BUILDINGS OF THE FUTURE

PILOT PROJECTS 2009–2015
Environmentally Friendly Buildings and Planning

FRAMTIDENS BYGG

National Association of Norwegian Architects

Ministry of Local Government and Modernisation

BUILDINGS OF THE FUTURE

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The Cities of the Future programme was completed in 2014. The 13 largest cities in Norway, KS (Norwegian Association of Local and Regional Authorities), the state and the business community have collaborated on developing cities of the future. An important element of this programme has been to develop pilot projects within planning and architecture that pave the way for smart and environmentally friendly solutions in the future.

In Oslo, Drammen, Bærum and Asker, FutureBuilt is developing pilot projects, while Buildings of the Future has been responsible for the other ten cities. The National Association of Norwegian Architects (NAL) and the Low Energy Programme initiated the Buildings of the Future programme in 2009. The goal was to develop smart and environmentally friendly buildings and plans. The criteria for pilot project status in Buildings of the Future were many, but we have succeeded in including new buildings, rehabilitation projects and planning – 31 projects in total. Together with FutureBuilt's pilot projects, this has been an important arena for gaining experience and testing major changes for the building sector.

Few people within the building industry have previously participated in sustainable master planning, the calculations of greenhouse gas emissions in a lifecycle perspective, the development of open storm water systems, the reduction of car usage or the design and construction of passive houses. The programme has given those involved in the pilot projects increased knowledge that will make them better prepared to meeting tomorrow's challenges. This is the case for planners and executive officers in municipalities, procurers in both the public and private sector, architects and consultants, contractors, craftsmen and building material suppliers.

The participants have inspired each other, and developed new solutions, components and building materials. The implementation of new solutions contributes to lowering the costs of design and execution. Work on the pilot projects has contributed to reducing the costs of new environmentally friendly solutions.

The programme has led to innovation, awareness building, further education, knowledge and new forms of collaboration. The experiences from the pilot projects have contributed to changing the industry's practices and have provided knowledge to improve the building regulations. The status as pilot project in the Buildings of the Future programme combined with professional support from NAL has often been the factor that tipped the scales for municipalities and private clients in favour of demanding higher levels of quality in projects. We believe that the experience and knowledge that has been generated by the Cities of the Future programme is a good platform for continued efforts. We know that both municipalities and the business community have high ambitions, and that they want to contribute to turning today's visions into tomorrow's norms.

Øyvind Aarvig
Project Leader for Cities of the Future
Department of Planning, Ministry of Local Government and Modernisation

Pilot projects with 50 percent reduction of greenhouse gas emissions from energy, material specification and transportation.

BUILDINGS OF THE FUTURE

QUALITY CRITERIA:
In order to be granted pilot status, the project must meet the requirements of Cities of the Future and lead the way toward future solutions:

- When planning buildings, systems and outdoor areas, choose solutions that take into account the present and future climate.
- Develop an environmental strategy with clear environmental goals early in the process.
- The total greenhouse gas emission must not be higher than half of today's average. This is measured for three sources of emissions: Transportation, material specification and energy consumption (passive house standard for new buildings, minimum low-energy standard for rehabilitations, renewable energy sources).
- Greenhouse gas accounting must be an integrated part of the planning, design and construction phases. There should also be a strategy for energy leadership and efficient operations.

OTHER CRITERIA

The pilot projects shall, both singularly and together with their surroundings, make a positive contribution to the physical urban environment by exhibiting: Good architectural and landscape design, good environmental design, accessibility for all and cultural historical values.

GREENHOUSE GAS ACCOUNTING

Greenhouse gas emissions are presented for most of the pilot projects in this publication. They are given as a percentage reduction from a reference project for the relevant building type constructed in compliance with the current building regulations (TEK 10). The greenhouse gas accounts show data for three sources of emissions: as designed, as built and after two years of operation.

THE END OF THE BEGINNING

It has been inspiring to lead the secretariat for a programme with such a strong focus on the future. Here we, as professionals, have been able to do something specific to meet the environmental challenges of our time, and have been able to do so within a realistic economic framework. The projects have received financial support through state funding, but not more than the development costs justify – this makes the solutions competitive and suitable for the market. A 50 percent reduction in greenhouse gas emissions from transportation, material specification and energy use compared to today's building regulations is a significant reduction, and today there are several plus energy houses being built that can export energy. Buildings of the Future have, however, not only worked with reducing greenhouse gas emission. The programme has contributed to developing forward-looking architecture and good urban design that should encourage people to lead environmentally friendly lifestyles.

Many of the pilot projects have now entered the operational phase, and the two-year reports are being submitted. Not all of the projects are able to reduce their emissions to the degree projected. The causes vary, but we see that commissioning of technical installations is a recurring issue. Consequently, many are now starting to demand more from contractors than before. We also see the great significance of qualified operational personnel and motivated users. These are both areas that the industry and the state should focus on in the years to come. In addition, we see that the price of photovoltaic panels is about to make it profitable to produce electricity at the scale of the individual building.

Emissions from transport have been difficult to quality control in greenhouse gas accounting for the projects. Many good measures have been taken, but the results are rarely documented. There is no tradition for conducting a mobility survey in relation to building projects and it is a challenge to influence mobility patterns in during the operational stage.

Buildings of the Future has focused on the major cities. Looking forward, the accumulated knowledge should be made available to towns and villages. This will contribute positively to increasing the quality of planning and ease the transition to new building regulations.

Even though the Buildings of the Future programme finished in 2014, this publication is a status report rather than a final report. Many of the building projects are in the process of being designed or constructed and the development of entire urban areas take significantly more than five years. Therefore, the National Association of Norwegian Architects has the ambition to follow up the pilot projects to the degree that this is financially viable. We hope the project teams will continue to learn from each other in the years to come. For clarity, this publication is organised with one chapter per city, with each project described under the relevant city heading. Contact information is available for each city and each project.

We look forward to future collaborations on preparing the building industry for the future.

Øystein Bull-Hansen
Project Leader, National Association of Norwegian Architects

SARPSBORG

© Google Maps

1 CITY CENTRE KINDERGARTEN
2 MUNICIPAL LOCAL PLAN – SANDESUND-GREÅKER

IMPORTANT INFLUENCES

Sarpsborg has one municipal building project and one local plan project in the Buildings of the Future programme. Both the municipality and other participants in the building industry, such as architects, consultants and contractors have gained from being part of the pilot project. Head of Environmental Protection Charlotte Iversen says that the municipality works with environmental issues in a more constructive way thanks to a fruitful collaboration with the Buildings of the Future programme.

– Both the politicians and the municipality have become more aware of sustainability and environment. The new kindergarten, especially, has excited many people. The biggest challenge in the pilot projects has been to write the specification for the procurement process. Many useful conversations about possibilities and ambitions have taken place regarding this topic. We have tried hard to generate new ideas when we have written the programme for a building project or a master plan, says Charlotte Iversen.

Iversen tells us that the collaboration with Buildings of the Future has led to parking restrictions in the municipal strategic plan for the city centre, and a restriction on the number of parking spaces is now being imposed for a central residential area for the first time. Climate adaptation and storm water management is also receiving increased attention by the municipal engineers, planning officers, and building officers. Buildings of the Future has been successfully embedded in the municipality's leadership and the collaboration has increased knowledge on climate change, energy and the environment. This knowledge will be invested in future plans and projects.

CHARLOTTE IVERSEN
Head of Environmental Protection
Sarpsborg Municipality

CITY CENTRE KINDERGARTEN, SARPSBORG

Oscar Pedersens vei/Hjalmar Wessels vei, 1721 Sarpsborg

CLIENT: Sarpsborg Municipality
ARCHITECT: Plus Arkitektur AS

GROSS AREA: 1260 sq. m.
COMPLETED: 2015 (planned)

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive building energy standard
- Climate adaptation: Permeable surfaces, rainwater harvesting
- Indoor climate: Natural ventilation with mono-pitched roof for stack effect
- Outdoor areas: Biodiversity, useful plants, attractive arenas
- Educational kindergarten: User participation in the design process

CONTACT INFORMATION:
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MORE INFORMATION:
http://www.arkitektur.no/ny-sentrumsbarnehage

Principal section. Ill.: Plus Arkitektur

Greenhouse. Ill.: Plus Arkitektur

Entrance zone. Ill.: Plus Arkitektur

CITY CENTRE KINDERGARTEN

BETWEEN CITY AND COUNTRY

Sarpsborg Municipality is planning to build a kindergarten where the children have the opportunity to cultivate food in a greenhouse that shields the building from traffic noise. Biodiversity will be the hallmark of the kindergarten.

The kindergarten can accommodate 126 children and approximately 30 members of staff. It is located in slightly sloping terrain between a residential area, Borregård manor, and a park. A busy road, Fylkesveien, runs through a beautiful tree-lined avenue beside the kindergarten. The noise issue is solved architecturally by building a double façade towards the road. This will work as a noise barrier, a solar reflector and an educational (greenhouse) environment.

The kindergarten will be built to the passive energy standard. Cross-laminated timber panels are being considered as a building material. A possible solution where rainwater is used for watering plants in the greenhouse is being explored. The outdoor areas are to be an integral part of the surrounding landscape. Activities will make use of the terrain and take inspiration from the surroundings, for example through the cultivation of various plants. Contact between indoor and outdoor is important, and as many rooms as possible will have a view to the outside. Covered areas make outdoor activities possible in all kinds of weather. Architectural design and local planning have been carried out simultaneously.

KINDERGARTEN WITH GREEN FINGERS

Modern architecture and the lush cultural landscape inspire learning in the kindergarten. The architect, environmental advisor and municipality all worked closely together in the design phase.

– The kindergarten's greenhouse will also function as a barrier against traffic noise. Here the children can grow vegetables and follow their development from seed, to plant, to food, says Rasmus Hamann at Plus arkitektur. Composting of organic waste and the display of real-time energy use in the kindergarten are also part of the learning process.

MUNICIPAL LOCAL PLAN SANDESUND-GREÅKER
Sandesund-Greåker, 1722 Sarpsborg

CLIENT: Sarpsborg Municipality

AREA: Approx. 224.000 sq. m.
Completion: 2016

IMPORTANT ENVIRONMENTAL FEATURES:
- Sustainable transformation, preservation and densification of a mixed-use area
- Transport: Strengthening and prioritising of public transport, design for cyclists/ pedestrians
- Environmental adaptation: Microclimatic analysis, strengthening of natural qualities
- Potential for local energy production
- Preservation of cultural heritage

CONTACT INFORMATION:
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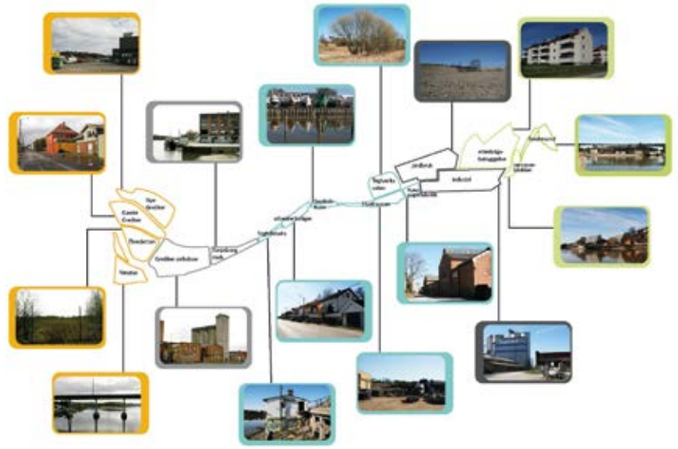
MORE INFORMATION:
http://www.arkitektur.no/kommune-delplan-sandesund-greaker

The Glomma River has been an important traffic artery for ship transportation. Photo: Sarpsborg Municipality



Area plan. Ill.: Sarpsborg Municipality

MUNICIPAL LOCAL PLAN – SANDESUND-GREÅKER

URBAN GROWTH ALONG THE GLOMMA RIVER

The new municipal local plan – Sandesund-Greåker in Sarpsborg will encourage sustainable development. The project aims for best practice with regards to continuity from long-term planning to the approval of individual building permits.

The local plan area is a 4.5 km stretch of land, boarded by County Road 109 to the North, the Glomma River to the South, the Rolvsøysund Bridge to the West and the Sandesund Bridge to the east. Railway tracks divides the area lengthwise. The old main street separates the former working class residences in the upper section from the industrial area, storage facilities and businesses in the lower section towards the river. There are two deep-water docks in the area, but few companies use them. The area is dilapidated, and some of the residents suffer from poor living conditions. The companies that rely on transport along the river will most likely be able to remain in the area and in that way continue the area's historical activity despite the substantial changes that will take place. The municipality wishes to expand on the industrial area's character and preserve important elements of industrial heritage during the process of change.

Sarpsborg has few development areas and Sandesund-Greåker is a vital piece of the puzzle of handle expected growth in the coming years. The area will be densified in an environmentally friendly way with a larger proportion of dwellings and active businesses, and less storage and industry. The ambition is to combine efficient utilisation of space with attractive dwellings and recreational facilities. Most properties are small and narrow with great differences in elevation. This makes them problematic for housing. It is therefore important to collaborate so that housing development can take place across property boundaries. The area slopes towards the South and has good solar access and views towards the river. It has become difficult in many places to build, so it is important to densify those areas that are most suitable. Densification hubs that are connected to pedestrian walkways, bicycle lanes and public transport routes will reduce the dependence on cars. An energy strategy for the area will be developed and will evaluate different energy systems and consider possibilities for local energy production. A detailed evaluation of the microclimate has been carried out that will influence future development.

SARPSBORG EXPANDS ITS TOOLBOX

A mobility strategy and a microclimate analysis are being undertaken for the pilot project in the Sandesund-Greåker area.

– With help from NAL and Buildings of the Future, the analyses were review by specialists. This has assured us that the documents are suitable for use in the further development of the municipal local plan. Through this we have strengthened our knowledge, something that we will benefit from in the future, says Karoline Bergdal, architect in the Planning and Society Development Department of Sarpsborg Municipality.

FREDRIKSTAD

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1 LISLEBYHALLEN
2 FLOA

POLITICAL DECISIONS MOTIVATE THE ORGANIZATION

Fredrikstad has two municipal pilot projects in the Buildings of the Future programme. They are one building project and one local plan. Rolf Petter Heidenstrøm tells us that the programme has improved the municipality's level of ambition concerning technical solutions and energy use. In addition, the municipality has become better at local planning, gained knowledge, and adopted more efficient working methods.

– Due to good interdisciplinary collaboration, Lislebyhallen is now under construction. The main challenge was gaining knowledge internally and achieving a mutual understanding of the necessity for building environmentally friendly and resilient buildings. We will use this new knowledge in our future work to develop a more precise distribution of responsibility within the municipality.

Heidenstrøm tells us that in order to get different departments to prioritise the projects it was necessary to have politicians vote for the projects to become pilot projects. The Building and Planning Officers have also been important supporters in the work to develop the projects. In 2015, the municipality is working on systematising new knowledge into routines and guidelines so that they can improve their own norms and methods. Buildings of the Future has also influenced the development of the local building industry, especially for those who have been involved in the projects. The pilot projects have contributed to increasing the general interest for passive houses. Some developers have started thinking more sustainably when programming building projects.

ROLF PETTER HEIDENSTRØM
Environmental Protection Advisor,
Fredrikstad Municipality

PILOT
PROJECTS

LISLEBY MULTIPURPOSE HALL
Leiegata 17, 1617 Fredrikstad

CLIENT: Fredrikstad Municipality
ARCHITECT: Plus Arkitektur AS

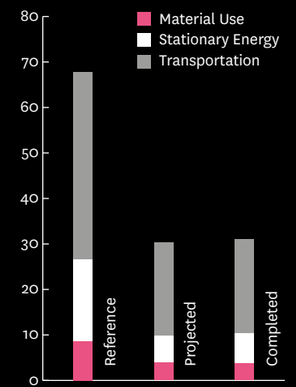
AREA: 3.300 sq. m.
COMPLETED: Summer 2015

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive building energy standard
- Energy performance certification standard A (yellow)
- Loadbearing construction, exterior walls and parts of interior walls in cross-laminated timber panels
- Surface water management with rainwater harvesting, green roofs, permeable surfaces
- Multipurpose use of areas: School, local societies, after school programme

CONTACT INFORMATION:
Anne Skauen, Fredrikstad Municipality, 95 91 25 52, aska@fredrikstad.kommune.no

MORE INFORMATION: http://www.arkitektur.no/lislebyhallen



Estimated in kg CO_2-equivalent per sq. m. per year

Ill.: Plus Arkitektur AS

Ill.: Plus Arkitektur AS

From left Brynjar Teien and Thomas Nordenhaug, AF Bygg Østfold, Nina Stene Wilhelmsen, Fredrikstad Municipality. Photo: Fredrikstad Municipality

LISLEBY HALL

MULTIPURPOSE HALL CONSTRUCTED IN TIMBER WITH PASSIVE ENERGY STANDARD

The new multipurpose hall is being constructed by Nøkleby School in Fredrikstad. The building has high environmental ambitions; a goal to meet the passive energy standard, extensive use of timber, and climate adaptation measures in terms of open storm water management.

Nøkleby School will be the main user of the hall during the daytime, while local groups will have priority during the remaining opening hours. The building will seat 120 in tribunes, in addition to containing educational areas and afterschool facilities that can house 112 students and 220 children respectively. Lisleby Hall has a compact shape with a rectangular footprint of 37 x 67 meters and a total height of 11 meters. The building's design and location creates a barrier to noise from a busy street to the North. A slate roof cantilevers out where ridge and walls meet the existing school building. To the South, the building has a sedum roof made from Norwegian Sedum that will retain 72 percent of rainfall.

The building has a loadbearing construction of cross-laminated timber panels, interior wooden surfaces and a façade clad with Accoya timber. The project's high environmental ambitions lead to higher investment cost than traditional building projects. However, by choosing robust solutions and high-quality building materials lifecycle costs should be comparable to traditional projects. The building should be as low-cost as possible for management, operation and maintenance, primarily by using robust and maintenance free solutions. Selection of timber is therefore central, since aging plus wear and tear gives timber a natural aesthetic of its own.

Fredrikstad Municipality has high ambitions for reducing emissions from transportation. The municipality is using a mobility surveys as a tool for strategic planning. Students, staff and sports teams are contributing to the development of the surveys. The staff will reduce their car usage and tenants will be chosen based on travel distances of the users. Working with the attitudes of students and parents is also a focus area.

MOBILITY PLANNING AT THE MICRO LEVEL

Nøkleby School near Lisleby Hall is about to complete its own mobility plan. The school is mapping the travel habits of its students and staff. A former survey showed that most students rode bicycles or walked to school. It is possible to get even more people to walk or cycle. In September 2014, the school participated in the national campaign "Walk to school» day. More than 90 percent of the 530 students participated and the winners were rewarded with honour, glory, pastries and refreshing drinks. Writing a mobility plan is something we mainly associate with large businesses. As part of Lisleby Hall's status as a pilot project in the Buildings of the Future programme, Nøkleby School is the first establishment in Fredrikstad to write such a plan, says Anne Skauen in Fredrikstad Municipality.

FLOA AREA

Trosvikstranda, 1608 Fredrikstad

CLIENT: Fredrikstad Municipality
CONSULTANT: Norconsult

AREA: approx. 134 decares
COMPLETION: 2017

IMPORTANT ENVIRONMENTAL FEATURES:

- Transformation of an industrial area in two phases: planning and sustainable urban development
- Storm water system: Opening of the Veum stream, green corridors are strengthened
- New city centre ring road: Development of an environmentally friendly city street

CONTACT INFORMATION:
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MORE INFORMATION:
http://www.arkitektur.no/floa

Proposals for buildings at Trosvikstranda maintaining sightlines up and down the Veum stream, as well as the dockside promenade. Ill.: Norconsult

The Veum stream's estuary at Trosvikstranda (building stage 1 Floa). Ill.: Norconsult

FLOA

SUSTAINABLE URBAN DEVELOPMENT IN SEVERAL STAGES

The Floa area lies on the edge of Fredrikstad City Centre, and is a natural extension of this area. The development of the area is split into a short-term and a long-term stage. The first phase is Trosvikstranda.

The Floa area measures 134 decares and lies along one of the entryways to the city. Fredrikstad Municipality is a major property-owner, so it was easier to demand that the development meet the criteria given in the Cities of the Future programme. The owner structure is otherwise rather complicated. The area will have a compact urban structure containing residences and businesses, and allowing for modern forms of industry. Building projects will be carried out in stages, in close collaborators with property-owners. Trosvikstranda, an area of 36 decares, will be developed first. In the middle of this area, the Veum stream presently runs through pipes, but will later brought to the surface. Water will be an important environmental quality. The area is being planned for extensive use and outdoor areas toward the beach will be car-free. The new city centre ring road will be built on the Northeast side of the buildings as an environmentally friendly city street with relatively high traffic loads. This flow will potentially allow for the establishment of shops and other urban facilities and strengthen accessibility for pedestrians and bicyclists. Businesses will still be able to operate within the area, but in phase two the municipality will stimulate development in the rest of the Floa area through the exchange of properties, building agreements and rezoning. A public marina will also be established.

PACKED WITH INDUSTRIAL HERITAGE

About 100 years ago, slightly to the South of where the Veum stream will soon see the light of day again ran the river Evja. Across the Evja River there were three small pedestrian bridges from the city centre side to what is today known as Floa, formerly named Seierstenholmen. Here Norway's first steam-powered saw mill, Wilhelm Gutzeit & Co.'s Dampsagbrug, was built in 1860. The workers had their homes on the North side of Seierstenholmen, at Trosvikberget, which was one of Fredrikstad's typical worker's neighbourhoods at the edge of town. This historical industrial area can now look forward to exciting development, and in time the entire Seierstenholmen/ Floa will be renewed – perhaps with a hint of its past?

PORSGRUNN

1 HEISTAD SCHOOL

INSPIRED BY THE SPECIALIST NETWORK

Heistad School is Porsgrunn's pilot project in the Buildings of the Future programme. The municipality has greatly appreciated the exchange of information and knowledge, as well as inspiring meetings. Project leader Rolf Berg has felt that it was especially useful to form a network with other organisations in a similar situation and with related projects.

– For the municipality it has been very useful to gain access to expert knowledge and to be able to exchange experience with other pilot project teams. Buildings of the Future has served as a bridge between us, public participants and the Norwegian State Housing Bank. Visits to building sites or completed buildings and the sharing of knowledge have also been very useful. The greatest reward has probably been increased knowledge for the participants in the project. The greatest challenge has been that there are a many forms to fill out, both to achieve pilot project status and to apply to the government enterprise Enova. In terms of transportation demands, we have been wondering if it might be more useful to differentiate between city and country to a larger extent. Our experience is that Buildings of the Future contributes to making the participants in the building industry more brave when it comes to trying out new technology and innovative architecture.

ROLF BERG
Project Leader,
Porsgrunn Municipality

HEISTAD SCHOOL
Lundedalen 35, 3900 Porsgrunn

CLIENT: Porsgrunn Municipality
ARCHITECT: Børve og Borchsenius AS

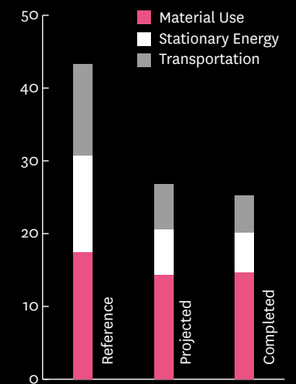
AREA: 5.500 sq. m.
COMPLETED: January 2013

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive building energy standard
- Energy performance certification standard A (dark green)
- Energy: Orientation, photovoltaic array and solar thermal collectors, thermal mass, extra insulation
- Use of timber both externally and internally, and in the structure
- Storm water management and extensive new planting along with preservation of existing vegetation
- Communal use

CONTACT INFORMATION:
Rolf Berg, Porsgrunn Municipality, 35 54 74 43, rolf.berg@porsgrunn.kommune.no

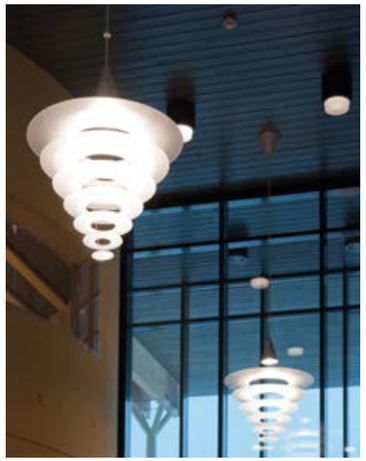
MORE INFORMATION: http://www.arkitektur.no/heistad-skole



Estimated in kg CO_2-equivalent per sq. m. per year

The school seen from the entrance area. Photo: Børve og Borchsenius

The schoolyard towards Northeast. Photo: Børve og Borchsenius



Details from the foyer. Photo: Børve og Borchsenius

HEISTAD SCHOOL

PASSIVE ENERGY SCHOOL IN PORSGRUNN

Heistad School in Porsgrunn is the first passive energy school in the Grenland area. The school accommodates 400 students and contains a department for students with special needs. After one year of operation, the school has started to produce more thermal energy than it requires.

The educational reform of 2009 meant that the new school at Heistad would be expanded to include a department for 14 students with special needs. The organisation of the school can be compared to a small village, with a square, streets, open spaces and private rooms. The development consists of a main building and three “fingers”. Two of the “fingers” contain bases with separate student entrances that encourage flexibility and communal use. The third “finger” contains the administration and workspaces for staff members. The main building contains the school’s common area. Near the entrance square lies an ellipse-shaped cylinder that rises over two storeys – an “egg” – in which the library and the school kitchen are located.

Heating is water-based and comes from a local bioenergy heating plant. The building envelope is oriented to maximise passive solar heating: the bases face East and West so that the sun does not shine into the school during school hours. In addition, thermal mass in concrete stores heat in floors and ceilings. The most important measure is the photovoltaic array and solar thermal collectors mounted to the South. The photovoltaic array produces electricity for rooms where the students can cultivate plants. The solar thermal collectors contribute heat water in the heating system, in addition to heat recovery from wastewater in the showers. Additionally, there is a large area of solar thermal collectors on the existing sports hall to the North, Heistadhallen. The system delivers hot water to changing rooms in the new school building. After the system became operational in 2013 the use of hot water has proven to be lower than expected and it is therefore export of surplus heat to an existing hall is being considered.

1:1

In the middle of what appears to be four shining metal capsules from outer space, a windmill stands rotating. The sculptures in the schoolyard at Heistad School are made by Thomas Nordstrøm and Annika Oskarsson. When the artists heard about Heistad’s ambition to be an “energy school”, they conceived the idea that the light in the sculptures could be produced by wind power. By clarifying the connection between cause and effect at a scale students can relate to, the artwork has an educational value. The photovoltaic array that is mounted on the school’s Southern façade also has an educational value. The energy from the sun provides the school’s cultivation rooms with light. Here the students can see for themselves how much electricity is being produced at any given time and measurements are part of the educational programme regarding energy consumption.

SKIEN

© Google Maps

1 TELEMARK EMERGENCY CENTRE

CLEAR MARKS

Skien started early with its first pilot project, the Telemark Emergency Centre, and later began an extensive collaboration on the subject of city centre development with Buildings of the Future. This collaboration was discontinued due to insufficient capacity, but has made a clear impression.

– Both the Mayor and Deputy Mayor have shown great interest in the collaboration with the Buildings of the Future programme, and those who have been involved have gained experience, especially in terms of environmental issues like green spaces, storm water management and energy efficiency in buildings, says Marja Skotheim Folde in the municipality's Planning Department.

The collaboration on the city centre development was discontinued due to insufficient capacity before the different participants were involved, but it has still provided results. For example, a city centre group is now working on the themes of Buildings of the Future, and the municipality is working on attractive and practical pathways for pedestrians and bicyclists between the city centre and the surrounding residential areas. This will give people the experience of living so close to the city centre that they do not need feel that they need to use a car. The collaboration with Buildings of the Future has also influenced the design of storm water management and climate adaptation strategies in municipal local plans for the Grenland area. In Skien, drainage patterns, flood paths and green spaces have been mapped, and new local plans are now required to promote climate adaptation and the strengthening of green corridors.

– We will coordinate zoning, landscape, storm water management, and technical infrastructure plans. Areas will be reserved and strategies developed for the distribution and management of storm water early on in the planning process. Here in the municipality we (especially the Planning and Building Departments) have greatly appreciated the live streaming of the Brød & Miljø breakfast meetings which we have use to increase our knowledge, says Marja Skotheim Folde.

Skotheims colleague, Hans Petter Heimholt, is an Energy Efficiency Coordinator in the municipality and was also involved in the pilot project Telemark Emergency Centre. He says that all those involved in the project have learned a great deal from the collaboration with the Buildings of the Future programme, and that the project has been managed efficiently by Planning and Building Executive Officers.

– As a client, the municipality now puts more emphasis on energy efficiency and good solutions for accessibility for all. In connection with the procurement of new buildings, strategies for the operational phase and energy efficient solutions have been given particular attention when the projects are evaluated (40 percent), says Heimholt.

MARJA SKOTHEIM FOLDE
City Planner,
Skien Municipality

TELEMARK EMERGENCY CENTRE
Skotfossveien 39, 3720 Skien

CLIENT: Skien Municipality
ARCHITECT: Børve og Borchsenius AS

AREA: 1.600 sq. m.
COMPLETED: July 2012

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard A (yellow)
- Low carbon concrete with hollow-core slabs
- Green roofs
- Solar thermal collectors

CONTACT INFORMATION:
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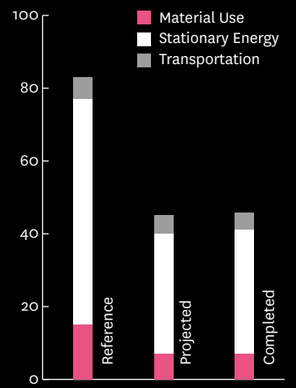
MORE INFORMATION: http://www.arkitektur.no/krisesenteret-i-telemark



Estimated in kg CO_2 equivalent per sq. m. per year


Façade toward the garden. Photo: Vegard Giskehaug


Façade toward the South, with solar thermal collectors. Photo: Vegard Giskehaug

TELEMARK EMERGENCY CENTRE

CLOSE TO REDUCING GREENHOUSE GAS EMISSIONS BY 50 PERCENT

The emergency centre was completed in 2012 and is built to the passive energy standard. The same year the emergency centre was awarded the municipality's award for forward-looking place- and task-adapted architecture. The building has achieved a 50 percent reduction in greenhouse gas emissions from stationary energy consumption and material specification.

The emergency centre in Telemark is located between the suburb Gulset and the city centre, near Myren in Skien. The project has been a collaboration between all the municipalities in Telemark, with Skien Municipality as the client. The building measures 970 sq. m. and contains 11 dwelling modules with common areas, administrative areas, offices and meeting facilities. The greenhouse gas figures for the project show that it nearly reduces the emission by half, for material use, transportation and energy consumption. The emissions for stationary energy consumption in the building are estimated to be 48 percent lower than a normal building by today's standards. On the materials side, the project has achieved a similarly large reduction, 50 percent compared to a typical building.

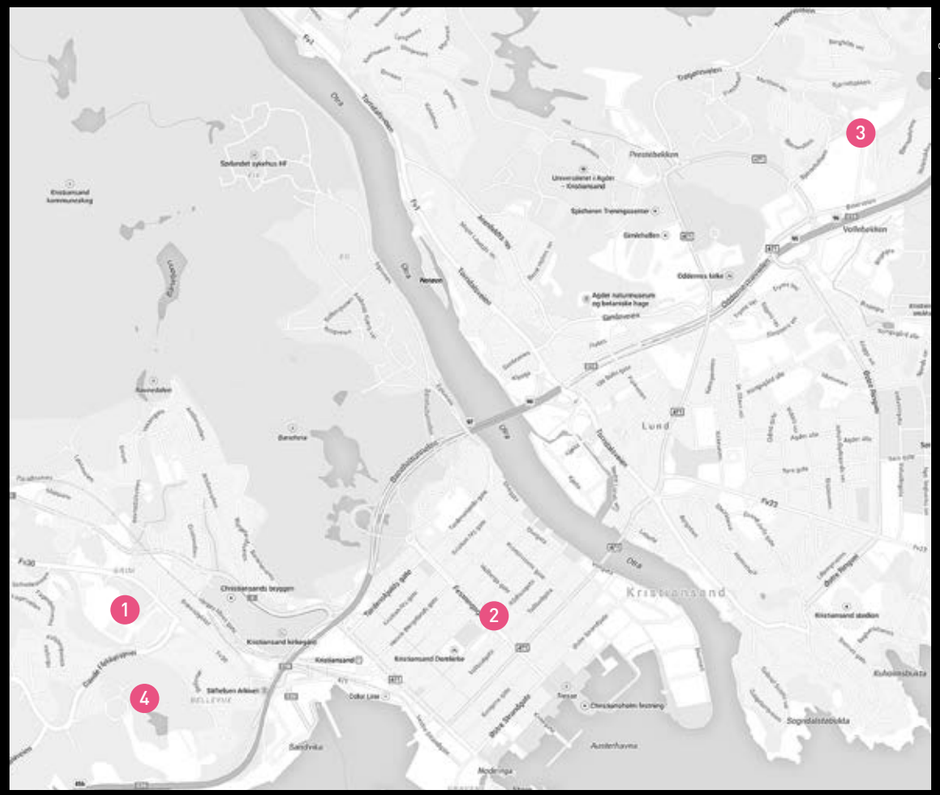
The building has water-based heating (radiation and convection), and an air-to-water heat pump as the primary energy source. In addition, there are solar thermal collectors mounted on the façades to make use of passive solar warming for preheating domestic hot water and the space heating system. The centre has a small glazed area toward the North, whilst toward the South a permanent solar-shading device is mounted. The building itself is situated so as to function as a screen for wind and noise. The façade consists of a combination of brick and timber cladding (Kebony). The building has a sedum roof and storm water from the roof is directed to a nearby river.

After two years in operation, Skien Municipality has compared the emergency centre's energy consumption with the municipality's nursing homes, which are also in operation twenty-four hours a day. Already in 2014, the building's first year of operation, the energy consumption was between half and (at best) one third of that of the other buildings.

ARCHITECTURAL LOW CARBON DIET

It all started with a wish to develop an environmentally friendly type of concrete with a reduced carbon footprint in connection with the Telemark Emergency Centre. Skanska added fly ash to the cement and gave it the name "low carbon concrete". Construction times were longer because the new concrete had longer setting time, but low carbon concrete was used in spite of this. This made a great impact on the greenhouse gas emission emissions. The concrete manufacturer Contiga has continued the production with a slightly lower substitution content in order to optimise setting times. For Skanska the next step is a collaboration with Norcem where they will look at the possibility to develop new binding agents that give the concrete even better environmental credential with shorter setting times. – It is clear that pilot projects, like the Telemark Emergency Centre, have a crucial role in developing these kinds of products for the market. There are business opportunities, but this depends on building projects of a certain size to create sufficient demand for innovative products, says Sverre Smeplass at Skanska.

KRISTIANSAND



© Google Maps

1 MØLLESTUA KINDERGARTEN
2 THE CITY HALL QUARTER
3 BJØRNDALEN
4 STJERNEHUS HOUSING CO-OPERATIVE

EXEMPLARY ACTIVE

Kristiansand Municipality participated in the Buildings of the Future programme with a housing co-operative and a private local plan. In addition to these two projects, the municipality has acted both as client and project manager.
The municipality chose its local plan project by inviting private developers to compete. The prize was to earn the title “District of the Future” and to become a pilot project in the Buildings of the Future programme.

– Buildings of the Future has been embedded in the municipality, at a political and an administrative level. A government programme led by ministers and ministries has an impact on the municipality. Approved pilot projects have received greater attention and better coordination. In terms of planning application fees, passive energy houses have been granted a 50 percent reduction. For the local plan project the emphasis has been on efficient coordination and organisation by the Planning Department, says Erik Sandsmark in Kristiansand Municipality.

Those involved with the pilot projects have benefited greatly from continuous communication, seminars and workshops with experts. This has increased knowledge in the municipality among architects, consultants, clients and contractors.
The pilot projects have given valuable experiences, with the building of passive energy houses and the rehabilitation of existing buildings to low-energy standard. The projects have also been important for testing future regulatory demands. Erik Sandsmark thinks it has been demanding to deliver good documentation for the greenhouse gas emissions.

– The collaboration with the Buildings of the Future programme has influenced the municipality as client in the right direction. We have established environmental criteria for municipal buildings. The Green Space Factor is already a topic in the development of plans and the use of the Blue-Green Factor will be included in the next revision of the municipal strategic plan. We will establish a climate adaptation group to follow planning processes. The municipality is also positive towards planning for bicycles, pedestrians and public transportation. We have been made more conscious of the connection between urban sprawl and reduced possibilities for planning for environmentally friendly transportation, says Sandsmark.

ERIK SANDSMARK
Advisor, City and Society Department
Kristiansand Municipality

MØLLESTUA KINDERGARTEN

Møllevannsveien 40, 4617 Kristiansand

CLIENT: Kristiansand Municipality
ARCHITECT: Amtedal & Hansen Arkitektkontor AS

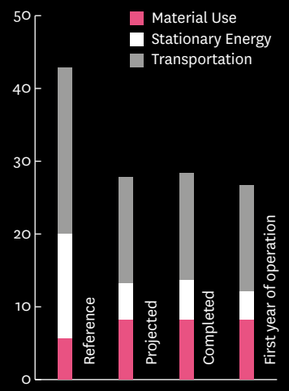
AREA: 1.260 sq. m.
COMPLETED: June 2011

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard/Plus energy standard during summer months
- Energy performance certification standard A (yellow)
- Energy: compact building envelope with extra insulation, solar thermal collectors, photovoltaic array
- Transportation in operation: reduced parking and rental of bicycles and trailers
- Educational kindergarten: user participation

CONTACT INFORMATION: Odd Gjestemoen, Kristiansand Municipality, 91 66 83 89, oddgjestemoen@kristiansand.kommune.no

MORE INFORMATION: http://www.arkitektur.no/mollestua-barnehage



Estimated in kg CO_2 equivalent per sq. m. per year

Main façade and outdoor area. Photo: Sidsel Jørgensen

The entrance area with blocks that shine with different colours depending on whether the kindergarten is producing electricity or receiving electricity from the grid. Photo: Sidsel Jørgensen

MØLLESTUA KINDERGARTEN

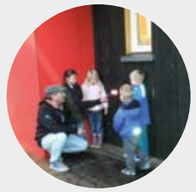
PASSIVE ENERGY PROJECT ON THE WAY TO PLUS ENERGY

Møllestua Kindergarten in Kristiansand was completed as a passive energy building in 2011. After three year of operation, valuable experience have been gained. By selling energy produced by the building's photovoltaic array to the grid during summer months, the building is paving the way to meeting the plus energy standard – the next generation of energy efficient buildings.

When Møllestua Kindergarten was to be upgraded in 2010, the existing building was considered unsuitable and demolished. Today, the new building accommodates 100 children and 29 staff, in six divisions on two floors. The kindergarten has accessibility for all with particular consideration for children with hearing difficulties. The kindergarten meets the passive energy standard, and is meeting some of the requirements of a plus energy building. By designing a compact and well-insulated building, optimised in terms of the site and location, the energy consumption has been reduced to a minimum. 384 solar thermal collectors have been installed on the roof, contributing to the production of hot water, and a photovoltaic array produces electricity. Surplus electricity is exported to the grid so that the kindergarten functions as a plus building during summer months.

Møllestua Kindergarten is a certified eco-lighthouse. The scheme includes an educational programme focusing on waste and consumption. In addition, the kindergarten will soon be expanded with an ecological kitchen garden and its own greenhouse where children can follow the development of a seed into a plant and, finally, finished produce.

Møllestua was one of the first projects to be included in the Buildings of the Future programme. When granted pilot project status the project had already reached a stage where the material specification could not be changed. The building has a larger carbon footprint from the material use than the reference project. This is mainly due to a structural systems in steel, the use of plasterboard, and glazed panels in interior walls, as well as large emissions and increased material use in connection with meeting the passive energy demands for U-values.



HOW DOES THE SUN CREATE PINK DOTS?

It is early in the morning at Møllestua Kindergarten. On the exterior wall are 73 shining, pink dots. The acrylic blocks are part of the artwork in the kindergarten, but the artwork also has an educational side. The colour of the light signals the building's current energy consumption. Present is Geir Nordstokkå from the Building and Real Estate Department of Kristiansand Municipality, together with four children. – When the sun shines on the roof, something "catches" the sunbeams and creates electricity. This is used among other things to produce light in the kindergarten. When the blocks shine red we are receiving electricity from the grid. When the blocks are white the kindergarten produces its own electricity, explains Nordstokkå.

CITY HALL QUARTER
Rådhusgaten, 4611 Kristiansand

CLIENT: Kristiansand Municipality
ARCHITECT: HRTB Arkitekter AS

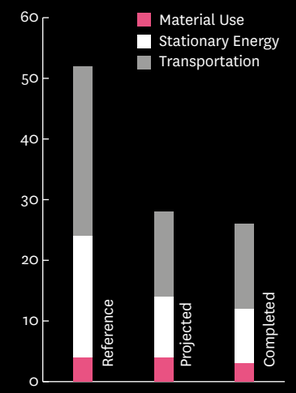
AREA: 13 300 sq. m.
COMPLETED: February 2014

IMPORTANT ENVIRONMENTAL FEATURES:

- Low-energy building
- Energy performance certification standard B (dark green)
- Rehabilitation and transformation of an existing quarter
- Energy: remote cooling (seawater from the fjord) and water-base heating
- Material: Reuse of building stock, environmentally sensitive demolition
- Transport in use: facilities for bicyclists, rental of electric bicycles

CONTACT INFORMATION: Arne Birkeland, Kristiansand municipality, 90 92 41 82, arne.birkeland@kristiansand.kommune.no

MORE INFORMATION: http://www.arkitektur.no/radalslien-bofellesskap



Estimated in kg CO_2 equivalent per sq. m. per year

The City Hall Quarter from the Stortorget square. Photo: Svein Tybakken, Kristiansand Municipality

Atrium with amphitheatre and the old fire tower in the background.
Photo: Svein Tybakken, Kristiansand Municipality

Indoor bicycle parking with rental of electric bicycles for staff.
Photo: NAL

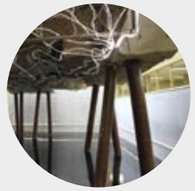
CITY HALL QUARTER

NEW CITY HALL IN AN OLD FIRE STATION

The highly regarded brick façade of Kristiansand City Hall stands adjacent to the historical square in the city centre, as it always has, but it now hides a modern and environmentally friendly office environment. The project meets the needs of the future while preserving the past.

The goal has been to establish a modern and forward looking administrative centre for the municipality – both to consolidate and to increase the efficiency of the administration and its accessibility for citizens. The City Hall is located in a quarter on the East side of the town square. It was a requirement that several of the façades facing the square and the old fire tower should be preserved. The establishment of a connecting lower ground floor made it necessary to lay new foundations for the existing structures and secure the old façades that were to be preserved. The fire tower now stands as an independent object in the middle of the new building, with the old stone foundations exposed at lower ground floor level. This is an example of what can be achieve through good cooperation between client, municipality, architect and the preservation authorities.

The main entrance from the town square leads into a spacious atrium with open galleries and an amphitheatre that leads down to meeting facilities on the lower ground floor. The building measures approximately 15 000 sq. m. where 2/3 is new build and 1/3 is rehabilitation. The City Hall Quarter today accommodates 430 workspaces, and emphasis has been placed on good working conditions that can satisfy the needs of both the present and the future. The best results in terms of reduced greenhouse gas emissions were achieved within transportation. The complex is located in the middle of the city centre and has no parking spaces, but excellent indoor bicycle parking facilities with the rental of electrical bicycles for the staff. Because some of the old façades were not secure against freezing, the insulation thickness was limited. This led to slightly lower results for operative energy than would otherwise have been expected.



FROM FIRE TOWER TO SCULPTURE

The 25-meter fire tower was erected in 1894 and weighs 565 tonnes. To ensure that the tower did not fall during construction the old stone foundations were reinforced with concrete and tie beams, resting on steel piles. To avoid subsidence damage, jacks were mounted on each pole. During construction, a steel frame was erected around the tower to receive lateral pressure. The tower now stands on 16 steel piles that reach 30 meters down into bedrock. The old stone foundations and the new poles are visible and accessible at the lower ground level, so that it is possible for visitors to see how the tower is supported.

BJØRNDALEN
DISTRICT OF THE FUTURE
Bjørndalen, Kristiansand

CLIENT: Skanska Bolig AS
ARCHITECT: Not chosen

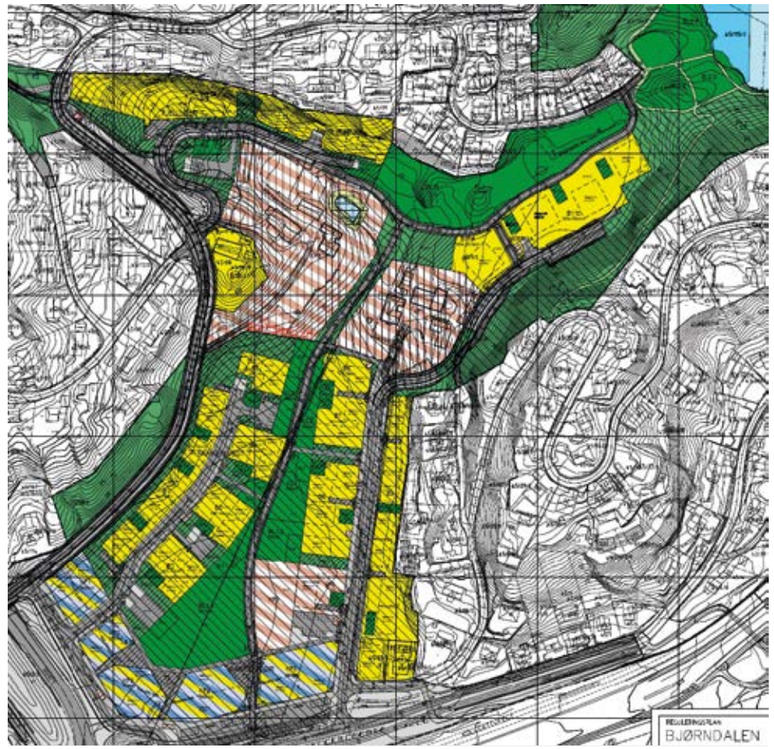
AREA: 61.360 sq. m.
COMPLETION: 2022

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Sustainable urban development and planning
- Energy goal: 100 percent CO_2 neutral energy delivery
- Storm water treatment: Blue-Green Factor tools are being considered

CONTACT INFORMATION:
Ole Morten Helland, Skanska Bolig, 92 85 15 92, ole-morten.helland@skanska.no

MORE INFORMATION: http://www.arkitektur.no/bjorndalen

Aerial view. Photomontage. Ill.: Rambøll



Master Plan. Ill.: Rambøll

BJØRNDALEN

A DISTRICT FOR THE FUTURE

Bjørndalen in Kristiansand is a new development East of the city centre. The area has a complex programme of housing, businesses and public institutions. The project has high ambitions for the reduction of greenhouse gas emissions, and thorough design and efficient use of area will make it possible to combine high quality with sound economics.

Bjørndalen is a pilot project that addresses all of the goals for local development in the Cities of the Future programme. 60.000 sq. m. can be constructed, with 38.000 sq. m. for housing and 22.000 sq. m. for housing and businesses. The project contains 500 dwellings, a kindergarten and mixed-use buildings for businesses and youth housing. Bjørndalen lies 2.5 km East of the city centre, but at the same time very central within the network of facilities and workplaces in the region. The area is designed for green mobility in the form of buses, bicycles and pedestrians. Lower and upper secondary schools, a university, a kindergarten and sports facilities are all within walking distance.

Some themes that are being discussed by the client, municipality and Buildings of the Future:
- Sizing and placement of parking facilities so that car use is reduced to a minimum. The use of planting and noise screening to make bus stops more attractive.
- Management of storm water in a small stream through the area and removal of a pocked of cold air that might arise in outdoor areas.
- How the area toward the main road can become an attractive and sunny square with businesses and service facilities at ground floor level. It will be important to screen against traffic noise from the main road in an urban manor that does not look like a traditional noise screen.
- Knowledge resources have been funded by the Norwegian State Housing Bank and workshops have been hosted to consider economics of building integrated photovoltaic arrays.
- An application will be made to Innovation Norway for resources to consider the economics of using cross-laminated timber panels in larger projects with a great deal of standardisation.

Necessary changes to the local plan are being conducted, and the intention is to begin design work early in 2015. The construction of infrastructure will begin in the spring of 2015.

PHOTOVOLTAIC PANELS AS A NATURAL PART OF BUILDING TRADITIONS

The goal is to create a pilot project that combines rational building and sound economics with high environmental ambitions and good architecture. This could be an example of great relevance. The technical natural science research institute (Tekna) is a central participant in this project. – The Norwegian State Housing Bank has donated 500.000 NOK in knowledge resources so that we can find good solutions for making photovoltaic panels a natural part of the architecture in the Bjørndalen area, says Erik Sandsmark, spokesperson for the Cities of the Future programme in Kristiansand Municipality.

STJERNEHUS HOUSING CO-OPERATIVE

Kobberveien 20, Grim,
4616 Kristiansand

CLIENT: AL Stjernehus Housing Co-operative
ARCHITECT: Spiss Arkitektur & Plan AS

AREA: 4.550 sq. m.
COMPLETED: March 2015

IMPORTANT ENVIRONMENTAL FEATURES:

- Low-energy standard class 1
- Energy performance certification standard B (dark green)
- Energy efficient rehabilitation
- Improving of standard of dwellings
- Result oriented co-operation between client, architect/ engineers, contractors and users

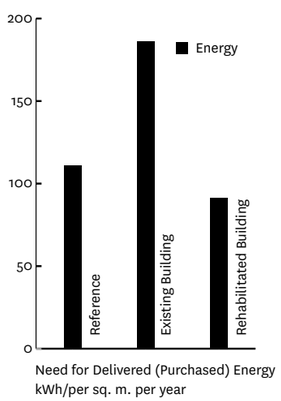
CONTACT INFORMATION: Odd Helge Moen, Sørlandet Boligbyggelag, 48 19 00 76, ohm@sorbbl.no

MORE INFORMATION: http://www.arkitektur.no/stjernehus-borettslag-oppgradering

Estimated in kg CO_2 equivalent per sq. m. per year

Apartment building upgraded March 2014. Photo: Svein Erik Bjorvand

Photomontage, apartment building after rehabilitation. Ill.: Spiss Arkitektur & Plan



Need for Delivered (Purchased) Energy kWh/per sq. m. per year

KRISTIANSAND

STJERNEHUS HOUSING CO-OPERATIVE

REHABILITATION AND ENERGY EFFICIENCY IMPROVEMENT OF EXISTING APARTMENT BUILDING

The eleven-storey Stjernehus, "Southern Norway's coldest housing co-operative", has completed a programme of rehabilitation and energy efficiency improvement. Results from this project will be valuable for other housing co-operatives, especially with regards to process.

Stjernehus was built in 1965 and contains a total of 60 apartments over 10 floors, and a basement. The building had a significant need for rehabilitation and maintenance. For example, there were considerable thermal bridges in the concrete structure that led to a large heating requirement. The co-operative eventually agreed to raise their ambition to low-energy standard class 1 and that CO_2 emissions would be reduced by 69 percent. Since the building has a very visible location within the Kristiansand skyline, the architectural design of the rehabilitation was considered important. Walls, floors and roofs were given extra insulation. The thermal bridges were identified using thermography and removed or minimized. The façades were checked for asbestos and the building was re-clad. Windows and doors were replaced and new glassed-in balconies were mounted without structural contact with the internal concrete structure. Balanced ventilation with heat recovery was installed and oil boilers are gradually being replaced with district heating.

Wind is the most important microclimatic challenge in the area. Particular focus has been placed on use of wind-proof solutions and maintenance friendly materials in the project. Glassed-in balconies form outdoor spaces that are protected from wind and weather. This increases comfort and the use of the balconies, as many of the apartments have a very good view. Thanks to a constructive collaboration between experts, the co-operative committee and the residents, Stjernehus has met expectations. A good collaboration and an open dialogue have also led to residents feeling confident in the process and the result. In connection with the rehabilitation, Sørlandet Boligbyggelag has participated in two research projects: BESLUTT and BEVISST. The results have value for other co-operatives. The work was begun in April 2014 and completed in March 2015.

A GOOD ATMOSPHERE – IN THE BUILDING – AND AMONG THE RESIDENTS

In a housing co-operative, it can be difficult to reach agreement on rehabilitations. The Stjernehus co-operative committee took the necessary time and energy to inform all the residents about the plans and gave them the opportunity to comment. The committee received full support and the process strengthen the sense of community in the co-operative. The research projects BESLUTT and BEVISST offered help along the way, and a guide has been written that can be of use for other housing co-operatives that are about to embark on rehabilitation, says committee leader Sven Arild Bransdal and Odd Helge Moen, Technical Director of Sørlandet Boligbyggelag.

SANDNES

© Google Maps

1 NEW CITY HALL SANDNES
2 HAVNEPARKEN SANDNES

IT ALL HANGS TOGETHER

Through collaboration with the Buildings of the Future programme, energy, climate and the environment been put on the agenda for politicians, planners and procures in Sandnes. They are now making new demands of the local building industry.

– The core values of Buildings of the Future have been meet in the design of several building projects under municipal supervision in Havneparken Sandnes, which is our urban development in the old harbour area. Together with Buildings of the Future we have challenged ourselves in different ways. We need to think of the environmental criteria in all the decisions we take regarding the vision, infrastructure, zoning, detailed development and construction, to be able to fulfil the criteria, says Head of Environmental Protection, Hans-Ivar Sømme.

Sandnes Municipality has launched an open architectural competition where the new City Hall will be an example for other developers in the area. Good energy solutions have also influenced the ambitions for building projects that are not pilot projects. Among others, the old hospital has been rehabilitated as the new Sandnes Health Station with energy performance certification standard B.

– It has been both stimulating and challenging to work on the pilot projects, but it is clear that it costs to be part of such developmental work. Some consider only the increased costs of the design and investment phase, but in the long-term reduced energy costs and increased knowledge should compensate for this, says Sømme.

HANS-IVAR SØMME
Head of Environmental Protection,
Sandnes Municipality

Sandnes Municipality's Planning Department will follow-up on the pilot projects in the future and Cities of the Future coordinators will be involved in the planning processes. This is particularly true for zoning and transportation, energy in building, and consumption and waste. Sandnes has a tradition of making parking spaces available in the city centre, but is now working on new solutions. Climate adaptation is challenging because of the city's location on landfilled areas, but good cooperation with the climate adaption network and thorough work on municipal strategy plan ensures that this is now being considered.

Cities of the Future is well embedded in the municipal administration, both politically and administratively, and the level of knowledge has increased. The networks of experts have been significant in this context. Meetings and seminars have also contributed.

– It could become demanding to keep and develop this knowledge without the positive force the networks have represented. Buildings of the Future have also been enthusiastic about improving the practices of the building industry in general. This relates directly back to the demands and expectations that the municipality makes of new building projects, Hans Ivar Sømme says.

PILOT
PROJECTS

NEW CITY HALL, SANDNES
Havneparken, 4306 Sandnes

CLIENT: Sandnes Eiendomsselskap KF
Architect: Code of Practice Architects GmbH

AREA: approx. 11.300 sq. m.
COMPLETION: Planned for 2018

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Central location: Public transportation and design for bicyclist/ pedestrians
- Central development: Attractive arenas and meeting places
- Architectural competition: Aesthetics and architecture will be a focus

CONTACT INFORMATION: Jarle Angelsen, Sandnes Eiendomsselskap KF, 99 08 10 34, jarle.angelsen@sandnes.kommune.no

MORE INFORMATION: http://www.arkitektur.no/nytt-radhus-sandnes

Aerial perspective. Photo: Sandnes municipality

Perspective. Ill.: Code of Practice Architects GmbH

Interior perspective. Ill.: Code of Practice Architects GmbH

NEW CITY HALL, SANDNES

THE CITY HALL SETS THE STANDARD FOR THE ENTIRE AREA

As the first building in Havneparken Sandnes, the new City Hall will set the standard both in terms of architectural quality and environmental ambitions.

The building will be a “beacon” and an example for future projects. It will accommodate all of the core functions for the municipality and contain meeting rooms for the City Parliament and the Municipal Executive Board, service facilities and workspaces for 350 employees. The 4269 sq. m. site combined with the permitted volume gives the possibilities for 11.000 sq. m. gross area over four floors. The new City Hall’s location and significance suggests that it will become an iconic building, both for the citizens and for the recently initiated transformation of the area. To ensure that the building is designed with high architectural quality, an open architectural competition was held in autumn 2014. 56 proposals were received and the competition was finalised in March 2015. The winner was the German architectural office Code of Practice Architects GmbH.

The building will meet the passive energy standard. The approved local plan for the area requires that all building are to be able to make use of a district heating system. Apart from this the building is being planned with particular emphasis on environmentally friendly materials, spatial efficiency and the accommodation of public transportation.

THE ART OF CONVINCING AN EXECUTIVE BOARD

In Sandnes the new City Hall was going to set the tone for all other development in Havneparken. The City Hall was going to be an icon of architectural quality and environmental ambition. It was therefore surprising when the Executive Board, in April 2014, in opposition to the Deputy Mayor’s clear recommendation, decided that there would not be an architectural competition. Instead the board decided on a design and build contract with design proposals as the basis for adjudicating. The decision led to criticism in the media and involvement by the residents. NAL’s competition leader Per Rygh characterized the decision as unwise and unusual.

– Actually I do not know of any other large city municipalities that has chosen to build a City Hall without an architectural competition, Rygh said. Later the same month the City Board changed their decision in favour of an invited architectural competition. Following Rygh’s comments, this was changed this to an open competition.

HAVNEPARKEN SANDNES
Havneparken, 4306 Sandnes

CLIENT: Sandnes Eiendomsselskap KF
ARCHITECT: Not yet chosen

AREA: 150.000 sq. m.
PROJECT PERIOD: 2012–2025

IMPORTANT ENVIRONMENTAL FEATURES:
- Strategic, interdisciplinary design
- Requirement for meeting the passive energy standard
- Reduced parking
- Green mobility
- Climate adaptation

CONTACT INFORMATION: Hans Ivar Sømme, Sandnes Municipality, 51 33 57 05, hans.ivar.somme@sandnes.kommune.no

MORE INFORMATION: http://www.arkitektur.no/havneparken-sandnes

Aerial perspective. Ill.: Space Group Company

Waterfront. Ill.: Space Group Company

Park area. Ill.: Space Group Company

HAVNEPARKEN SANDNES

HAVNEPARKEN SANDNES

The old harbour area in Sandnes City Centre will undergo an extensive transformation between now and 2025. The ambition is that this will become a model of sustainable urban development with an emphasis on quality.

In connection with the development, an environmental strategy has been written in accordance with the Buildings of the Future criteria. Sales agreements for sites refer to the environmental strategy in order to ensure that those intentions are realised in individual building projects. The public company Sandnes Tomteselskap KF, has an important role in the development and has been an intermediate owner for approx. 60 percent of the site area before resale to private developers.

The local plan area is 102 decares, an allows for the construction of a maximum floor area of 150.000 sq. m. New buildings will accommodate public activities and housing, as well as offices and businesses. All building projects in the Havneparken area will satisfy the demands of passive energy standard. In the most central areas, demands have been made for commercial units at ground floor level. This is important in order to ensure an active city centre throughout the day. The first building project in the area is under construction. At the same time an open architectural competition for the new City Hall, planned to be completed in 2018, has been held.

The company Sandnes Indre Havn Infrastruktur (SIAS), which is jointly owned by the municipality and private landowners, is responsible for the development of all infrastructure in the area. There is a maximum requirement for parking spaces in the environmental strategy. A shared car park is also planned in the area. The first building projects do not have parking spaces included in their designs. Havneparken lies adjacent to existing public transportation hubs and is planned for green mobility. Lyse delivers renewable energy to the district through the installation of a district heating and cooling system based on water from the fjord. Other environmental features include elevated terrain in connection with rising sea levels and flooding, as well as storm water management and green roofs.

THE MUNICIPALITY SETS THE STANDARD!

– We will make sure that all developers in the Havneparken area will build in an environmentally friendly way. We do so by holding an open architectural competition for the new City Hall. It will be so attractive and environmentally friendly that all other developers will understand that they need to meet similar standards. The municipality will set the standard, says Head of Environmental Protection, Hans Ivar Sømme, Sandnes Municipality.

STAVANGER

© Google Maps

1 HUSABØRYGGEN SHELTERED HOUSING
2 VÅLANDSHAUGEN KINDERGARTEN
3 OFFICE BUILDING TROLL
4 ØSTRE HAGEBY
5 VINDMØLLEBAKKEN

MAIN FOCUS ON ENERGY

An important experience from the work in Stavanger is that contractors often deliver technical systems that do not work as they should. Thanks to the Buildings of the Future programme we are now measuring results in a way that highlights this. – It is necessary to agree routines for handover and follow-up with contractors, says Gerd Seehuus, Project Leader for Cities of the Future in Stavanger.

Through the Buildings of the Future programme, Stavanger Municipality has received knowledge and access to a network. The municipality now places more emphasis on sustainability and has been introduced to the passive energy concept. The Planning Department is more involved with the pilot projects than usual.

– We have worked hard to bring new and old solutions together. Many stakeholders need to be coordinated. The programme is anchored in the political and administrative leadership and we are now working systematically to embed experiences in the organisation, says Gerd Seehuus.

GERD SEEHUUS
Project Leader,
Stavanger Municipality

PILOT
PROJECTS

HUSABØRYGGEN SHELTERED HOUSING
Sagafjords vei 1, 4085 Hundvåg

CLIENT: Stavanger Municipality
ARCHITECT: Brandsberg-Dahls Arkitektkontor AS

AREA: 3250 sq. m.
COMPLETED: Summer 2013

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard B
- Loadbearing structures, floor slabs and rooves in cross-laminated timber panels.

CONTACT INFORMATION: Espen Svendsen, Stavanger municipality, Operation & Energy Department, 51 50 74 09, espen.svendsen@stavanger.kommune.no

MORE INFORMATION: http://www.arkitektur.no/husaboryggen-bofellesskap

Entrance from the garden. Photo: Hans-Christian Knudsen, Brandsberg-Dahls Arkitektkontor

Entrance façade. Photo: Hans-Christian Knudsen, Brandsberg-Dahls Arkitektkontor

Interior. Photo: Hans-Christian Knudsen, Brandsberg-Dahls Arkitektkontor

HUSABØRYGGEN SHELTERED HOUSING

HUSABØRYGGEN SHELTERED HOUSING

At Hundvåg in Stavanger 24 dwellings with passive energy standard have been completed. The building is constructed with a compact volume, extensive use of cross-laminated timber panels, and timber exterior cladding.

The sheltered housing has three separate areas: two for residents with mental disabilities and one for residents with psychiatric illnesses. The site is part of a larger developmental area in the district. The terrain slopes slightly toward the south with good solar access. Based on an analysis of the microclimate the building is located at the Northern end of the site – in order to provide shelter from the wind, and to make space for a sunny garden to the South.

The areas for residents with mental disabilities is located over two floors at the Western end. The psychiatric area is on the upper level due to safety considerations for this group of residents. All area have common rooms with access to balconies and terraces. Husabøryggen is built to the passive energy standard, with a loadbearing structure of cross-laminated timber panels, and is designed in accordance with the principles of accessibility for all. The building is design for simple orientation through the clear organisation of functions and conscious use of contrasting colours. Common areas are equipped with audio induction loops and acoustic measures have been taken in common areas and corridors.

A GARDEN FOR ALL SENSES

The smell of oregano. All imaginable nuances of green. The sound of a white wagtail. The outdoor area at Husabøryggen Sheltered Housing is shaped like a modern garden of the senses with organic lines, colours and plants that vary throughout the season. The main part of the outdoor area lies on the sunny Southern side. A pathway winds between small knolls in the terrain, and seating is available near an ashlar wall, to rest and enjoy the sun, or watch small birds fight for a place at the birdbath, or if it should start to rain, seek shelter in the small garden pavilion. The garden will function as a recreational area for all residents and an important principal for the design is that different groups can use the garden at the same time and still experience it as their own. The landscape architect solved this task by creating natural divisions with pergolas, espaliers and small variations in height.

– The Garden of the Senses is a natural extension of the sheltered housing's common recreational areas and enriches everyday life for both residents and staff, says landscape architect at Asplan Viak, Randi Thomsen.

VÅLANDSHAUGEN KINDERGARTEN, STAVANGER

Jørgen Moes gate 9, 4011 Stavanger

CLIENT: Stavanger Municipality – Stavanger Eiendom
ARCHITECT: Abacus AS

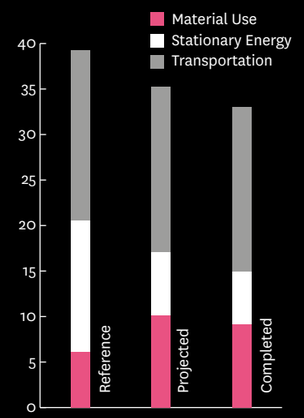
AREA: 830 sq. m.
COMPLETED: December 2012

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard A (light green)
- Thermal mass
- Natural and low-emission materials
- Flexible floor plans

CONTACT INFORMATION: Espen Svendsen, Stavanger Municipality, Operation and Energy Department, 51 50 74 09, espen.svendsen@stavanger.kommune.no

MORE INFORMATION: http://www.arkitektur.no/valandshaugen-barnehage



Estimated in kg CO_2 equivalent per sq. m. per year

Façade toward outdoor area. Photo: ABACUS

Southern façade with solar thermal collectors. Photo: ABACUS

Sedum roof. Photo: ABACUS

VÅLANDSHAUGEN KINDERGARTEN

STAVANGER'S MOST FUN AND ENERGY EFFICIENT KINDERGARTEN

A new kindergarten in Stavanger with an original architectural design, passive energy standard, semi-climatised zones and environmentally friendly building materials.

Vålandshaugen lies at the top of the Våland district in Stavanger. The local centre and public transportation is only a short distance away. The building has four departments with separate entrances. The developer wanted to use as many natural and environmentally friendly building materials as possible. Timber and stone has been used extensively, and the exterior it clad with heartwood pine. Inside, solid wood oak floors have been laid in playrooms, and all surfaces have environmentally friendly treatments. Reuse of furniture has been a focus area, and a large oak table was bought from a local sawmill. It is now an art table for the children. Extra sound-absorption measures were taken in the kindergarten. The parents report that their children less tired when they come home and are less noisy.

The kindergarten meets the demands of the passive energy standard. The building's shape takes wind and sun conditions into account. Toward the South, the building has a 25-degree gradient and opens up to let sunlight in. Passive solar heat is stored in thermal mass. Energy for space heating comes from two energy wells that are connected to a water-to-water heat pump. On the Southern wall solar thermal collectors are mounted. Energy from the solar thermal collectors is stored in the energy wells during summer months and used during the winter. A sedum roof retains rainwater and is part of the storm water management strategy

At the start of Buildings of the Future, this project had come far in the design phase. Many important choices were made regarding building materials and this is reflected in the greenhouse gas emission figures where the footprint from building materials is higher than of the reference building. This is mainly due to use of concrete in the first floor slab and steel loadbearing structure.

A SMALL FAIRY-TALE

The kindergarten has wooden panels that will turn grey, with colourful holes in different sizes. The building has a slightly strange slanted shape and is situated between a residential area and a green knoll with an odd tower on top, the Våland tower. This is a lookout tower, which was erected in 1895 and was the watchman's residence for the city's first fresh water reservoir. Before today's Våland tower was built another tower stood in the same place. This tower was erected during the Napoleonic war between 1807 and 1814. The tower was called Vålandspibå, a name that is still used for the present tower. The tower, together with the kindergarten's almost futuristic, simple and playful shape, gives the place a fairy-tale like atmosphere.

TROLL, HINNA PARK
Jåttåvågen, 4020 Stavanger

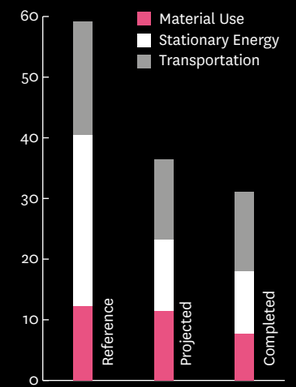
CLIENT: Troll Næring AS
ARCHITECT: Eder Biesel Arkitekter AS

AREA: 8300 sq. m.
COMPLETED: October 2013

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard A (light green)
- Structure and material use: Use of materials with low CO_2 emissions
- Compact building shell
- Solar thermal collectors

CONTACT INFORMATION: Hilde Sund, Hinna Park AS, Development Leader, hilde.sund@hinna-park.no

MORE INFORMATION: http://www.arkitektur.no/kontorbygget-troll



Estimated in kg CO_2 equivalent per sq. m. per year

Interior, from the atrium. Photo: Norbert Miguletz

Main façade with entrance. Photo: Norbert Miguletz

Southern façade with water surface.
Photo: Norbert Miguletz

OFFICE BUILDING TROLL

A CHARACTERISTIC OFFICE BUILDING IN JÅTTÅVÅGEN

In Jåttåvågen, between Stavanger and Sandnes, oil platforms for the North Sea were formerly constructed. Now the area is being transformed into a district with a clear environmental profile. When you stand by the railway station and look down at the bay, the office building Troll is easily distinguishable, lighting up the surroundings with its refined metal façade and characteristic shape.

Jåttåvågen lies by the Gansfjord halfway between Stavanger and Sandnes. It is easily accessible due to a double-track railway, high-frequency bus lines and a deep-water dock. As a demonstration of the art and power of engineering, a diagonal concrete tower (an oil platform leg) stands in the middle of the axis between the railway station and the fjord. On the right-hand side of this axis lies Viking Football Stadium, with several cultural facilities and shops facing the street. On the left-hand side are industrial buildings with cafés and other facilities. The office building Troll, with its distinct architecture, is the most profiled of these. In Jåttåvågen, Stavanger Municipality wishes to create an active urban area with a good mix of housing, commerce, services and workplaces. The area has the city's largest and most modern upper secondary school and the University of Stavanger is only a bicycle ride away. The area is also a centre for knowledge for sports and health. The stadium houses large cultural events. A mobility survey has not yet been conducted, but reduced car usage is possible. There are a limited number of free parking spaces, the public transportation system is good, and the construction of a bicycle lane between Stavanger and Sandnes has begun.

Construction of the office building Troll began in June 2010 and was completed in October 2013. It is constructed to the passive energy standard and has energy performance certificate standard A. The podium is rectangular with three floors above ground level. There are two towers, one with two floors and one with five above this. On the lower floors a central atrium in the shape of a "cleave" in the building volume provides light and transparency to the interior. A diagonal wall marks the building's main entrance. The windows are deep-set and have colourful frames that create variation. The façades are clad with galvanized steel plates with a characteristic shimmering play of light.

THE TROLL BUILDING GLIMMERS DISCRETELY – JUST LIKE THE ARCHITECTS HAD IMAGINED IT WOULD.

The office building Troll has already become a landmark in Jåttåvågen. When the building was finished, the client organisation was surprised at how much it looked like the first sketches they had been shown. The architects Vilhelm Eder and Christine Biesel of Eder Biesel explain that this is due to good teamwork, a professional client and last, but not least, a good structural engineer. – We worked long and hard to realise our ambitions with regards to the façades clad with galvanized recycled steel. Accounting of greenhouse gas emissions showed that this material was the second best after timber. This was an important argument when convincing the client. When it also turned out to be inexpensive, there was no reason to hesitate, says Vilhelm Eder.

ØSTRE HAGEBY
Åkragata 6-16 og 22-32, 4015 Stavanger

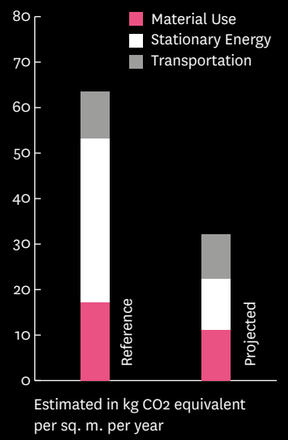
CLIENT: Ineo Eiendom AS,
Base Propert AS
ARCHITECT: Eder Biesel Arkitekter

AREA: 9800 sq. m.
COMPLETION: December 2015

IMPORTANT ENVIRONMENTAL FEATURES:
Passive energy standard
Energy performance certificate standard A (light green)
Low-temperature district heating
Storm water management

CONTACT INFORMATION: Johnny Galta, Ineo Eiendom, 90 26 36 43, johnny@ineoeiendom.no

MORE INFORMATION: http://www.arkitektur.no/ostre-hageby



Estimated in kg CO_2 equivalent per sq. m. per year

View from the balcony in one of the apartments. Ill.: Eder Biesel Arkitekter

Life between buildings. Ill.: Eder Biesel Arkitekter

Aerial perspective. Ill.: Eder Biesel Arkitekter

ØSTRE HAGEBY

RESIDENTIAL AREA WITH AMBITIONS

Østre Hageby is a new residential area in Stavanger where alternative, renewable energy sources and the use of environmentally friendly building materials is gaining ground. The long-term ambition is that buildings can be upgraded to plus-house standard, and that they deliver electricity to a local smart grid.

Østre Hageby is centrally located at Rosenvang in Stavanger, in close proximity to public transportation, schools, kindergartens and local facilities. The site connects directly to a green space with pedestrian routes and paths that lead to a larger, public recreational area. The buildings are adapted to the terrain and have a “comb structure”, with one long building along Åkragata street and five rows of urban terraced houses (with two floors) at right angles to this. Østre Hageby will contain 66 dwellings in total, 7 three-storey terraced houses, 33 two-storey terraced houses and 26 apartments with one or two storeys.

With compact volumes, high-standards of constructions, high quality building materials, and by making use of solar energy, the houses at Østre Hageby will achieve passive energy standard and energy performance certification standard A. In the long-term, the buildings will be upgraded to zero-energy or plus house standard. The energy source is a geothermal heat pump connected to energy wells with a depth of 200-metres. These are drilled in connection with the parking basement where the district heating system with heat pumps and pools for thermal storage are located. By upgrading each house with approximately 45 sq. m. of photovoltaic panels, the residential area will deliver surplus energy to the grid in the future, thus functioning as a producer of energy in the area. The buildings are built with degradable materials including the loadbearing structure, surfaces, details and other components. The primary material is timber.

READY FOR THE FUTURE

In Østre Hageby the houses are ready to connect with the future’s climate-smart electricity supply. The term Smart Grid is used for the next generation of electrical networks, where one employs advanced communication technology to exploit the energy infrastructure better. Renewable energy sources like wind power and bio-energy entail a shift from the centralised solutions of today to a decentralised and flexible energy infrastructure of the future. When plus houses become the norm the electricity grid will need to be able to handle the export of surplus electricity. With new smart electrical meters, homeowners get access to precise consumer data that can be used to control the electrical grid and the production of energy. Even without using less energy, we can reduce the total energy consumption by using energy in a smarter way.

VINDMØLLEBAKKEN
Vindmøllebakken 2, Storhaug,
4014 Stavanger

CLIENT: Helen & Hard AS,
Kruse & Smith
ARCHITECT: Helen & Hard AS

AREA: approx. 5000 sq. m.
COMPLETION: 2017

IMPORTANT ENVIRONMENTAL FEATURES:

- Low-energy design corresponding to passive energy standards
- Energy performance certification standard A (dark green)
- Compact, low structure, timber construction is being considered
- Environmental adaptation: green surfaces/roofs/roof terraces, permeable surfaces
- Common areas and opportunities to reduce one's own use of space; gaining by sharing
- Outdoor areas: attractive arenas and meeting places, social living, urban environment

CONTACT INFORMATION: Ane Dahl, Helen & Hard, architect, 51 55 43 70, ad@hha.no

MORE INFORMATION: http://www.arkitektur.no/vindmollebakken

Common areas. Ill.: Helen & Hard

Street space. Ill.: Helen & Hard

Aerial perspective. Ill.: Helen & Hard

VINDMØLLEBAKKEN

CLOSE COMMUNITY IN A MODERN TIMBER TOWN

Vindmøllebakken is a reinterpretation of the compact and low, traditional wooden houses in Stavanger. 16 of the total 48 apartments will be gathered in an environmentally friendly shared house. Here green urban surroundings, community, and sharing will create attractive living conditions and contribute to spatial and resource efficiency.

The whole project is planned as a compact and low structure in wood. This ties the project in with the surrounding timber houses. The old industrial buildings from Eastern Stavanger's canned-goods period will be reused and will accommodate businesses, civic functions and roof gardens. In addition to this, the quarter will contain approximately 50 dwellings including the shared house. Potential buyers of the apartments in the "Vindmøllebakken sustainable shared house" have participated in seminars and workshops to develop the scheme. The other dwellings will vary in size, but none will be smaller than 50 sq. m.

Rows of houses form diagonal steps down the sloping terrain. Between the rows are located sheltered, varied and car-free spaces. Here people can spend time, grow herbs and vegetables between the climbing plants, and children can play. These spaces also connect with the surrounding area. This, combined with roof terraces, makes sunlight and views available to all the dwellings. The streetscape end in a common playground, which is a continuation of the green area at Svankevika in the North. A passage has been created across these street spaces through the buildings. This connects the street spaces with the playgrounds.

The area will be a green city landscape with cars parked underground. The parking provision is 0.8 cars per dwelling. This is below the norm. The shared house will have a car pool with seven cars. All the housing units have parking spaces for three bicycles and there will be a bicycle workshop in connection with the shared house.

SHARING IS PROFITABLE

Vindmøllebakken takes sustainability seriously. Social, ecological and economical qualities are discussed with the residents. Here the "gaining by sharing" model is employed – this concerns the individual and common rewards that can be gained by doing more together and sharing more with each other in everyday life. This model is developed through a collaboration between Helen & Hard AS, Gaia Trondheim and Kruse Smith AS. The foundation for the work is Helen & Hard's relational design philosophy and method: To create environmentally sound solutions we need to explore the potential for reciprocal exchange between people, surroundings and material resources. The collaboration with the programme "The Edible City District" will inspire the residents to grow herbs and vegetables on the rooves and in the street spaces.

BERGEN

© Google Maps

1 RÅDALSLIEN SHELTERED HOUSING
2 SØREIDE SCHOOL
3 FJØSANGERVEIEN 213
4 VISUND, HAAKONSVERN
5 NØSTEGATEN 65A
6 INDRE ARNA

BERGEN GOT A MOVE ON IN 2014

The Buildings of the Future programme has contributed knowledge and start-up help, especially this past year. The programme has been very inspiring for the many participants in the pilot projects. The local breakfast meetings have been very popular, says consultant Elisabeth Sørheim in Bergen Municipality.

Bergen Municipality has its own environmental department and decided early on that all new municipal buildings would have passive energy standard and that passive energy and plus house buildings would have reduced fees when applying for building permission (a 50 percent reduction for passive energy standard and a 75 percent for plus energy standard). Rådalslien shared housing was their first pilot project with Buildings of the Future. It was constructed as a passive energy house with cross-laminated timber panels and was completed in 2011. The building was delivered within budget, but was still so costly that the developer Bergen Bolig- og Byfornyelse KF departed from this standard for a while. With Søreide School the contractor Skanska calculated lifecycle costs for 25 years of operation and concluded that the passive standard would be profitable. The project group found out early on that the only way to meet the Buildings of the Future's criteria for a 50 percent reduction of greenhouse gas emissions for material specification was to build with timber. This turned out to be an interesting challenge. Collaboration with Buildings of the Future on this project has led to a more positive attitude to passive energy buildings and of timber construction.

– In 2014, the municipality got the strategic plan project for Indre Arna under way. They have carried out parallel commissions to highlight possibilities and are now considering using klimagassregnskap.no (online climate gas emissions accounting) or BREEAM communities to measure results. Buildings of the Future has contributed constructively to programming the parallel commission. The programme's environmental ambitions are higher and there is an awareness regarding the need for a unified energy, transport and parking strategies. To achieve successful urban development in this district in the years to come it is important to achieve a good cooperation between city planners and mobility consultants, both internally in the council and with external stakeholders such as the National Rail Administration and the Public Roads Administration, Sørheim points out.

Thanks to one person being given the task of bringing in new pilot projects, several private developers have submitted projects in 2014, but these are still at a very early stage. Buildings of the Future has also contributed to local network and knowledge building, including breakfast meetings that are a collaboration between the municipality, State Housing Bank, Hordaland County Administration, the Hordaland County Governor, Bergen University College and Bergen School of Architecture. – Through breakfast meetings and pilot projects Buildings of the Future has influenced the building industry in the Bergen area, Sørheim concludes.

ELISABETH SØRHEIM
Special Consultant, Environmental Department, Bergen Municipality

RÅDALSLIEN SHARED HOUSE

Rådalslien 35, 5239 Rådal, Bergen

CLIENT: Bergen Bolig og Byfornyelse KF
ARCHITECT: Arkitektgruppen Cubus AS

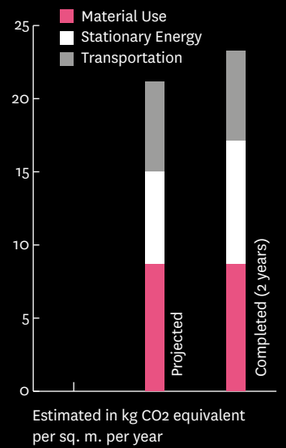
AREA: 1000 sq. m.
COMPLETED: January 2011

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard A
- Interdisciplinary research project
- Timber: loadbearing structure, floor slabs, exterior and interior walls
- Evaluation and optimisation during the operational phase

CONTACT INFORMATION: Harald Holmås, Bergen Bolig og Byfornyelse KF, 55 56 56 26, harald.holmas@bergen.kommune.no

MORE INFORMATION: http://www.arkitektur.no/radalslien-bofellesskap



Estimated in kg CO_2 equivalent per sq. m. per year

Photo: Arkitektgruppen Cubus. Rune M. Karlsen

Photo: Arkitektgruppen Cubus. Rune M. Karlsen

RÅDALSLIEN SHELTERED HOUSING

SET A NEW STANDARD FOR ENVIRONMENTAL BUILDINGS IN BERGEN

Rådalslien Shared Housing was Bergen's first pilot project in the Buildings of the Future programme and the first municipal passive energy project in the country. As part of Bergen Municipality's strategy to reduce the carbon footprint, the building has a structure of cross-laminated timber panels.

The building was completed in January 2011 and is designed by Arkitektgruppen Cubus. Located in Rådalslien on the outskirts of Bergen, it contains ten sheltered housing units with lifetime homes standard. The apartments are 50 sq. m. and consist of a living room, a kitchen, a bedroom and a bathroom. There are five apartments on each floor. Additionally, the building has a common lounge, offices, changing facilities, and overnight staff facilities. Outside the main building are two buildings, one for the storage of sports equipment, and the other a service building. The entire complex house is designed to be accessible for all. The location on a sloping Westward site gives excellent sun conditions. All the apartments have balconies or terraces.

The project has been important in gaining experiences about forward-looking environmental and energy measures in line with the municipality's climate and environmental action plan. Experience showed that it was difficult to get private clients in the region to accept the demands of the passive energy standard. With Rådalslien, Bergen Municipality has set an example. The ambitions for the project were high, both architecturally and environmentally, and it was the municipality's goal to demonstrate that these qualities did not oppose each other. They were successful.

Rådalslien Sheltered Housing was one of the first pilot projects with the Buildings of the Future program to be completed. In spite of the use of cross-laminated timber floor slabs, greenhouse gas reductions from material specification were modest. This is partly due to the use of plaster with a large carbon footprint. The project should however be regarded as a success since the experiences have been valuable to the industry, both regionally and nationally.

THE PAST PROVES THE FUTURE RIGHT IN BERGEN

With the country's first municipal passive energy building in cross-laminated timber panels, Bergen Municipality showed how choosing timber in larger building projects contributes to ensuring both environmental and energy conservation. Using timber in loadbearing structures gives very good greenhouse gas emissions figures. Lars Peder Brekk, Minister of Agriculture at the time, was impressed with the result. – Many Norwegian municipalities have ambitions regarding the environment and energy, and in this country, we have a lot of locally grown timber. I am certain that we will see many municipal passive energy buildings with cross-laminated timber panels in the future, said Brekk when the sheltered housing units were opened in 2011. Time has proved the former minister right. Today, timber is again a popular alternative to steel and concrete, also for larger constructions. This is good news for both the climate and the forestry industry. Due to less felling, Norway now has an enormous resource just waiting to be used.

SØREIDE SCHOOL

Ytrebygdsveien, 5251 Søreidgrend, Bergen

CLIENT: Skanska Norge AS
Public-private collaboration with Bergen Municipality as the tenant with requirements.
ARCHITECT: Asplan Viak AS

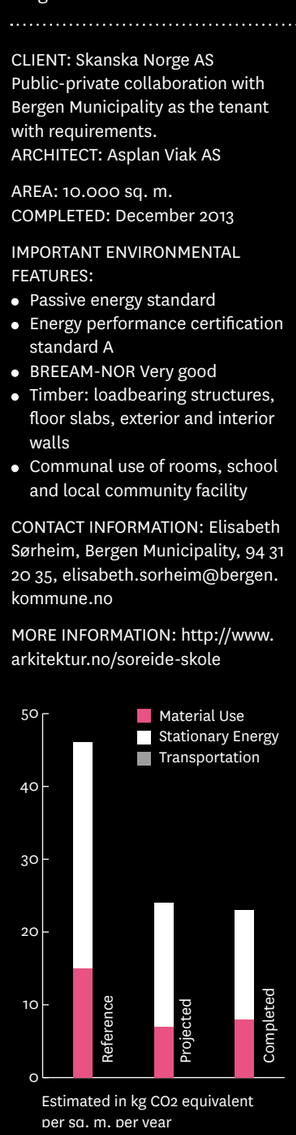
AREA: 10.000 sq. m.
COMPLETED: December 2013

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard A
- BREEAM-NOR Very good
- Timber: loadbearing structures, floor slabs, exterior and interior walls
- Communal use of rooms, school and local community facility

CONTACT INFORMATION: Elisabeth Sørheim, Bergen Municipality, 94 31 20 35, elisabeth.sorheim@bergen.kommune.no

MORE INFORMATION: http://www.arkitektur.no/soreide-skole



Estimated in kg CO_2 equivalent per sq. m. per year

Photo: Jan M. Lillebø, Bergens Tidende

Photo: Jan M. Lillebø, Bergens Tidende

Photo: Jan M. Lillebø, Bergens Tidende

SØREIDE SCHOOL

LEARNING ARENA IN TIMBER AND HUB FOR LOCAL COMMUNITY

The long-awaited school in the Ytrebygda district of Bergen opened in February 2014 and is full of studious children. The school is built largely from timber, both surfaces and structures.

The capacity at Søreide School was at the breaking point for many years. The consequence was that students were sent via bus to other schools or located in temporary buildings. Impatient and frustrated parents would not leave bureaucrats and politicians alone. Bergen municipality already had positive experiences with the passive energy standard and cross-laminated timber construction from the building of Rådalslien Sheltered Housing. When it was decides to build a new school the municipality commissioned a new timber passive energy building.

The new Søreide School has flexible spaces that accommodate 600 students (years 1 to 7). The school has three main parts with common areas in each one. In addition to a multipurpose hall and bases for the different years, the building contains a kitchen, a library, a workshop, a music room and an arts and crafts facilities. The school uses the multipurpose hall during daytime and local sports clubs use it in the evening. The large, bright common space with assembly room and cafeteria serves as a lounge for students during the day and as a hub for the local community in the evening. The school lies on a large sunny site, where much of the original vegetation has been preserved. The outdoor areas are well designed for play and physical activity.

The school is part of Bergen Municipality's programme "Time for Timber". Therefore, timber was chosen for loadbearing structures, floor slabs and walls at an early stage in the design process. The process of calculating greenhouse gas emissions showed clearly the great environmental benefit of using timber extensively. The façades are clad with Kebony, Royal-impregnated panels and stained panels. In addition to timber, low carbon concrete (containing cement substitutes) was used for foundations and the basement. The project has been forward looking with regards to energy as well. The school has water-based heating that is supplied by a geothermal heat pump, solar thermal collectors and electricity.

PROUD GUIDES

Both students and teachers are happy and proud of their new school. – I have seen countless school buildings in many countries and many are nice, but this is the nicest one in Europe, claims headmaster Atle Myking. The school gets many visitors from Norway and abroad who wish to learn more. The school uses this in its educational programme by allowing the students to be guides for the visitors.

FJØSANGERVEIEN 213

Fjøsangerveien 213, 5073 Bergen

CLIENT: Fana Invest AS
ARCHITECT: TAG Arkitekter AS

AREA: 1100 sq. m.
COMPLETION: Planned spring 2016

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard A (light green)
- Cross-laminated timber panels and timber cladding
- Provision for bicyclists
- Roof and outdoor areas adapted for biodiversity

CONTACT INFORMATION: Jesper Jorde, TAG arkitekter, 97 52 64 22, jj@tagarkitekter.no

MORE INFORMATION: http://www.arkitektur.no/fjosangerveien-213

Building seen from the forest. Ill.: TAG Arkitekter

Perspective as seen from the road. Ill.: TAG Arkitekter

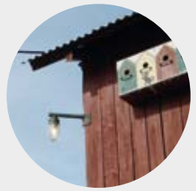
FJØSANGERVEIEN 213

REHABILITATION WITH BIRDSONG

An anonymous industrial building from the 1980s will be transformed into an energy efficient pilot project and be a benchmark for the interaction between building and nature.

Fjøsangerveien 213 lies in a row of smaller industry buildings that separate the E39 road and Fjøsangerveien from Langeskogen in Bergen. The area is owned by the foundation Stiftelsen Johan Langes Minde and was formerly a part of a farm's outfields. Johan Lange offered the forest areas as recreational facilities for the "walking public". The Langeskogen Forest became one of the most important recreational areas in Bergen. Between the forest and the industrial buildings is a bicycle path, which is both part of a hiking trail network and an important access point for bicyclists into Bergen City Centre.

Fana Invest owns the building and has hired TAG Arkitekter to design a 1100 sq. m. expansion with 20 workspaces. The building today has electrical heating and is poorly insulated. The client has requested a building with identity and an environmental focus. Rehabilitating the existing building to meet the passive energy standard was also part of the task. The whole building will be clad with timber. Toward the East, the building forms a vertical wall against the noisy motorway. The West side of the building faces the forest and has a sloping roof which will be covered with a trellis for climbing plants, thus extending the forest up and over the building. There will be several dormer windows in the sloping roof with nesting boxes for bird species in the forest. To avoid car parking between the building and the forest, existing parking spaces are repurposed as a communal parking area for all the activities in the vicinity.



FACILITATING A RICHER BIRDLIFE

In the forest by Fjøsangerveien there are many species of birds – among them hole-nesters. A tawny owl is known to nest nearby. Håvard Bjordal, Head of Environmental Preservation in Bergen Municipality, is interested in ornithology and bird watching in his spare time. A few years ago, he built Norway's first swallow hotel in Åsane. This year he has built a sand martin hotel in the lower level of a bird tower in a nature reservation in Fana and made nesting boxes from reusable materials for barn swallows, house martins and common swifts. Bjordal will help with the design and placement of nesting boxes near the building so that birds will want to nest there. – For the area to become attractive for birds there must be access to open water and there is a small brook running nearby. Bushes with edible berries and fruits, as well as a feeding station, are also necessary, says Bjordal.

VISUND, HAAKONSVERN

Haakonsvern Orlogsstasjon,
5866 Bergen

CLIENT: Forsvarsbygg
ARCHITECT: Link Arkitektur AS

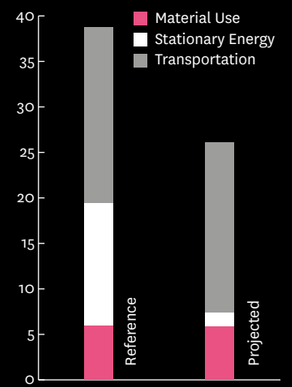
AREA: 2000 sq. m.
COMPLETED: Spring 2015

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard/zero energy building
- Energy performance certification standard A (dark green)
- Compact building volume
- Interdisciplinary process
- Solar thermal collectors

CONTACT INFORMATION: Arild Lunde, Forsvarsbygg, 90 62 28 57, arild.lunde@forsvarsbygg.no

MORE INFORMATION: http://www.arkitektur.no/haakonsvern-nytt-administrasjonsbygg-for-flo



Estimated in kg CO_2 equivalent per sq. m. per year

Aerial perspective. Ill.: Link Arkitektur

VISUND, HAAKONSVERN

ZERO EMISSION AMBITIONS AT HAAKONSVERN IN BERGEN

Forsvarsbygg wishes to take the lead in creating Norway's most energy-efficient office building. A broad interdisciplinary team of researchers and consultants is developing the pilot project at Haakonsvern.

In the winter of 2014, construction began on the administration building which will most likely be the most energy efficient office building in Norway. The project explores many familiar and innovative solutions that could have value for other similar projects. To make the experiences available, an internet-based, easy to read and educational eight-step strategy for designing office buildings with zero energy standard has been created. The project is part of the ZEB programme (The Research Centre on Zero Emission Buildings), a national project led by SINTEF and NTNU. Together the team have developed an energy efficient building shell with optimised technical solutions.

The new administration building will contain 2200 sq. m. over three floors. The building will accommodate storage, archives, customer-service areas, and administrative functions. The administrative functions are located on the building's first and second floors. Storage, archives and customer service areas are on the ground floor with easy access. The building will contain cellular offices and (approximately 50 percent) open landscape, with great flexibility with regards to technical instillations. The building is sized for approx. 100 workspaces. The building meets the passive energy standard with a photovoltaic array and connection to a seawater heat pump and for heating and cooling. Estimated energy consumption is approx. 16 kWh/sq. m. Extensive documentation of the project can be found at "Utvalgt arkitektur" on the website: arkitektur.no

Haakonsvern Naval Station lies outside Bergen and the carbon footprint from transportation is therefore large. Due to the new building's special function as part of a military zone it has not been possible to consider alternative locations.

ZERO-ENERGY AS ORDERED

In this project a bespoke contract has been made with contractor Veidekke. They will not receive final payment until a specified period after completion in order to allow Forsvarsbygg to check that the zero-energy building functions as specified. – It will take at least 18 months of monitoring before the test results are ready. Veidekke considers this project a challenge and a very exciting one at that, says project leader Bjørn Tore Rognstad, Forsvarsbygg.

NØSTEGATEN 65A

Nøstegaten 65A, 5011 Bergen

CLIENT: Sandviken Vedlikehold AS
ARCHITECT: OPA Form Arkitekter

AREA: 210 sq. m. passive energy building, 250 sq. m. rehabilitation
COMPLETION: Planned spring 2016

IMPORTANT ENVIRONMENTAL FEATURES:

- New building: passive energy standard / rehabilitation: Low energy standard class 1
- Energy performance certification standard A (dark green)
- Prefabricated cross-laminated timber panels
- Spatial efficiency
- No parking spaces

CONTACT INFORMATION: Espen Folgerø, OPA Form Arkitekter, 90 61 57 13, ef@opaform.no

MORE INFORMATION: http://www.arkitektur.no/nostegaten-56a

Façade toward the public area. Ill.: OPA Form Arkitekter

The block with new building and the existing buildings that are rehabilitated. Ill.: OPA Form Arkitekter

NØSTEGATEN 65A

NEW BUILDING AND REHABILITATION IN ONE OF BERGEN'S HISTORICAL ENVIRONMENTS

Sandviken Vedlikehold and OPA Form Arkitekter aim to rehabilitate and construct new buildings in a way that preserves the social and architectural qualities of the old wooden houses at Nøstet.

Nøstet was once a workers' neighbourhood and was considered a slum. The area with the crooked streets and slanting wooden houses is today valued as a picturesque urban environment with a characteristic social life. Many of the buildings in the district are listed or protected, while others are very dilapidated. Nøstegaten 65A comprises four buildings and makes up half of a typical block in the area. Two of the buildings are protected and the other two are so worn down that they need to be demolished and replaced with new buildings. The rest of the quarter is listed. West of the quarter is a narrow "smau" street, on the North side an old square, East of the quarter is a small, open place used for parking, and to the South is Nøstegaten, which will be upgraded and become a public area in connection with the construction of housing along the dock by the Nøstebukta waterfront.

OPA Form does not only want to build with high architectural quality, they also feel a responsibility for the social life within the quarter and out toward the public spaces. There are, therefore, many entrances toward the streets and squares and a clever system of bridges that ensure that people will meet in everyday life. This is the way to create a building and outdoors space that can frame the unique social life in the old neighbourhood. No parking spaces will be constructed as the project is centrally located and residents are not expected to need car. The buildings' adaptation to the existing context are not an attempt to copy them, but to reinterpreting existing qualities regarding the use of materials, construction techniques, the size of the volumes and the complex shapes that have appeared due to the houses' vernacular adaptation to the plots and the surroundings.

"ELEMENTFABRIKKEN"

The lot at Nøstegaten 65a is so narrow that there is no space for building site facilities. Large parts of the building are therefore to be constructed using prefabricated elements to ensure a rational building process. Prefabricated wall elements are difficult to procure. – The solution was to start my own factory. The project has inspired a new concept which has become a learning platform for those involved and which is now ready for delivery in other projects. Together with Sandviken Vedlikehold, which does the carpentry for the project, I started Elementfabrikken AS. Now five houses have been constructed as a trial project and Nøstegaten 65a is ready for construction, says architect Espen Folgerø from OPA Form.

INDRE ARNA
Arna district, Bergen

CLIENT: Bergen Municipality

AREA: up to 470.000 sq. m. based on possibility studies
COMPLETION: Not decided

IMPORTANT ENVIRONMENTAL FEATURES:
- Vision – city centre development
- Coordinated zoning and mobility planning
- Organising for environmental mobility and parking
- Regional focus on wood
- Energy strategy

CONTACT INFORMATION:
Laila Nesse Rosseland, Bergen Municipality, Department of Planning and Geo data, 93 29 40 24, laila.rosseland@bergen.kommune.no

MORE INFORMATION: http://www.arkitektur.no/omradeprosjekt-indre-arna

View north on the fjord. Photo: Bergen Municipality

Indre Arna has beautiful natural surroundings, but the railway has cut the valley off from the fjord. The photo is taken from Ådnanipa. Photo: Svein Heggelund

INDRE ARNA

A HUB WHERE THE RAILWAY CREATES POSSIBILITIES, BUT ALSO CHALLENGES

It takes 10 minutes by train and 25 minutes by car from Indre Arna to Bergen City Centre. It is therefore a good place to build housing and workspaces that can relieve Bergen Centre. However, the location of the railway creates challenges for how a new town centre might be planned.

Indre Arna is both a district of Bergen and a beautiful river valley with fjord, mountains and a salmon stream. Thanks to the railway tunnel through the Ulrik mountain it takes only 10 minutes to reach Bergen Centre. Railway tracks cut across the narrow valley. If you are walking to the fjord you must follow a concrete pedestrian underpass from the parking bay next to a beautiful church, pass under the tracks and platforms, and into a shopping centre. Then you must walk through the shopping centre, descend an escalator and step outside again before reaching the fjord. Around you is a sea of parked cars.

A double-track railway to Bergen will be completed in 2018. This, together with a general population growth in the region, will improve the market for building new dwelling and workplaces in Indre Arna. The goal is to make Indre Arna more attractive by building further on the fabric of the old town centre and creating a diverse housing and urban environment, where you can go anywhere on foot or by bike. In collaboration with the local programme “Time for Timber” the developers will look at how timber can be used as a building material on a large scale. Three architectural offices from Bergen have made future visions of Indre Arna in a parallel commission. The river valley will be reconnected to the fjord and the car will have to yield to pedestrians and bicyclists. The new visions have been presented to local residents, politicians and businesses and will lay the foundation for new local plans.

FUTURE VISIONS FOR INDRE ARNA

The three architectural teams OPA Form/Smedsvig, CUBUS and 3RW/S333 delivered possibility studies in November 2014. They show how Indre Arna can be developed into a mixed use urban area. One of the most daring propositions was to add several hundred floating housing units in the Arnavågen bay in order to not destroy the beautiful nature of Western Norway. The proposals were exhibited in large format by the shopping centre Øyrane Torg. – The future visions and the comments they have generated will be considered in future work on designing a strategic plan for Indre Arna, says Laila Nesse Rosseland in Bergen Municipality.

TRONDHEIM

1 BRØSET
2 ÅSVEIEN SCHOOL
3 KJØPMANNSGATA 11
4 MOHOLT 50|50
5 POWERHOUSE
6 CIRKA TEATER

LOCAL EXPERTISE

Trondheim has two municipal pilot projects; one building and one local plan. In addition, two private building projects and one private local plan are included as pilots. Spokesperson Simon Loveland is happy that access to advisors through the Buildings of the Future programme has contributed to the development of local expertise for clients, contractors and consultants. This has created a platform for even more environmentally friendly projects in the future, he says.

– It is a shame that we did not manage to start more municipal pilot projects before Buildings of the Future was finished. However, we do have the opportunity to draw on experiences from Åsveien School. In the work on the new local plans, for example, we can set climate and environment goals early on in the process, which are then implemented in the construction phase. In the autumn of 2014 we held internal courses for all project leaders on greenhouse gas emissions accounting and storm water management, says Loveland.

In the project Åsveien School they worked hard on greenhouse gas reductions during the design and construction phases. It was a challenge that the reference building at klimagassregnskap.no did not match their building well. This was solved by the creation of a modified reference building.

In Trondheim the person responsible for energy in the Buildings of the Future program is involved in all projects that deal with new buildings and larger rehabilitations. In this way, the right resources are brought in to lift the ambitions of future projects.

Loveland explains further that the goal is that work on greenhouse gas reductions and climate adaptation will become a natural part of the municipality's building practice. – The pilot projects show that the industry is capable of working in new ways. Built projects have a greater impact and educational value than projects that remain on paper. The fact that Buildings of the Future is a national programme increases the number of pilot projects and has great influence. We now see possibilities for collaboration with others who are involved in environmental building in the locality, like for example ZEB and Trebyen Trondheim, he concludes.

SIMON LOVELAND
Advisor, Trondheim Municipality

BRØSET AREA

Fagertunvegen 2, 7021 Trondheim

CLIENT: Trondheim Municipality
ARCHITECT: Not chosen/parallel commission

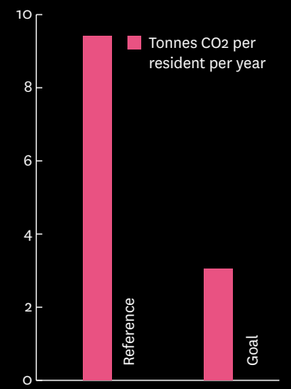
AREA: 350 decares, 4000 residents
COMPLETION: Uncertain, area plan decided June 2013

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard A (dark green)
- Maximum three tonnes of CO_2 emissions per resident per year
- Environmentally friendly lifestyle
- Designing for pedestrians, bicyclists and public transportation

CONTACT INFORMATION: Ole Ivar Folstad, Trondheim Municipality, 95 26 37 88, ole-ivar.folstad@trondheim.kommune.no

MORE INFORMATION: http://www.arkitektur.no/broset1



Estimated in kg CO_2 equivalent per sq. m. per year

Illustration living environment. Ill.: Placebo Effects/Team Cowi (COWI AS + Arkitekt Kimmo AS + Norsas AS)

3D model. Ill.: Trondheim Municipality

Excerpt from Team Asplan's analysis material (Asplan/Vika + Entasis AS + Dahl & Uhre arkitekter AS + Vigdis Haugtrø). Ill.: Team Asplan

BRØSET

IT IS ALL ABOUT LIVING IN AN ENVIRONMENTALLY FRIENDLY WAY

Outside Trondheim City Centre a new urban district for 4000 people is being developed. This is the only pilot project in the Buildings of the Future programme with a goal of maximum greenhouse gas emissions per resident per year. The goal is three tonnes.

Brøset is situated four kilometres outside Trondheim City Centre. Its location and topography makes the area a valuable resource for urban development in Trondheim. In keeping with the municipality's densification policies, a forward-looking district where an environmentally friendly lifestyle is encouraged is being developed. Each resident will be responsible for a maximum of three tonnes of CO_2 emissions per year. The average today is between eight and eleven tonnes. Instead of a traditional urban planning competition Trondheim Municipality chose to carry out a parallel commission. In January 2011, four interdisciplinary teams presented their visions. The results from the parallel commission are still among the most interesting examples of how new sustainable districts can be planned.

Based on the contributions from the parallel commission, Trondheim municipality has made a local plan which was adpoted in June 2013. This plan for zoning and transportation solutions contains:

- Approx. 1700–1900 dwellings – corresponds to approx. 3500–4000 residents
- Connecting street for public transportation with adjacent business and service functions
- Connecting green areas and a central park
- Three kindergartens, an elementary school and a health and welfare centre
- Twice as many dwellings as parking spaces

THE BRØSET EFFECT

– The goal for Brøset is to reduce CO_2 emissions significantly by today's standards. To get there new technology is not enough – attitudes and lifestyles are just as important. The goal therefore is to build an urban district so pleasant that it encourages a sustainable lifestyle. In this way we can create many neighbourhoods like Brøset, then a green district and later a green city. This is the Brøset Effect, says Mette Skjold at SLA Arkitekter. She is part of one of the four teams that participated in the parallel commission. SLA coined the term "the Brøset Effect" in January 2014. In short, the team's proposal combines architectural quality with environmental and social sustainability so that everyday life becomes better and cheaper. Experiences can be applied to other similar local plans.

ÅSVEIEN SCHOOL
Fagertunvegen 2, 7021 Trondheim

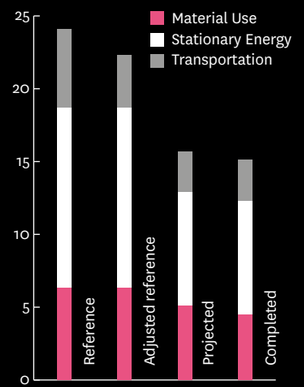
CLIENT: Trondheim Municipality
ARCHITECT: Eggen Arkitekter AS

AREA: 8750 sq. m.
COMPLETED: February 2015

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard A (dark green)
- Timber: Loadbearing structures, floor slabs, exterior and interior walls
- Communal use of areas, school and local community facilities
- Storm water management with rain gardens and dams

CONTACT INFORMATION: Randi Lile, Trondheim municipality, Development unit, 92 86 18 21, randi.lile@trondheim.kommune.no

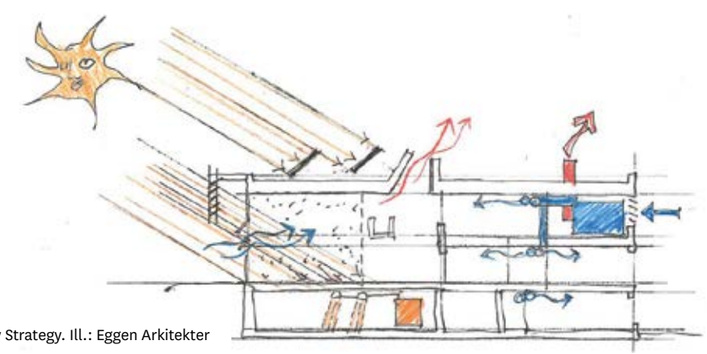
MORE INFORMATION: http://www.arkitektur.no/asveien-skole



Estimated in kg CO_2 equivalent


Photo: Eggen Arkitekter, Bård Solem


Exterior perspective. Ill.: Eggen Arkitekter


Energy Strategy. Ill.: Eggen Arkitekter

ÅSVEIEN SCHOOL

PASSIVE ENERGY SCHOOL TO BE USED BY ALL

The new Åsveien School and Local Community Centre is the first passive energy school building in Trondheim. Through good design and a constructive dialogue between the client, the architect and the contractor, the project achieves large reductions in the total carbon footprint. The reductions come from energy measures, spatial efficiency and use of cross-laminated timber panels. The measures are instructive and well documented.

The old Åsveien School was demolished to make way for a new one. It will accommodate 630 students and a centre for 20 autistic children. A multipurpose hall is also being constructed. The building has an open plan that can be adapted to future needs, and flexible areas. By organizing the building in defined zones, rooms can be made available to different user groups in the evenings. When the old school site was chosen it done so with a local community centre in mind. Co-location of the school and the multipurpose hall will provide Byåsen with a new cultural centre where activities can take place throughout the day and week.

In spite of the new school having a larger area than the old one, the energy consumption has been reduced to a quarter. Parts of the building's heating needs are meet by a geothermal heat pump with ten wells at a depth of 200-metres. The most pronounced feature of the new school, however, is the extensive use of timber. Loadbearing structures and internal walls are constructed using cross-laminated timber panels, and the façades are clad with slow-growing heartwood pine. Specifying timber has reduced the greenhouse gas emissions for building materials by over 40 percent compared to a traditional concrete construction. Construction began in July 2013 and the school was completed in December 2014. The hall was opened in February 2015.

GREENHOUSE GAS ACCOUNTING ENTHUSIAST

Architect Bård Solem at Eggen Arkitekter has an unusual interest. He is a greenhouse gas accounting enthusiast. It was working on the Åsveien School that first introduced him to the tool. This became a professional revelation and since then he has collaborated with Civitas on the further development of the online accounting tool. He also works as an advisor and travels around the country giving lectures at seminars and conferences. In the autumn of 2014, he gave a talk at the Forum Holzbau Nordic in Trondheim. – By using the online tool actively in the design phase, you will develop a instinctive understanding for which materials lead to greenhouse gas reductions. This makes it easier to make choices that reduce emissions while staying true to the architectural concept, says Solem.

KJØPMANNSGATA 11
Kjøpmannsgata 11, 7013 Trondheim

CLIENT: Nidarholm Invest AS
ARCHITECT: Bergersen Arkitekter AS

AREA: 650 sq. m.
COMPLETION: Not decided

IMPORTANT ENVIRONMENTAL FEATURES:
- Low energy class 1
- Preservation through rehabilitation
- Prefabricated timber
- No parking spaces
- Public area and enriching of the urban environment

CONTACT INFORMATION:
Berit Andersen, Nidarholm Invest AS, 95 75 02 26, berit@nhinvest.no

MORE INFORMATION: http://www.arkitektur.no/kjopmannsgata-11

Kjøpmannsgata 11 is the fourth wharf house from the left. Photo: Rune Andersen

Sketch project. Ill.: Brendeland & Kristoffersen

KJØPMANNSGATA 11

ONE OF TRONDHEIM'S WHARF BUILDINGS FROM THE 1700'S IS GIVEN NEW LIFE

The wharf buildings in Trondheim are an important part of the city's history. The project at Kjøpmannsgata 11 will demonstrate how reuse, forward-looking architecture, energy rehabilitation and preservation can be combined.

Kjøpmannsgata 11 is one of many empty storage buildings from the 1700s along the Nidelva River. The building is not listed, but like the other wharf buildings, it has great cultural and historical value. This is a typical building type for the nation's coastal towns. Preservation through reuse is a relevant topic. In Trondheim alone 20.000 sq. m. of waterfront storage buildings are empty and many are dilapidated. Due to its relevance, this project has been given pilot project status with the Buildings of the Future programme, and there is a broad collaboration between the project team and local the authority.

The wharf buildings have a unique location in the heart of Trondheim, and reuse could enrich the urban environment in the city centre. There is an ongoing public discussion concerning what kind of uses to allow. Establishment of dwellings in combination with business on the ground floor are among the options discussed. However, not everyone wants to establish dwellings in the wharf buildings, partly because it could lead to significant changes to the building fabric. Instead of establishing private outdoor spaces, one suggestion is to make Kjøpmannsgata a public area that everyone can enjoy. The project explores different alternatives for the use of the wharf buildings in Trondheim by developing an example of how things might be done. In addition to examining how well suited Kjøpmannsgata 11 is for mixed uses, the project will investigate how a modern construction can interact with the existing building fabric in a respectful and architecturally interesting way. The result will satisfy today's standards for environment design, accessibility for all, and fire safety.

SMALL PROJECT WITH LARGE POTENTIAL IMPACT

Trondheim's citizens have a strong relationship to the old wharves. These historical buildings are an important part of the cityscape, but several wharves are empty and dilapidated. The wharves have been there for more than 200 years and should be there for another 200. New functions for the old storage buildings are needed, that both preserve the historical qualities and meet the needs of the future. In this pilot project, many forces aligned to explore options that a project of this size would not normally be able present. Studies will generate new understanding and knowledge about which of the wharves are empty. Trondheim Municipality has, together with the Business Association in Trondheim, begun a vitalisation project for the Kjøpmannsgata wharves. – The urban environment, tourism and climate adaptation will all benefit from finding new uses for existing buildings and revitalising the area. We are building for the future by using the past, says Head of Cultural Heritage, Gunnar Houen.

MOHOLT 50|50
Moholt Allé, 7050 Trondheim

CLIENT: SiT
ARCHITECT: MDH Arkitekter AS

AREA: 103.000 sq. m., in which 40.000 sq. m. are new buildings
COMPLETION: 2016

IMPORTANT ENVIRONMENTAL FEATURES:

- Passive energy standard
- Energy performance certification standard B (light green)
- Cross-laminated timber panels: loadbearing constructions, floor slabs, exterior and interior walls
- Repurposing the parking areas as a hub for the local community
- Design for pedestrians, bicyclist and public transportation

CONTACT INFORMATION: Bård Kåre Flem, SiT – Studentsamskipnaden i Trondheim, Development unit, 90 56 70 16, bard.k.flem@sit.no

MORE INFORMATION: http://www.arkitektur.no/moholt-5050

Aerial view of Moholt student village with the new public area centrally located in connection with public transportation in Jonsvannsvegen. Ill.: MDH Arkitekter

In the public area many new outdoor recreational spaces will be established. Ill.: MDH Arkitekter

From Jonsvannsvegen. New high-rise buildings with timber cladding will signalise a new kind of student village. Ill.: MDH Arkitekter

MOHOLT 50|50

A 50 YEAR OLD STUDENT VILLAGE IS PLANNED FOR THE NEXT 50 YEARS

The winning proposal "Tun og Tårn" described living at Moholt like living in a park, whilst urban elements make it a meeting place for the local community. In the spring of 2015, construction began on the first phase of densification with the construction of 23.000 sq. m.

Moholt is the largest student village in Trondheim, with approx. 2500 students. It was constructed in the period 1964–1974 and is in need of rehabilitation. The student union wishes to densify the area and has extensive plans for the architecture, urban environment, and sustainability profile. The student village is 50 years old, and the new project looks ahead to the coming 50 years. The student village is situated 3.5 km Southeast of Trondheim City Centre and 1.5 km from the university campus at Gløshaugen. The area is 145 decares and the buildings comprise linked and detached three-storey brick buildings containing student dormitories and apartments.

In 2013 a competition was held where four architect-lead groups presented ideas for further development of the area. The winner was MDH Arkitekter's proposal "Tun og Tårn". The project consists of five student-housing towers with nine floors, a kindergarten, a multipurpose building with communal library/café, and a central public area close to the bus stop. All buildings will be constructed using cross-laminated timber panels. Building material specification, the passive energy standard, and a geothermal heat pump will contribute to low greenhouse gas emissions. Parking spaces will be removed, and the area will be reorganized for bicyclists, pedestrians and public transportation. This will lead to lower greenhouse gas emissions and make Moholt a vibrant and attractive meeting place, both for students and other residents in the area.

SHARING KNOWLEDGE GIVES REASONABLE INVESTMENT COSTS FOR BUILDING PROJECTS

Four design and build contractors invited to bid participated in an educational programme on cross-laminated timber panel constructions. The programme was a collaboration between the student union, Innovation Norway and iTre/Trebruk. – Very useful and highly recommended. We did this both to ensure quality in the buildings and to achieve reasonable investment costs. Knowledge gives security, and this influences pricing, says project manager Bård Kåre Flem of the Student Union.

POWERHOUSE BRATTØRKAIA
Brattørkaia 17A, 7010 Trondheim

CLIENT: Entra ASA
ARCHITECT: Snøhetta AS

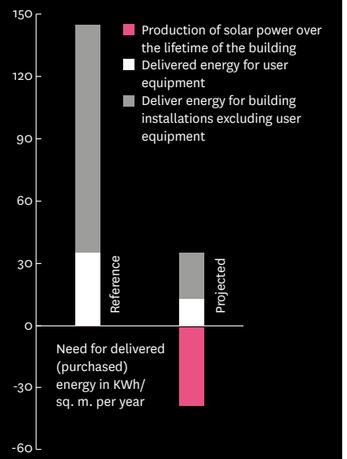
AREA: 13.500 sq. m.
COMPLETION: 2017

IMPORTANT ENVIRONMENTAL FEATURES:

- Plus energy standard
- Energy performance certification standard A (dark green)
- Environmentally friendly building materials
- Limited number of parking spaces and green mobility initiatives
- Building integrated photovoltaic array
- Goal to be awarded BREAAM-NOR Outstanding certification

CONTACT INFORMATION: Siri Steinbakk, Entra ASA, 48 30 90 10, ss@entra.no

MORE INFORMATION: http://www.arkitektur.no/powerhouse-brattorkaia



The façade toward the harbour promenade. Ill.: Snøhetta/MIR

The bridge over the station area with Powerhouse in the background. Ill.: Snøhetta/MIR

The sloping roof is covered with integrated photovoltaic panels. Ill.: Snøhetta/MIR

POWERHOUSE

FORM FOLLOWS THE ENVIRONMENT

With the new office building at Brattørkaia, the Powerhouse collaboration wants to demonstrate to others that it is possible to make energy-positive buildings anywhere on earth. The building will, throughout its lifetime, generate more energy than it consumes.

The Powerhouse collaboration develops plus energy buildings. The project partners are the client organisation Entra, the contractor Skanska, the environmental organization ZERO, the architect firm Snøhetta, the consultancy firm Asplan Viak, the aluminium company Hydro and the aluminium profile company Sapa. The first Powerhouse project was the rehabilitation of an office building at Kjørbo in Sandvika, Bærum. In Trondheim, the Powerhouse collaboration has taken the initiative to develop and build a new, energy-positive office building at Brattørkaia. The project is the result of interdisciplinary cooperation between many of the leading knowledge centres in Norway.

Powerhouse Brattørkaia is a pioneer project in several ways. Buildings today consume 40 percent of the world's energy. The potential for energy saving is enormous, both in Norway and globally. Powerhouse Brattørkaia will produce more energy than it consumes. The building will be 13.000 sq. m. and will house approx. 500 workspaces. The spectacular architectural shape is created from the need for using the sun as an energy source. A South facing sloping roof gives ideal conditions for photovoltaic energy production, something that is crucial to making the building produce more energy than it consumes. The surplus energy from the operational phase will, in the course of the building's lifetime, exceed energy consumed during the production of building materials, transportation, construction, operation and disposal. The building will produce an annual surplus. This makes Brattørkaia a plus energy building, and a world-class pioneer project.

AN ENERGY SCULPTURE IN THE CITYSCAPE

Politicians are positive, but several people think that the sculptural shape of the building, which catches the sunlight, breaks with the historical cityscape. The project has undoubtedly sparked an important and necessary debate in the city. Future demands for energy-positive buildings will change architecture. To optimize energy production, buildings must be adapted to available energy sources and solar angles, and the placement of buildings within their assigned sites becomes more important. – Today's guidelines do not give sufficient flexibility for innovation, and put limitations on development. New energy demands could require extreme change and this could create other forms than today, says Process Leader at Powerhouse, Tine Hegli from Snøhetta.

CIRKA TEATER
ACTING ARENA FOR CHILDREN
Skippergata 10, 7042 Trondheim

CLIENT: Cirka Teater AS
ARCHITECT: Agraff Arkitekter AS

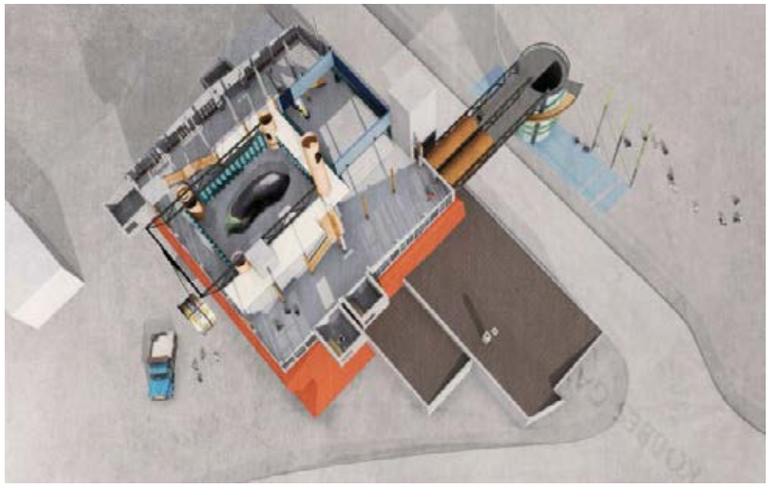
AREA: 1400 sq. m.
COMPLETION: Not decided

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy building
- Energy performance certification standard A (dark green)
- Reuse of demolished materials and existing building components
- Local community centre
- Communal use of areas throughout the day

CONTACT INFORMATION: Monica Stendahl Rokne, Cirka Teater AS, 91 87 49 51, post@cirkateater.no

MORE INFORMATION: http://www.arkitektur.no/cirka-teater-scenekunstarena-for-barn

Cross-section perspective, preliminary project. Ill.: Agraff Arkitekter



Plan perspective, preliminary project. Ill.: Agraff Arkitekter

Cirka Teater's production Musika mobile, 2009. Photo: Dino Makridis

CIRKA TEATER

WAR REMAINS AND THE REUSE OF BUILDING MATERIALS BECOME AN ENVIRONMENTALLY FRIENDLY CHILDREN'S THEATRE

Between submarine bunkers from the Second World War at Nyhavna in Trondheim lies a disused building. A soap factory was constructed on its roof. This is the home of Cirka Teater. By reusing building materials, the theatre wishes to develop the site into a spectacular performing arts arena for children.

Cirka Teater is an independent theatre group with a long-standing regard in Trondheim. Their productions are known for "reuse scenography" made from elements others might call "junk". The theatre has, in collaboration with Agraff Arkitekter, made a preliminary project that shows how a performing arts centre for children can be developed on the roof of a building located between two large submarine bunkers built by the German Navy during the Second World War and known as Dora.

The existing building has massive concrete walls and the roof is four metres thick. As part of the preliminary project Agraff Arkitekter worked with GAIA Trondheim to register the possible reuse of building materials from a disused smelting plant outside the city centre. Even though it is unlikely that it will be possible to reuse those materials the process illustrates the core idea of the project. The preliminary sketches show how the reuse method in scenography can be transferred to architecture. In the sketches, Cirka Teater demonstrates how building parts can be disassembled, brought to the site, and then reassembled in new ways. The result is an original building that appear almost fictional, in line with the theatre's fantastic stories. The project has received a great deal of attention and is due to be included in the municipality's plans for transformation of the area as a whole. The project group is in dialogue with the municipality, Trondheim Port Authority and several other interested parties about a further development of the project.

TWO STOVES ON THE SEASHORE

Cirka Teater has always worked with reuse in all imaginable, and preferably unimaginable, forms. For a small theatre company reuse is profitable. However, the real driving force is a protest against the direction of modern society, with its consumption and economic growth. Cirka Teater wants to give soul back to that which has been discarded. The idea for the theatre's first performance was conceived when a stove was found in the ebb tide by the Trondheim fjord. This seemingly worthless object was given renewed power as a living and scrambling participant in the show "Og så kom fyren". Since then the idea of reuse has been the foundation of the artistic work at the theatre. With their reuse scenography the theatre shows how objects from junkyards can easily be assigned new value and meaning. – The concept of reuse allows the theatre to be a place where we are introduced to something different and expand our horizons, says Gilles Berger at Cirka.

TROMSØ

© Google Maps

1 KVAMSTYKKET KINDERGARTEN
2 THE FRAM CENTRE

TROMSØ MAKES NEW DEMANDS OF BUILDING PROJECTS

Tromsø Municipality has two pilot projects in the Buildings of the Future programme. It has also received advice regarding a new school building. Now all municipal buildings will meet the passive energy or low energy standard.

– All those involved in the completed Kvamstykket Kindergarten project learned a great deal. The new Fram Centre has not yet started on site due to a lack of state funds, but the criteria in the Buildings of the Future programme will be used when the project is continued. The municipality has also become more aware of the value of good storm water management, both in connection with urban planning and building projects. Now all municipal buildings will meet the passive energy or low energy standard, says Svein Karoliussen, Building of the Future's main contact for energy in buildings in Tromsø Municipality.

SVEIN KAROLIUSSEN
Development advisor,
Tromsø Municipality

PILOT
PROJECTS

KVAMSTYKKET KINDERGARTEN
Anton Iversens veg 1, 9009 Tromsø

CLIENT: Tromsø Municipality Eiendom
ARCHITECT: Arkitekturverkstedet i Oslo/Asplan Viak

AREA: 1150 sq. m.
COMPLETED: December 2011

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard A
- Geothermal heat pump
- Low-emission materials
- Communal use and flexible floor plans

CONTACT INFORMATION: Svein Karoliussen, Tromsø Municipality, 90 73 79 80, svein.karoliussen@tromso.kommune.no

MORE INFORMATION: http://www.arkitektur.no/kvamstykket-barnehage

Façade toward the South and outdoor area. Photo: Tom Benjaminsen

Happy kindergarten users in the outdoor area. Photo: Tom Benjaminsen

KVAMSTYKKET KINDERGARTEN

FIRST PASSIVE ENERGY KINDERGARTEN AND PILOT PROJECT IN TROMSØ

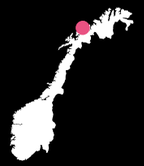
Kvamstykket Kindergarten was one of the first completed pilot projects in the Buildings of the Future programme. Passive energy standard, accessibility for all, renewable energy and contextual architecture have been some of the focus areas in the project.

The overall architectural concept has been to establish a building shell where the Western, Northern and Eastern walls fold around an outdoor areas. Here the volume opens up to the South and gives shelter and contact with outdoor playground areas. The building is orientated so that the main façade faces toward the South for ideal daylight conditions, with entrances and sunny, warm play areas for the children. Inside, a readily understood floor plan with clear principles is easily navigable by both children and adults. The kindergarten has six bases, each with its own clear identity. One of the bases has the knowledge capacity to receive refugee children.

The base areas are gathered on the ground floor at the same level as the outdoor play areas. Administrative facilities for staff are on the first floor, with a lift and staircase located centrally in the building. Common play areas are organized as a square with a walkway beside the base areas. This gives great flexibility in terms of different usage, shared use and overlap, as well as the possibility of changes to room divisions over time. The site lies within Tromsø's concessionary area for district heating, but the infrastructure is not yet in place. As an alternative to district heating a geothermal heat pump has been installed, with an electric boiler for stand-by and peak loads. Energy consumption in 2014 is 103 kWh/sq. m (gross area). The client believes that it is possible to improve this further.

WOOD UP CLOSE

Kvamstykket was not only the first passive energy kindergarten in Tromsø. The building was, in addition, one of the first to use a new kind of passive energy wall defined in SINTEF's Byggforsk series, with an OBS board in the middle and pressure-proof mineral wool on either side. To monitor this unconventional construction the municipality contacted the Norwegian Institute of Wood Technology whom installed moisture and temperature sensors in the structure. After two years, the results showed that the walls had no critical issues, but the ground beam at one point in the North wall was experiencing water penetration in periods of heavy rain. The reason for this was a poorly executed junction that has now been corrected.



THE FRAM CENTRE
Strandveien 14, 9006 Tromsø

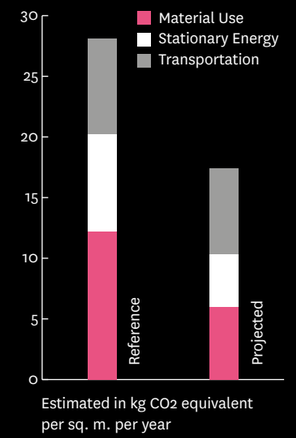
CLIENT: Statsbygg
PROJECTING GROUP: HENT, Rambøll, Studio 4 Arkitekter and Per Knudsen Arkitektkontor

AREA: 10.000 sq. m.
COMPLETION: Not decided

IMPORTANT ENVIRONMENTAL FEATURES:
- Passive energy standard
- Energy performance certification standard A (dark green)
- CO2 and LCC analyses
- Cooling from seawater and heat from a server plant
- Climate change analyses and measures

CONTACT INFORMATION: Robert Ekanger, Statsbygg, 98 46 07 40, roek@statsbygg.no

MORE INFORMATION: http://www.arkitektur.no/framsenteret



Estimated in kg CO2 equivalent per sq. m. per year


Atrium with “meeting room tents”. Ill.: Per Knudsen Arkitektkontor

THE FRAM CENTRE

AMBITIOUS ENVIRONMENTAL GOALS FOR THE EXPANSION OF THE FRAM CENTRE

The Fram Centre in Tromsø is Norway’s gathering point for research, environmental supervision and advising on the polar areas and the Barents region. A preliminary project for a significant expansion of the centre was completed in October 2012 and the project awaits state funding before construction can begin. The environmental goals in the preliminary project are among the most ambitious Statsbygg* have worked with so far.

The Fram Centre was constructed in 1998 and is situated on the waterfront at the Southern end of Tromsø City Centre. Today the building has reached its capacity. There have been plans for an extension since 2010, but the project has not yet received funding. The existing buildings contains 15.000 sq. m. over six floors, and contains offices, laboratories and rooms for 500 researchers from 20 different research institutions. The functions in the building are complex and have been demanding for the designers of the 10.000 sq. m. extension. Additionally, the project involves necessary restructuring of existing facilities. The Fram Centre is part of a composition comprising the neighbouring building, and the experience and learning centre Polaria. Situated between the Fram Centre and Polaria a new park will bind the buildings together. The placement and design of the new building is intended to improving the microclimate in the area.

The project has ambitious environmental goals and is to meet the passive energy standard. The existing building’s insulation will be improved. The project is part of the development of Statsbygg’s own software klimagassregnskap.no. Environment and climate analyses are performed in relation to lifecycle cost analyses. The analyses have been used actively when deciding on materials and solutions. For example, the extent of demolition has been reduced. Estimated additional investment costs for meeting the passive energy standard based on the preliminary project is 3–5 percent. Passive energy standard is considered to be cost-effective compared to meeting the building regulations (TEK10) in a lifecycle perspective where operation costs and maintenance are included.

A MEETING ROOM FOR POLAR CONDITIONS

In the proposal for the extension of the Polar Environmental Centre in Tromsø, the concept was to make use of space between the new and the old building as a light well. The building is a focal point for research, environmental surveillance and advising on polar areas and the Barents region, and from this the architect got an idea: How about making the light well a semi-climatized room where the temperature varies with the weather outside? To make the area usable for extended periods a suggestion was made that a number of heated woollen tents could function as a meeting space. This is a reference to polar themes and significantly decreased the need for heating.

*The Norwegian government’s key advisor in construction and property affairs, building commissioner, property manager and property developer.

ACTIVITIES

By the end of 2014, a total of 31 pilot projects were in the programme. 12 of the 23 building projects are now completed and four of these are currently preparing reports after two years of operation.

PILOT PROJECT GATHERINGS

Once a year we have invited those involved in the pilot projects to meet: Oslo 2010, Stavanger 2011, Oslo 2012, Kristiansand 2013 and Trondheim 2014. The meetings have included building site inspections, presentations of pilot projects and experiences, and inspiring lectures and discussions. Download the presentations from the meetings in Kristiansand and Trondheim at framtidensbygg.no

Some of the participants in Buildings of the Future meeting in Trondheim in November 2014. From the front left: Anders S. Moe, Mona O. Stangborli, Sylvia Skar, Eili Vigestad Berge, Hilde Bøkestad, Laila Nesse Roseland, Cathrine Andersen, Aksel Tjora, Seemi Lindtorp, Elisabeth Sørheim, Gerd Seehus, Ingvild Edelsten Dahl, Svein Karoliussen, Geir Nordstokkå, Simon Loveland, Øyvind Aarvig, Karoline Bergdal, Ole Petter Skallebakke, Eirik Sandsmark, Øystein BullHansen, Rasmus Hamann, Barbara Hasenmüller, Øystein Ihler. Photo: NAL

The movie was shown during the last Cities of the Future gathering and awarded Best Presentation from the 13 cities.

THE STUDENTS TOOK THE LEAD

Fourth-year students at Nøkleby School have made a movie about the pilot project Lisleby Hall. The students take on the various roles of architect, project leader, energy advisor as they present Lisleby hall. You can find the movie here:

https://vimeo.com/112636110. Recommended!

PROJECT ADVISING, COURSES AND WORKSHOPS

Start-up seminars have been held in connection with all the pilot projects, with follow-up based on the specific needs of each project. The programme has also offered tailor-made workshops and courses and continuous monitoring of each the projects. The topics have been transportation, energy, material specification, quality control systems, climate adaptation and greenhouse gas emissions accounts. We have had access to Cities of the Future's expert coordinators in addition to approx. 30 external advisors over these four years. Advice from experts has given the pilot projects valuable support and increased knowledge, and the advisors have gained valuable experience through the process as well.

Eivind Selvig from Civitas gives advice on how klimagassregnskap.no can be used. Photo: NAL

The mobility guide is one of the tools Buildings of the Future and FutureBuilt has developed in collaboration.

COLLABORATION WITH FUTUREBUILT

FutureBuilt has worked on developing pilot projects in Oslo, Bærum, Asker and Drammen, while Buildings of the Future have handled the other major cities in Norway. All routines, guides and tools have been coordinated. We have also hosted many seminars, workshops and study trips together. The experience has been stimulating for all those involved.

SHARING EXPERIENCE

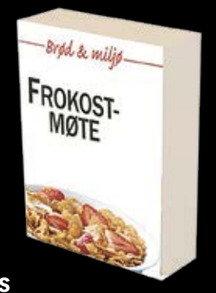
NAL's project database is the largest database for architecture and planning in the country. All the pilot projects have entries here. The database is a platform both for reporting and publication. Here anyone interested can find project information, descriptions, key figures, plans, illustrations and photos. The Ministry of Local Government and Modernisation, State Housing Bank, Enova and NAL showcase the pilot projects on their web pages. The experiences from the pilots have been used in a number of courses and workshops.

The in-depth presentations on the web are an important factor in spreading the experiences gained in the pilot projects.

Formal unveiling of the plaque in the City Hall quarter of Kristiansand by Minister of Climate and the Environment Tine Sundtoft and mayor Arvid Grundekjøn.

HONOUR & GLORY

When building begins, pilot projects are given a building-site banner that is placed in a visible spot during construction. The banner highlights the ambitions for a 50 percent reductions of greenhouse gas emissions. Upon completion, a plaque is given which is mounted on the building and the client and the architect receive diplomas. Many pilots have received visits from government ministers at the opening ceremony.



BREAKFAST MEETINGS

Brød & Miljø, NAL's popular monthly breakfast meetings at Arkitektenes Hus, is an important communication channel for environmental projects. Many of the pilots with Buildings of the Future have been presented during these meetings. The meetings are streamed and the recording is available for free afterwards at arkitektur.no. The recordings that deal with the pilot projects will also be available via each project's web page. Bergen Municipality has held a series of breakfast meetings with assistance from Buildings of the Future.

ACTIVITIES

On a trip to Hamburg in 2013 we visited Hafencity, the international building exhibition, IBA Hamburg, and the international garden exhibition.

INSPIRATION FROM ABROAD

Switzerland and Germany are forerunners when it comes to environmentally friendly material specification, the passive energy standard and sustainable planning. Together with FutureBuilt, Buildings of the Future have organized study trips to these two countries. On the trip to Zurich in 2012 there was a focus on inspiring individual projects in addition to examples of interesting housing developments and new environmental technology. The study trips have been popular and an important part of the network building in the programme.

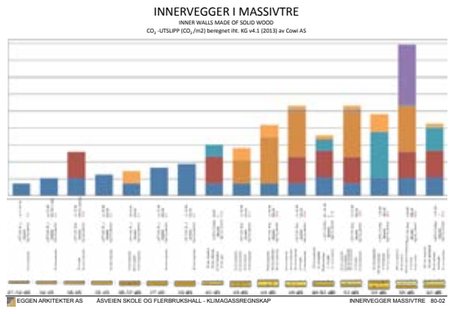
Winter at Vålandshaugen kindergarten

USE OF TIMBER

Timber is an environmentally friendly material with a long tradition in Norway. Buildings of the Future have helped further modern use of timber in collaboration with the programmes “Timber and City”, “Time for Timber” and the business organization Trefokus. Timber is the main material in 14 of the pilot projects.

GREENHOUSE GAS ACCOUNTING

It is important to be able to estimate carbon footprints so that the effect of different alternatives can be quantified and compared objectively. The calculation tools have developed quickly during the period in which Buildings of the Future has been active. The fact that Statsbygg launched a BIM*-integrated version of klimaregnskap.no during autumn 2014 says something about development in the field. The tools have not only influenced the work of designers, but the material manufacturers have also tried hard to reduce the footprint of their products.



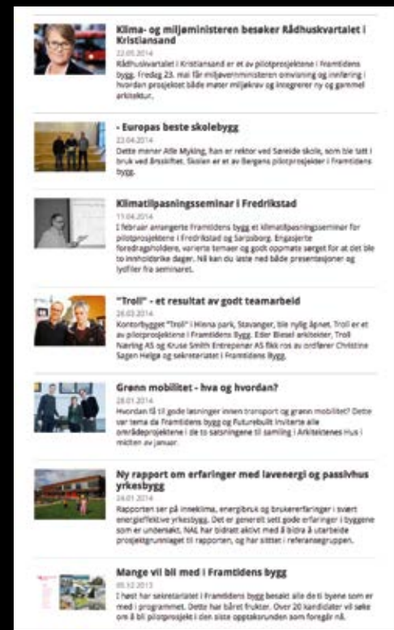
The pilot projects and the experiences they have given have been decisive to the development of greenhouse gas accounts in the building industry.

*BIM = Building Information Modelling

RESEARCH

Several of the pilot projects have been used as research cases for different topics like use of timber, decision making processes in housing co-operatives, energy use, indoor climate, sustainable planning and product development.

Sørlandet Boligbyggelag has participated with Stjernehus co-operative in the research project “BESLUTT: Decision making processes in housing co-operatives and co-ownerships”. What leads to sustainable upgrade projects? A guide was published which offers many good tips and can be used directly in projects for co-operatives and co-ownerships.



FRAMTIDENSBYGG.NO

At framtidensbygg.no participants and other can find information on quality criteria, project advising, tools and resources, and recent news stories about the projects. Newsletters have been sent out to all participants on a regular basis.

ARCHITECTURAL COMPETITIONS

One of the demands in Buildings of the Future has been that the building and planning pilot projects must have high architectural quality and contribute to a good urban environment. The programme has encouraged the use of architectural competitions and parallel commissions to further creativity, new thinking, and professional development and to create the best starting point for the development of the pilot projects. Some examples are Moholt 50|50, Indre Arna and Sandnes City Hall.

Illustration from CUBUS’ vision for the future development of Indre Arna in Bergen.

– HAS CONTRIBUTED TO CHANGING THE BUILDING INDUSTRY

From Søreide School. Photo: Asplan Viak, architect Christian Irgens

EIVIND SELVIG, Advisor, Civitas

– Buildings of the Future and FutureBuilt have pushed the building sector in a more environmentally friendly direction. They have made specific demands for the pilot projects and contributed to the further development of klimagassregnskap.no. This has increased the demand for product documentation (EPDs). The industry has learned more about what gives building material and transportation reductions in greenhouse gas accounts. The pilot projects are also important in terms of interdisciplinary work and the participants have learned a lot from each other.

KAROLINE BERGDAL, Architect, Sarpsborg Municipality

– Buildings of the Future is about sustainability and has increased the willingness to demand more, both in the public and private sectors. The municipality must make the extra investment necessary for certain projects. Good cooperation, courses and seminars have significantly increased the municipality's knowledge. We have also received help regarding quality control of our own work. The collaboration has contributed to better analyses and initiated exciting projects, but during the process, unforeseen events, capacity and economics have been challenges.

INSIGHT

GURO HAUGE, Leader, Low Energy Programme

– Pilot projects generate new solutions, new ideas and new processes. Buildings of the Future have pilot projects all over Norway, and it is important that the projects can continue to be a learning arena for the entire building sector. The Low Energy Programme encourages cities to continue to work on the pilot projects, especially regarding rehabilitation of existing buildings. This area sorely needs development.

ODD HELGE MOEN, Technical Manager, Sørlandet Boligbyggelag

– The upgrading of Stjernehus Housing Co-operative has been teamwork where Buildings of the Future has contributed to making the project even better. We have participated in interdisciplinary workshops that have increased knowledge in the project. One of these workshops was held in Kristiansand, and this made it possible for more representatives from the board and the building committee to participate. This was very useful for us. Our ability to think ahead when it comes to the existing building stock has increased, and that is where the largest potential lies.

MARIANNE ERTSAAS, Project Developer, SiT Bolig

– We have gained valuable experiences by participating in the Buildings of the Future programme through discussing goals, solutions and ambitions for our project Moholt 50|50. Buildings of the Future has made useful tools available to us so that documentation of the environmental ambitions is possible. We also received useful information from other projects and the opportunity to profile our own project through presentations and web pages.

RASMUS HAMANN, Architect, Plus Arkitektur AS

– The collaboration with the Buildings of the Future program has made us set higher environmental goals in our projects. The clients have become more interested in investing in environmental initiatives. In the work on the City Centre Kindergarten in Sarpsborg we have received helpful contributions from Buildings of the Future in the form of seminars and lectures. We have also received direct project advising, for example in connection with greenhouse gas accounting. The collaboration with Buildings of the Future has increased knowledge for us and the other participants. I wish there had been even more project-specific advising – in the different phases.

RANDI AUGENSTEIN, Architect, Helen & Hard AS

– Being a pilot project with Buildings of the Future is a recognition of our project Vindmøllebakken and its ambitions regarding the environment. This recognition has made it easier to receive support and research funding for the project. This is very positive. We regard it as positive that through Buildings of the Future we have gained access to expert advisors within the fields of energy and the environment. The challenge is using these advisors in a way that benefits the entire projecting team. The Buildings of the Future programme contributes to making everyone involved reach a bit further and try out new solutions. This is one of the reasons why Vindmøllebakken will be using a new timber building system.

NINA STENE WILHELMSEN, Project Leader, Fredrikstad Municipality

– In the work on Lisleby Hall, we have had great advantage of expert input from the Buildings of the Future network. The greatest challenge locally has been to get permission to go further than the current building regulations (TEK). We have received excellent expert help to do so. Buildings of the Future has made the building industry take the environmental impact of buildings seriously, and this has influenced the choice of building materials. Manufacturers now experience that material choices are based on other factors than price, maintenance and lifetime.

ARNE BIRKELAND, Project Leader, City Hall quarter, Kristiansand Municipality

– Buildings of the Future has provided a great deal of inspiration and support. The environmental goals of the programme have made it clear that we lack knowledge about CO2 figures. We have therefore had great benefit from courses and reference project, and from advising. Buildings of the Future has made us aim high with regards to environmental standards for new municipal buildings. Our experience is that the building industry is now moving in the right direction in terms of climate challenges.

DAGFINN SAGEN, Architect, MDH Arkitekter

– Buildings of the Future have been very involved with Moholt 50|50 and has stayed up to date on what we have been doing. It has been useful to participate in collective events and seminars. It is our experience that local authorities associate Buildings of the Future with something positive and important. Being part of the Buildings of the Future program gives the project a stamp of approval.

SYLVIA SKAR, Advisor on Energy and Environment, Norconsult/ Coordinator on Stationary Energy, Cities of the Future

– It is important to showcase good examples. Buildings of the Future has contributed to changing established principles for energy, material specification, localisation and transportation. All the examples are unique, but at the same time based on knowledge and technology that others can learn from. When a project uses prefabricated elements in low carbon concrete, it paves the way for others to do the same. Buildings of the Future disproves myths and shows that interdisciplinary work between architects and engineers creates sustainable and robust buildings. Increased knowledge across the country is important to make environmentally friendly buildings the standard.

INNSIKT

BÅRD SVERRE SOLEM, Architect, Eggen Arkitekter

– Buildings of the Future and the pilot project Åsveien School has increased knowledge in our office. We have appreciated the contributions regarding problem solving, from both NAL and Eivind Selvig (klimagassregnskap.no), and have established a network for knowledge exchange. It has been motivating to receive so much good feedback. I question the goal of a 50 percent reduction of greenhouse gas emission in comparison to a reference building. It is more important to make right choices than to focus on a fictional reference building. Perhaps, instead, one could focus on the CO2 reduction per square meter or per user – this is more comparable. I hope for a "textbook" which is easily accessible and which summarises the experiences and the right choices in the project.

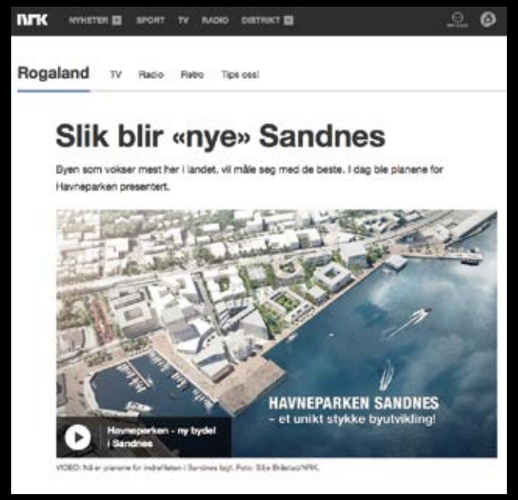
DAG RUNE SKARSTEIN, Projecting Leader Rambøll (formerly Skanska)

– It has been good to have specific criteria to relate to, and very good with a best practice guide. This made it easier to follow up initiatives during the design phase. It was good that the programme offered precise requirements regarding greenhouse gas emissions from, for example, building materials. This has led to increased knowledge for the participants. Participation in such projects demands flexibility and good organisational skills. Many people have had causes they were passionate about in addition to there being several environmental programmes to relate to. That makes it easy to get lost and one can end up with "documentation stress syndrome" and a fear of decision-making. The situation could become complex and prevent progress. At Søreide School, we were able to handle via close and successful collaboration on the project. The Buildings of the Future program is now ended and BREEAM and NS 3701 will most likely be the important standards when it comes to further development of the industry.

MARINA BAUER, Architect, OPA Form

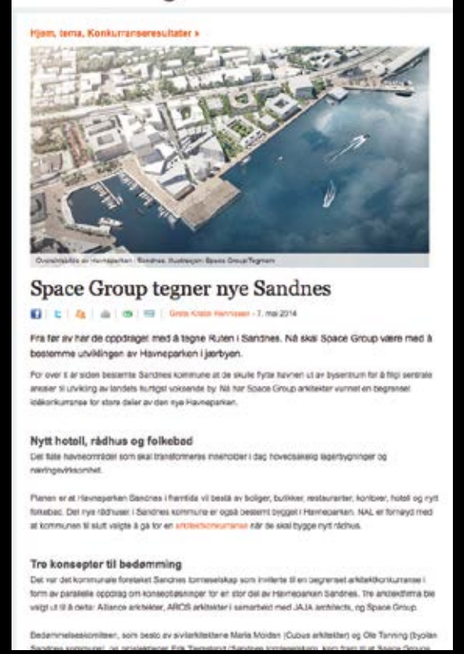
– Both the knowledge in the Buildings of the Future organisation and in the environments we have made contact with is very useful, contributes to increased knowledge, and stimulates interdisciplinary dialogue. Participation also gives authority to climate and environment work within the project group. All those involved have been proud of the project and its environmental ambitions. Through the programme a building physics group has been formed, including among others the Norwegian Institute of Wood Technology. This group plays a vital role when specifying construction methods and materials. One of the results is that we have reduced the need for ventilation in dwellings. Since our starting point has been real projects with demands for profitability, we have achieved realistic solutions that can be used to inform the revision of building regulations. This is a way to influence the whole building industry.

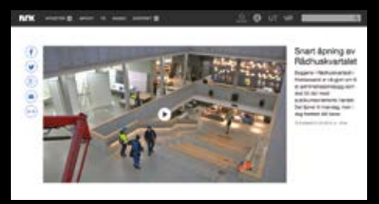
A SELECTION OF MEDIA CLIPPINGS



Reiser historisk skole bygg

Her ser du nye Søreide skole





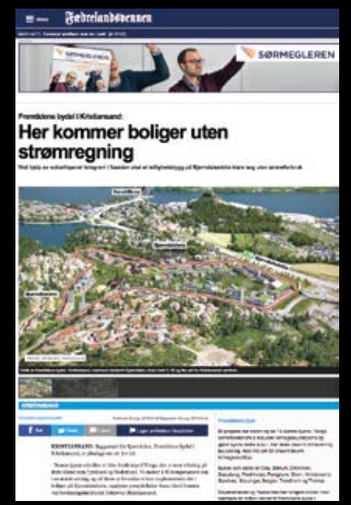


Photo: NAL

CONTACT BUILDINGS OF THE FUTURE

If you have questions please contact the individual pilot project participants. Contact information is given in each individual presentation.

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CURIOUS ABOUT THE BUILDINGS OF THE FUTURE PROGRAMME?

Read more about Buildings of the Future
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