at prefabrication – no enterprises do that.
- Cement is produced in Denmark. Concrete is produced in Iceland.
- Workers from Eastern Europe are coming to Iceland to work in the Icelandic building sector.
- For the newly built student houses, FS obtained tenders for steel containers from Switzerland. This would have made the project 30% more expensive.

5.3 Denmark

Interviewee: Pernille Egelund Johansen, KAB

Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovations.

Which certification system(s) have you worked with?	
Certification System	My organization has worked with
BREEAM	No
LEED	No
DGNB	Yes
Active house	Not much experience with AH, but some other project leaders in organisation might work with AH.
Nordic Built	Yes
Nordic Swan	No
Miljöbyggnad	No
In how many cases have you worked with the above-mentioned certification system(s)?	
Ellebo Garden Room is the first case where KAB is working with certification systems. None of our buildings are certified.	
Did your buildings get certified? To what level?	
KAB works with the Nordic Built charter, but they are not planning to have the building certified.	

What is your assessment of the specific certification systems' strengths and weaknesses in your specific case?

- Nordic Built has a lot of advantages compared to DGNB. NB focuses on facilitating the local anchoring and support from the residents of the building. This fits very well with the strategic work in KAB concerning political anchoring and supporting the local democracy in the local housing associations.
- A central point to why KAB chooses NB and not DGNB is that the target group is the residents of the building. It's not in their customers' interest to get certified or to pay a lot of money to get certified. The branding value of a certification is as such not an issue, as KAB does not lack residents. To build sustainable is more of "internal" interest.

What kind of support or tools would make it easier for you to meet the requirements of certifications?

- Tools to structure and support the dialogue with non-professionals (the residents) would be helpful.
- Pernille sees a huge potential in working with NB but using a "softer version" of the DGNB checklist to support the dialogue between consultants and residents.

How did the choice between certification systems come about?

- Other public housing companies in Denmark use DGNB. KAB is the only one (as far as we know) who uses NB in the initial phase of the renovation process. They see it as a way to brand KAB and make KAB different to other housing companies, but more central is the concern that NB meets the needs of creating a good dialogue with the residents better than e.g. DGNB.

What were your goals and purposes of choosing a specific certification system?

- Nordic built is concerned with people and local anchoring. This is what is important for KAB. NB is not as technical as for example DGNB. It is easier for the residents to understand and discuss the Nordic Built charter than the checklist from DGNB.

Are there specific conditions in your country that had influence on your choice?

- It is not the national context but rather the target group that influences the choice of certifications systems.
- NCC used Nordic Swan as certification system for new private housing because it is a brand that their customers recognize from the supermarket.
- Big companies like Novo Nordisk use international systems like BREEAM or LEED, because they are interested in international branding.

Are there specific green building strategies that you think work well in your country? Or others that don't work well? And Why?

- Same as above.

Other relevant information from interview

- KAB has a sustainable strategy (Bæredygtighedsstrategi) that all housing associations are committed to. The strategy sets out the direction for conducting sustainable and energy efficient renovations in all building projects within the KAB housing associations.

5.4 Finland

Interviewee: Virve Valonen, Concept Development & Sustainability Manager, Technopolis PLC

Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovations.

Which certification system(s) have you worked with?		
Certification System	My organization has worked with	I am familiar with this system
BREEAM	Yes	I am familiar with
LEED	Yes	I am familiar with
DGNB	No	[no response]
Active house	No	[no response]
Nordic Built	No	[no response]
Nordic Swan	No	[no response]
Miljöbyggnad	No	[no response]
Other	Promise in Finland, WWF's Green Office in own offices.	
In how many cases have you worked with the above-mentioned certification system(s)?		
As a consultant I have worked in ca. 2 BREEAM projects and in about 10 LEED projects. As owner, representing Technopolis, I have participated in our 20 LEED projects. Technopolis has also 2 BREEAM projects through acquisitions. Earlier I have also used Promise in other building owners' projects.		
Did your buildings get certified? To what level?		
Yes. 15 LEED certifications, mainly Gold. 1 Platinum. http://www.technopolis.fi/en/about-technopolis/sustainability/green-projects/Pages/default.aspx		

Opening Comments

- For Technopolis, LEED is more used than BREEAM.
- The reason for choosing LEED is because it is more relevant for commercial buildings as LEED is more focused on information on systems. BREEAM is more for housing.
- Technopolis has 15 projects that are certified. More than 20 more projects are in the pipeline.
- *Local certification systems:*
- Promise: Older Finnish certification. Not up to date. The popularity is therefore low. Mainly for public sector, e.g. the state.
- WWF green office: Received label in 10 own offices in Finland and Estonia. The plan is also to get offices in Oslo and Vilnius certified. WWF Green Office is currently not available in Russia because of waste management.
- The WWF certification is focusing on how people can be more eco efficient in their own office. Renovation can be included but is not the main focus. WWF consist of some basic tasks you have to fulfil, and on top of that you can add your own tasks. This motivates people to act. It is not just a certificate on the wall, people need to work as a team to get and keep the certification.

What would be your goals and purposes of choosing a specific certification system?

- LEED helps to maintain the quality of the building stock and lower the operating expenses. LEED has a direct effect on our results. It protects maintenance action and value. LEED gives security. There are no reputational risks. It is a security for tenants

that the quality is as expected, for example concerning indoor air quality etc. The comfort and security of the tenants secure a steady lease cash flow.

- A LEED certification contributes to the competitiveness of the buildings in the market where price, location, and certificates are important.
- If you, as a tenant, have two properties with same price and location and one has a certificate you choose the one with a certificate.

What is your assessment of the specific certification systems' strengths and weaknesses in Finland?

- LEED is good in Finland. It doesn't require as much special consultancy. More straightforward compared to BREEAM.
- BREEAM demands e.g. acoustic experts, environmental experts and other experts.
- LEED is easier and more cost efficient, and still they cover the same topics and same results and use third party evaluation.
- LEED's "regional priority credit" is good for Finland because of the high energy efficiency and water efficiency (cold climate and good toilet systems) in Finland. This makes it easier to get high scores.

What kind of support or tools would make it easier for you to meet the requirements of certifications?

- Tools or support is currently not needed. Currently Technopolis hires LEED consultants and LEED online system to check the forms etc. and LEED database in the Green Building Council. If materials etc. is needed, Technopolis can get them there.

What kind of national incentives could promote energy renovations?

- BREEAM and LEED are good in Scandinavia. The systems are suitable for Scandinavia and have an international perspective. For international companies etc. the international outlook is very important.

Virve had no comments concerning residential buildings.

5.5 Norway

Interviewee: Ms. Ellen M Devold, Avdelingsleder, Høyer Finseth Rådgivende Ingeniører: The experience of Høyer Finseth with the use of sustainability certification systems in Norway in building renovations. Interview translated and edited by Bjarne Bonn , communication consultant at Gate 21, Albertslund, Denmark.

Describe the experiences in your organization (and to your knowledge) with certification systems within sustainable building renovations.

Which certification system(s) have you worked with?		
Certification System	My organization has worked with	I am familiar with this system
BREEAM	Yes	I am familiar with
LEED	No	I am familiar with
DGNB	No	I am not familiar with
Active house	Yes	I am familiar with
Nordic Built	Yes	I am familiar with
Nordic Swan	No	I have only heard about it
Milj�byggnad	Yes	I am to some degree familiar with it. I have to some extent used it as a source of information in my work
Other	Norwegian Wood, Framtidas bygg, Futurebuilt, Ecoproduct	
In how many cases have you worked with the above-mentioned certification system(s)?		
Norwegian Wood: Around 15 projects. Framtidas bygg: I have been involved in three projects. Futurebuilt: One completed project (Str�ms� climate-friendly rehabilitation), several projects in progress. BREEAM NOR: Ongoing. Ecoproduct was used as part of the basis for evaluations related to Norwegian Wood and Framtidas bygg.		
Did your buildings get certified? To what level?		

Could you briefly describe the experiences in H yer Finseth with certification systems within sustainable building renovations.

Our experience is related to the BREEAM NOR system. BREEAM NOR is the Norwegian version of BREEAM which is adapted to suit Norwegian law and Norwegian ways of operating in the construction sector. We also use the English versions of BREEAM In Use and BREEAM Communities. BREEAM Bespoke is adapted to Norwegian circumstances. A local version of BREEAM In Use will be ready in a short while. Further information can be found at the website of the Norwegian Green Building Council: www.ngbc.no

We are also working on a number of projects which requires "passivhusstandard" (passive house standard) in accordance with the Norwegian guidelines NS 3700 and NS 3701. The standards can be found at www.standard.no

A few projects for the Norwegian state include a requirement to live up to a set of additional environmental demands. They include a demand for a 50% reduction of climate gas emissions

during the construction phase and a demand that it can be documented that the handling of materials is safe in terms of impact on health and environmental. These demands can be fulfilled by using EPD as a basis for evaluation in Ecoproduct, The Nordic Swan, the EU Ecolabel (“flower”). They can also be fulfilled through our own analyses/evaluations.

The so-called “Miljøfyrtårn” (literally: Environmental lighthouse) is another certification system which is quite common in Norway. It is a simple version of an environmental certification system like ISO 14001. A special version of “miljøfyrtårn” directed towards medium-sized architectural and engineering companies is under way. It is expected to be ready and tested in the spring of 2016. The aim is to get advisers to include environmental considerations in their work with projects as a way to increase the sustainability of construction projects. Further information can be found at <http://www.miljofyrtarn.no/>

Futurebuilt (www.futurebuilt.no) is not an environmental certification system but I should nevertheless like to mention it here as it is contributing to several climate friendly construction projects in the Oslo region. The aim of Futurebuilt is to pave the way for inspiring climate friendly projects which can inspire the entire construction sector, including developers, owners, architects, consultants, construction companies, suppliers and local authorities. We have participated in some projects which go beyond the demands of the building code. Futurebuilt leads to increased skills among the participating actors and makes climate friendly architecture more common. However Futurebuilt has until now focused more on physical surroundings and demands and less on the use of buildings and facilities and ways of living.

We have been working with other certification systems, like LEED, but LEED is rarely used in Norway.

In addition to Futurebuilt we have worked with two other inspirational programmes called cities of the future/future construction (In Norwegian: Framtidens byer/Framtidens bygg) and Norwegian Wood. Those two are similar to Futurebuilt in design, measures and ways of working.

What is your assessment of the different certification systems' strengths and weaknesses?

BREEAM NOR works well as a system contributing to a holistic handling of environmental concerns. The system covers a range of environmental and managerial themes. The system is weaker on ambitious follow-up on climate gas emissions, but nevertheless it gives a good grasp on emissions from materials where BREEAM NOR has stricter demands than the demands of Statsbygg (Statsbygg is a Norwegian public sector administration company responsible to the Ministry of Local Government and Modernisation) or the demands of Futurebuilt.

I also think that BREEAM NOR contributes to a general quality improvement because the way the project design process and the dialogue with developers and contractors is carried out requires all involved parties to understand and share the environmental ambitions for the project, i.e. the main target. This only happens if the managers of the work on project design implement BREEAM as an integral part of the project design work and not just as an add-on system for documentation.

What kind of support or tools would make it easier for you to work with certifications?

- A much more developed data basis with regard to environmental-friendly materials, e.g. an open-access database (Ecoproduct was a start but with too limited coverage).
- References and examples for various kinds of building types and building methods with regard to their climate gas emissions.
- Training of local public sector officials responsible for construction work.
- Consulting services targeted at developers to prompt them to become more ambitious and to choose more climate-friendly solutions when they work with renovation. Enova in Norway has had a similar programme but it remains isolated attempts.

How do you advise a customer who has to select a particular certification system for a project?

I assess the customer's ambitions, economy and type of building project to evaluate what will be appropriate. It is important that the chosen certification system does not require more work than the customer is prepared to do and suits the needs of the customer.

If reputation is important for the customer the right choice is a system which is well-known in the market.

Does Høyer Finseth recommend a particular certification system? If the answer is yes - could you specify which one and the reasons for the selection of this particular system. If the answer is no - could you elaborate a bit on the reasoning behind your position on this issue?

Only a few comprehensive systems are used in Norway. We will provide the customer with an overview of the existing possibilities. We will clarify what the customer strive to achieve with a certification system and provide advice in accordance with this. If the customer wants to use a comprehensive well-known system we recommend BREEAM NOR.

We will not recommend certification based on "Miljøfyrtårn" before they have launched their special programme for medium-sized architects and engineering companies.

Are there specific conditions in your country that are important to consider when you select a certification system?

We have quite a lot of different small construction companies. In other words a lot of actors lack the capacity to train their employees and have no experience with certification systems. Nevertheless they may well be able to include environmental considerations in their work and deliver good projects.

A similar situation exists for the architects while the consulting engineers in general are larger and sturdier.

The last couple of years have seen a lot of attention being paid to the issue of energy efficiency in Norway (which is a change). There has been less focus on other environmental issues. Many people consider this to be lopsided or mistaken as Norway has a lot of hydropower which is regarded as clean energy. The fact that we trade electricity with other countries and in this way

also uses electricity from non-renewable sources is not always easy to communicate and the import of electric power varies.

BREEAM certification has the potential to motivate more actors, the advantage of including several environmental themes and spurs one to work more holistically with environmental demands. This is all beneficial. The problem with BREEAM NOR is that the agency which has adapted it to suit Norwegian conditions (NGBC) is also making money on the use of the system. In other words, it is a commercial product, where licences, courses etc. are mandatory even if advisers are quite capable of keeping their knowledge up-to-date and accurate without participating. It is also considered expensive to use by smaller actors. The system is currently used mainly in Oslo and Stavanger and not very common in the rest of the country.

Are there specific green building strategies that you think work well in your country? Or others that don't work well? Why?

A strategy which might work well is the introduction of levies on electric power to make it more expensive but this is politically unfeasible.

The introduction of strict technical demands has had a significant impact and further tightening of these will be effective.

The choice of climate-friendly solutions is first of all a problem in situations where there are lots of different tenants in a building. In our experience a building owner will often have greater incentives to invest in environmentally friendly solutions where there is only one large tenant. If heating costs can be transferred to the tenant change is possible.

When it comes to other environmental targets like transport or the use of environmentally friendly materials they are currently regarded as "surplus phenomena". This means they are only used by actors who have the economic means and the will to pay for solutions. Since the use of fossil fuels is cheap and certain materials dominate the market this is difficult to change for the time being.

Any comments or suggestions to the project? What kind of knowledge could be useful for your further work with sustainability certification?

What is needed to prompt people who rent their apartments to choose more environmentally friendly options?

Experiences from Denmark, Sweden, Finland and Norway can be compared. But we have very different systems to handle privately owned/rented dwellings and property. It is possible that different approaches are needed.

As I have mentioned there is a lack of easily accessible knowledge of environmental properties of different kinds of building materials.

Emissions from transport to building sites must be taken more into account when construction projects in Norway are evaluated. Likewise total energy consumption (including the use of the building) and evaluation of energy consumption per person or company and not just per square metre have to be taken into consideration.

The same goes for LCA and LCC. A change in the number of years a building is expected to last from 30 or 60 to e.g. 100 years will be very important for the choices to be made.

The exemplary programmes which have already been realised, like Norwegian Wood (www.arkitektur.no), Futurebuilt, “Framtidens bygg” and cities of the future have contributed to an increase in environmental awareness generally and in the construction industry. They have also made high environmental demands more common and given many actors more knowledge. There has been some progress and more exemplary programmes will be needed - with more emphasis on ways of living, consumption and site-specific qualities which can contribute to the reaching of the targets. Permanent long-term solutions should receive greater attention.

I should like to refer to the following websites:

<http://byggjeneste.no/eco-product/>

<https://www.arkitektur.no/ecoproduct>

Økobygg (older Norwegian certification system)

<http://www.byggemiljo.no/wp-content/uploads/2014/10/Prosjektkatalog.pdf>

A precursor for BREEAM NOR and others.

<http://www.byggemiljo.no/>

<http://www.bnl.no/politikk-og-analyse/bnl-mener/>

www.lavenergiprogrammet.no has several measures for construction companies.

<http://www.zeb.no/>

Contains projects and research which to some degree are shared in the construction industry.