

Architectural Design Strategies for New Generation Energy Buildings (NGEB): Towards a future with limited resources

Project structure

This industrial-PhD project will be carried out in Arkitema's department of *Energy, Water & Industry* (part of *Commercial*), and the Royal Danish Academy - Architecture, Design, Conservation: Institute of Architecture and Technology.

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Main supervisor (Arkitema): John Strandfelt

CO-supervisor (Arkitema): Christian Schousboe Platz

Expected start date: March 1st, 2024.

Project description

The PhD-project focuses on developing sustainable architect- and engineer-oriented design strategies for *New Generation Energy Buildings (NGEB)*, needed in the green transition. It is framed around three fundamental aspects:

- Minimize greenhouse gas emissions.
- Incorporate adaptive solutions.
- Increase material and building lifespan.

These aspects have been highlighted as focal aspects for lowering the environmental impact of buildings and construction by the United Nations Environmental Program.

Project background

Historically some of the qualities and characteristics in industrial buildings, such as long-span structures with high flexibility and a repetition of modular systems, have reduced construction time and costs and have also been key for renovation and transformation success, increasing the total building longevity. Unfortunately, the actual lifespan and lifespan predictions for modern energy and industry buildings are decreasing and are among the building typologies with the shortest lifespan in Denmark, while also a high environmental impact is related to the building materials.

Project execution and perspective

The project includes a historic mapping of the development of industry and energy buildings, data and knowledge collection of design experience and requirements in contemporary energy and industry buildings, and a review of sustainable solutions used in other building typologies. For some building typologies, great efforts have been put into investigating and implementing circular solutions and materials with lower CO₂-emissions, but to a significantly lesser extent in industry and energy buildings. By investigating the interrelationship between material, technique, and form – through conceptual drawings, gathering knowledge and perspectives, testing physical prototypes - new design strategies for industrial and energy buildings will be tested and developed. A focal aim is to create a new platform or tool for these strategies, which can be used within the departments working with this building typology in Arkitema and COWI and to guide clients in early sustainable design strategies. It is also an important aspect of this industrial PhD-project to further strengthen the work and knowledge sharing between the research community and practice.