

Can a musician say: "Some days I play correctly, and some days I play beautifully"?

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Conceptual design of a carbon neutral kindergarten in Brøset, Trondheim

An interdisciplinary student design competition @ NTNU and Chalmers

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Introduction

In co-operation with the Norwegian State Housing Bank (Husbanken) and Hans Eek architects, the Norwegian University of Science and Technology (NTNU) and Chalmers University of Technology hereby invite to a student project competition.

The overall goal for this competition is to raise awareness regarding resource efficiency measures among architects and engineers, and the necessity of interdisciplinary co-operation among these two groups from the early stages of design on.

The specific topic of the competition in 2008 is to develop an attractive **concept** for a carbon neutral kindergarten in Brøset, Trondheim. Attractiveness, in this context, is related to three main issues:

- (1) the concept's ability to integrate environmental issues in architecture
- (2) adaptation to the local climate and site
- (3) zoning of functions according to usability and indoor climate

The competition is organised as a closed student project competition. The participants are interdisciplinary teams of students from NTNU and Chalmers enrolled in the following courses:

- AAR4610. "Energy and Resource Efficient Architectural Design" at NTNU, Faculty of Architecture and Fine Art
- TEP4245. "Climate Engineering" at NTNU, Faculty of Engineering Science and Technology
- AUT101. "Resource Efficient Building for the Future" at Chalmers, Architecture A4, Design Studio in the Master Programme "Design for sustainable development"

We wish the participants the best of luck!

NTNU

Chalmers

The Norwegian State Housing Bank

Hans Eek architects

Context: A carbon neutral settlement at Brøset, Trondheim

Is it possible to lower resource use and at the same time increase the quality of the built environment? Is there necessarily a conflict between low-energy design and usability? Can architecture and planning actually contribute to lowering society's carbon footprint? And can this be achieved while maintaining a high quality of life and a stimulating built environment?

These questions form the background for the design of a carbon neutral settlement in Brøset, Trondheim. The core of the project, generated by a consortium of researchers and governmental institutions, is to find out how issues of lifestyle, design and technology can be combined in the built environment to facilitate a lower carbon footprint.

In the beginning of 2008, the Norwegian government launched the vision of achieving a carbon neutral society by the year 2030, gathering the support of a broad coalition of governmental parties and opposition.

At the Norwegian University of Science and Technology (NTNU) in Trondheim, an interdisciplinary group of researchers and governmental institutions answered to this urgent and necessary challenge with a vision for a carbon neutral settlement in Trondheim driven by a symbiosis between architectural quality, lifestyle and technology issues.

The project group includes disciplines such as industrial ecology, architecture and planning, different kinds of engineering, and social sciences, and consists of researchers both of NTNU and SINTEF Byggforsk¹. From the early stages, in addition, contact with governmental institutions was actively sought out to ensure the political foundation of the project. The group therefore also includes representatives from The Norwegian State Housing Bank and the Municipality of Trondheim.

Three main topics are investigated in order to reach the goal of carbon neutrality:

- **The construction phase and its relation to the building's lifetime**, including issues like the transportation of materials, along with their embodied energy; the durability of the component design; the flexibility of the connections; and the generality of the floor plan and building geometry to facilitate a second service life
- **The operation phase during the entire lifecycle of the building**, including issues like energy supply systems, for example with community heating networks based on renewable energy sources; the reduction of energy use; the use of renewable energy; intelligent control systems; and focus on the combination of good indoor comfort with resource conservation
- **Lifestyle issues**, including topics like the creation of a city of short distances; food supply; travel and transportation

¹ A centre for applied research, closely connected to the university

The competition site

Attached to this programme is a map of the competition site in scale 1 : 5000 and 1 : 750.

A digital site file can be found on <http://www.trondheim.kommune> > kart.

Currently, a temporary kindergarten has been built on the site out of prefabricated modules. These modules will be moved in a few years to make room for a permanent kindergarten.



Goals for the competition project

The specific topic of the student competition in 2008 is to develop an attractive **concept** for a carbon neutral kindergarten in Brøset, Trondheim. The kindergarten will be part of a larger carbon neutral settlement at the Brøset site.

Three issues are fundamental to the competition project:

(1) The concept's ability to integrate environmental issues in architecture

- Integrated design solutions in which architecture & technology support and enhance each other.
- Choice of energy concept: Energy carrier and supply system. Reduction of energy use, and use of renewable energy. The energy consumption of the kindergarten should be **70 kWh/m² per year or better**. In addition, you should prioritise low-value energy for space and hot water heating. District heating is available, but you are allowed to consider alternatives.
- Choice of materials: use of local materials with low embodied energy, low emissivity and high durability

(2) Adaptation to the local climate and site

- The concept should show a thorough understanding of the nature of the site and its connection to the surrounding environment: orientation, built environment, view, traffic ...
- Different use according to season

(3) Zoning of functions according to usability and indoor climate

- A space efficient development of the kindergarten, related to the use and occupancy of different types of rooms, and the corresponding need for heating, shading, ventilation and lighting.
- Combination of good indoor comfort with resource conservation
- Think flexibility and usability during the building's entire lifecycle!

Functional programme for the kindergarten

The kindergarten should encompass the following functions.

The gross area dedicated to each function in the table below includes corridors, stairways and technical rooms. (Net area x 1,25)

Kindergarten for 72 children	Gross area in m ²	Specifications
Play and living area, indoors	288 x 1,25	Some of the area may be linked to the kitchen, wardrobe or communication area
Kitchen	26 x 1,25	Preferably 2 kitchens to serve all children simultaneously. The children can participate in the food preparation.
Children's wardrobes	99 x 1,25	Wet and dry wardrobe with toilets and possibility to wash hands.
Baby changing rooms + toilet	16 x 1,25	Should be wheelchair accessible
Common room	46 x 1,25	For larger children's meetings and breaks. May also be connected to entrance.
Office rooms	20 x 1,25	For the personnel
Wardrobe for personnel	15 x 1,25	Wardrobe and storage, toilets, shower
Storage and cleaning area	44 x 1,25	For toys, equipment, food, chairs and cleaning aids
SUM gross area	554 x 1,25	

The outdoor play area should be about 6 times the size of the indoor play and living area, i.e., about 1800 m² of outdoor play area not including access roads etc.

The play and living area indicated in the table above corresponds to a traditional kindergarten with 4 units. Within this area, a wide range of activities can be organised with a variable type and size of children's groups and different types of use of the available space. The group of 72 children is often divided into smaller units in order to give them the security and sense of belonging that can only be established in small groups.

Competition entries should submit the following documents

- Site plan, showing the disposition of the site, access, outdoor areas etc 1:200
- Site sections showing the height of the planned kindergarten and, if relevant, existing structures 1:200
- **Schematic** perspectives, plans, and sections showing the environmental and architectural concept for the kindergarten 1:100

- A description of the general concept / strategies used
- A short summary of the environmental goals for the project
- A visualisation (with sketches) of the interdisciplinary design process in the group: which options were considered, which choices were made, and why?

- Diagrams showing the integration of environmental issues in the architectural concept
- Diagrams showing the project's adaptation to local climate and site conditions
- Diagrams showing measures to optimise indoor environmental quality

Format

- The proposal should be presented on four A1 boards. The boards' mounting sequence must be stated. The drawings must be oriented with North facing upwards.
- A digital version in A3 size in pdf should be submitted on a CD for the assessment and publication afterwards.

Identification

The entries should be anonymous. The only identification on the A1 boards and CD's should be a motto for the project entry. Competition entries carrying any other indication as to the name of the participants shall be omitted from the competition.

To each entry a sealed envelope shall be attached, mentioning the group's motto on the outside. In the envelope the following information shall be provided:

- The names and addresses of all members of the group
- The bank account number of each group member to which the prize sum can be transferred

NB! All competition entries need to be submitted in English

The jury

The international jury consists of four professional architects and engineers:

- Gunilla Murnieks, Wingårdhs arkitektkontor AB, Göteborg
- Espen Dahl, civil architect MNAL, GASA architects AS, Oslo
- Ida Bryn, engineering consultant, Erichsen & Horgen AS, Oslo
- Maria Olsson, engineering consultant, WSP Environmental, Göteborg

The teachers from NTNU (Anne Grete Hestnes, Per Monsen, Per Olaf Tjelflaat, and Annemie Wyckmans) and from Chalmers (Michael Edén, Jan Gustén, Angela Sasic Kalagasidis and Barbara Rubino) do not participate in the assessment of the competition entries.

The prizes

There will be separate prizes for the Norwegian and Swedish groups. The prize money is provided by the Norwegian State Housing Bank, offering 30 000 NOK to the winning Norwegian teams, and the Swedish Partner, correspondingly offering 45 000 SEK to the Swedish prize winners. The prize money shall be distributed among at least three Norwegian and three Swedish groups. The jury may also decide on honorary rewards.

As soon as the jury has reached its decision, the manager of the prize sum will be informed, and the prize sum will be transferred to the winners. The prize money will be distributed equally among architecture and engineering students within the winning groups.

In addition, the winning design entries will be included in an article concerning the competition and the co-operation between Chalmers and NTNU. The article will be sent to *Arkitektnytt* and to *Arkitekten*, the monthly journal of the Norwegian and the Swedish Architect Association, respectively.

Time table

Start of the competition

1st of April 2008 at NTNU in Trondheim.

Workshop – Excursion to Trondheim

Chalmers' students prepare an excursion to Trondheim 1st to 4th of April 2008, where a closed workshop for all of the competition participants will build the interdisciplinary teams and introduce the participants to the site and competition programme. The excursion also includes participation in the Passivhus Norden conference 2nd and 3rd of April.

Questions to the jury

Questions to the jury shall be directed to: Annemie Wyckmans (NTNU) and Michael Edén (Chalmers)

There is no deadline for the submission of questions to the jury.

The jury's answer will be distributed to all participants.

Deadline for submission of competition entries

Tuesday 29th of April at 3 PM. Competition entries handed in after the deadline has expired will not be evaluated by the jury.

The Norwegian students submit their entries on it's:learning. The Swedish students submit their entries on Studieportalen.

The students carry paper presentation boards to Gothenburg, where they will be exhibited and evaluated by the jury.

All entries shall be exhibited in A-gården, Architecture.Chalmers.

Assessment by the jury – Excursion to Gøteborg

Wednesday 14th to Friday 16th of May at Chalmers in Gøteborg. During these days, the jury will publicly evaluate and discuss each of the competition entries. In addition, there will be an excursion to several low energy projects in Gøteborg.

Award Ceremony

The design entries are evaluated in public and the winning entries announced on May 15th. After the award ceremony, there will be a festive reception for all participants and sponsors.

Public exhibition

The design entries will be exhibited in public in Trondheim in June 2008.