Philanthropic Investment in Building Development Projects

Innovative demonstration projects that can inspire the development of sustainable modern buildings
Since its establishment in 2003, Realdania By & Byg has built 15 experimental development buildings, the purpose of which was to develop specific examples of how to promote healthy, efficient and sustainable new buildings, and how to develop modern new buildings in historical urban environments.

Realdania By & Byg’s aim is to inspire private developers and home-owners to sustainable development of the built environment. At the same time, Realdania By & Byg’s philanthropic investments in experimental new buildings generate revenue that can be used for further investments.

Realdania By & Byg operates in Denmark and the company only makes philanthropic investments in experimental new buildings in Denmark. However, Realdania By & Byg is happy to share the experiences as a philanthropic investor with international professionals working with the development of sustainable modern buildings.

Through websites, films and books, Open House events and the Realdania By & Byg Club, Realdania By & Byg shares the many stories the properties have to tell. Go to www.realdaniabybyg.org to find the full property list, publications and videos in English.

Introduction

This publication serves as an introduction to Realdania By & Byg’s work with philanthropic investment in experimental new buildings. It is also an invitation to international colleagues to get in touch for more information, networking, co-organization of events or private tours in the experimental new buildings.
Philanthropic Investment in Building Development Projects

How far can an investment in reducing energy consumption in single-family houses go before it is unprofitable? Can you build multi-storey residential properties that generate as much energy as they consume, and are thereby energy-neutral? And how do you achieve the largest and most profitable carbon reductions in the construction of new single-family houses and multi-storey residential properties?

These are some of the questions that the building development projects by Realdania By & Byg will help answer. We do this by testing new research-based knowledge in specific buildings. This supplements research and analyses with practical experience that can help develop building projects, the construction industry and advisers, and that can inspire development of more environmentally sustainable buildings.

Specific solutions and initiatives that can be scaled within a few years are very much needed. Today the construction industry is among the largest emitters of CO2 in the world. In order to meet the UN Sustainable Development Goals in 2050, it is crucial that the construction industry become more environmentally sustainable as the global population increases, more people move to cities, and unprecedented numbers of new buildings are built.

In 2023, Denmark will impose requirements for developers to reduce CO2 emissions in new building projects, and requirements for a rapid transition in the construction industry will only increase in the coming years. However, reductions in carbon emissions pose new challenges and raise a number of dilemmas in the construction industry. Even though environmental sustainability in the construction industry is not a new concept, “the green” solutions are still challenging for the industry, for example in testing new climate-friendly solutions and materials focusing on carbon reductions.

This is where philanthropic investments in Realdania By & Byg’s experimental building development projects can pave the way for specific solutions and new knowledge that make a difference; also outside Denmark.

What are philanthropic investments in building development projects? Realdania By & Byg is a subsidiary of the philanthropic association Realdania, and it covers the...
elements in Realdania’s articles of association linked to acquiring and building properties and through this promote the quality of life in the built environment. With ownership comes the opportunity to build new buildings and experiment with full-scale building projects, as well as create transparency about the process, finances and results.

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Realdania By & Byg invests in developing experimental new building projects to test new knowledge, hypotheses or ideas 1:1 in building projects, the precise effects of which they do not know in advance. As a philanthropic investor and developer, Realdania By & Byg can accept a greater financial risk than private and public stakeholders.

Financing for the building development projects comes from income generated by Realdania By & Byg from renting out its property portfolio. Even though Realdania By & Byg is a philanthropic investor, a precondition is always that the development properties can be built within the budget of a standard construction project, so that it is possible for the market to realise the solutions developed in the projects. Another precondition is financially sustainable operation of the development properties.

Some of Realdania By & Byg’s development properties are sold to private investors immediately after they have been built, whereas others are kept by Realdania By & Byg over a shorter or longer period of years. Keeping the properties for a period after completion allows Realdania By & Byg to follow the afterlife of the property. Realdania By & Byg is also responsible for operating the property during the period and for renting out homes or offices at market rates. Which solution is chosen depends on the purpose of the specific project.

The best solutions at the least cost
Building development projects by Realdania By & Byg have to support Realdania’s philanthropic strategy. A precondition is also that there is a philanthropic task, i.e. that the project cannot be carried out by the market itself, and that a thesis or an idea is best tested through a specific building development project.

Development projects by Realdania By & Byg can help kick start a process by showing visible initiatives and by setting the bar for architectural quality, increasing research-based new knowledge through 1:1 experiments, and testing and transferring knowledge to other stakeholders by describing and continuously developing different experimental designs. As an independent, non-commercial and impartial stakeholder with full control over all phases of the experiment, from formulation of test case, to design, materials, construction, as well as monitoring and documentation of tests-in-use and communication, Realdania By & Byg can also ensure transparency and openness about the results. Both the good results and those that should not be repeated by others.

Scalability in relation to the market is important when Realdania By & Byg builds development properties, as it is important that others can reproduce the solutions at the same price. It must therefore be possible to build the development properties within the budget of a standard construction project, and Realdania By & Byg has a pragmatic approach such that Realdania By & Byg does not necessarily pursue the most ideal solutions, but rather the best solutions at the least cost.

Examples of building development projects
There are different backgrounds for Realdania By & Byg’s building development projects, and the technical focus has changed over the years. Overall, Realdania By & Byg operates with four
main categories of building development projects, but in practice several of the issues within these categories are addressed in the projects:

- Healthy buildings
- Efficient buildings
- ESG-related buildings
- New buildings in historical urban environments

1. Healthy buildings

Our health, well-being and quality of life are impacted by many buildings with indoor-climate issues and by residents with a behaviour that negatively affects the indoor climate. Poor indoor climate affects our everyday well-being, can lead to serious diseases, and has significant socio-economic costs.

Through two projects, “Healthy Homes” in Holstebro and “Healthy Homes - Renovation” in Randers, Realdania By & Byg has examined how to build indoor-climate-friendly single-family houses and how best to renovate older single-family houses in order to achieve the most healthy indoor climate.

The theory in the “Healthy Homes” project is that recent years’ focus on energy and the environment may have had a negative impact on residents’ health and comfort. The purpose of the project is to demonstrate that it is possible to improve the indoor climate in Danish homes without compromising on energy efficiency or the environment, and without increasing costs. Another ambition is that the building should be able to encourage residents to a behaviour to help ensure a healthy indoor climate.

The purpose of “Healthy Homes - Renovation” is to find out which indoor climate solutions provide the greatest health benefits at the least cost when renovating an older single-family house. The goal here is to provide inspiration for Danish advisers and homeowners. In Denmark, 85% of homeowners live in a house built before 1980, when requirements for insulation, for example, were different from today.

An “indoor climate wheel” for advisers or owners of buildings was developed in connection with the projects. This is a control instrument that presents a number of factors affecting the indoor climate in a home. With help from Realdania, Realdania By & Byg’s work on “Healthy Homes” meant that an option to assess the health in a building project has been incorporated in the DGNB system, so that a DGNB certified building can now be awarded an add-on distinction in the form of a “DGNB Heart” for particularly healthy buildings. The market has welcomed this idea, and “Jernbanebyen”, which is being developed in the heart of Copenhagen, is the first urban development project in Denmark to create one of the healthiest neighbourhoods in the world and to strive for the DGNB Heart for the entire urban development area.

2. Efficient buildings

An efficient and innovative construction industry that can supply buildings with high architectural and aesthetic quality is crucial to reduce the consumption of building materials, the environmental impact in the construction process and buildings’ energy consumption in operation.

“The efficient building” is a 4-5-storey experimental building being built in Fredericia in 2021-2022, and it will examine potentials for efficiency improvements and test digital tools and working methods that can create a more efficient building, i.e. a building built with fewer resources, fewer defects and shortcomings, and/or higher value. The project will also examine how different solutions can develop collaboration, ensure planning, forge better synergy between operations and construction perspectives, and reduce resource consumption in terms of finances, time and the environment.

Even though the building itself is not the focus, the construction process still has to live up to the usual requirements from Realdania By & Byg regarding sustainable construction, and the building will have to be DGNB certified.

3. ESG-related buildings

A significant percentage of global carbon emissions comes from the construction industry. i.e.

Healthy Homes, Holstebro

Home Energy, Tilst
production of building materials, the construction process (including transport), disposal of construction waste and from heating and operation of the completed buildings. Carbon reductions are therefore an important focus point in many of Realdania By & Byg’s building development projects.

In the MiniCO2 Houses project from 2012, Realdania By & Byg tested how and where in the value chain the largest carbon reductions could be achieved at the least cost when building new single-family houses. A total of six different houses were built, each testing everything from material choice and recycling during construction, over design for extra-long lifespan and low maintenance, to flexibility in operation without adding new materials and the architecture’s possibilities to influence user behaviour. The “MiniCO2 Houses” project raised much debate in the industry, and one of the houses – the Upcycle House – became a reference in the Ministry of the Environment and Climate’s recycling strategy in 2016, as well as in the internationally profiled Sustania Sector Guide to Buildings.

In 2021-2022, the project will be followed up with the experimental building “MiniCO2 multi-storey wooden house”, which will contribute more knowledge about building multi-storey residential buildings with the least possible carbon emissions using wood as the primary material. In the long term, tiles, concrete, clay, bio-based materials or recycled materials could be tested and compared in similar experimental building projects. The experimental design will set the stage for benchmarking the multi-storey buildings against each other based on their respective performance in relation to the planetary boundaries, including their impact on ozone, acidification, biodiversity and up to nine other parameters.

An example of a project which has tested a theory is “Home Energy” from 2008. At that time, a widely-held opinion was that a house should be energy renovated as much as possible to achieve the lowest possible energy consumption, and thereby CO2 consumption. The project tested this in four different detached houses, and showed that there is a limit to what is worthwhile financially and in terms of carbon footprint. The project therefore helped raise a more relativistic debate on energy renovation and energy consumption. This is very important, as detached houses are the most common type of dwelling in Denmark.

Energy renovation was also in focus when “The Fortification Depot” in Copenhagen was to be renovated and transformed into a modern office environment in 2007. Here, the goal was to show how much a listed building complex can be energy renovated taking account of the specific factors that apply when the buildings are to be used for office workplaces (indoor climate and comfort). Energy calculations showed that it would be possible to achieve CO2 savings of almost 20%, but the actual CO2 savings are between just 4% and 8%, as draught-proofing the buildings, and thereby reducing the heat loss, increased room temperature, meaning that more energy is needed to cool the offices. The project was completed in 2012 and has attracted great international attention in professional circles.

Energy neutrality was one of the goals of the “BOLIG+” project from 2015. The ambition was to create Denmark’s first active energy-producing, energy-neutral multi-storey residential property, and to include healthy homes with optimal indoor climate and quality of life. The result was so
successful that the Danish Building Research Institute (SBI) believes that future construction projects should use experience and new knowledge from the project.

Where the above projects focus on CO2 reduction, the development of innovative communal housing for the elderly in Ringkøbing’s new green residential neighbourhood focuses on finding specific solutions to framework a community for people aged 50 and above in attractive surroundings. The goal was to increase the quality of life and to limit feelings of loneliness. An important criterion in this development was also that some of the 14 homes in the communal housing had to be affordable for anyone on a state pension. The aim was to ensure that the communal housing is accessible for a wide range of people with very different backgrounds – financially, educationally, professionally and socially.

4. New buildings in historical urban environments

Many new buildings are built in the middle of historical urban environments, where the architecture is often the subject of heated debate. Should the architecture try to imitate the historical environment or break with it? This has also been a challenge for some of Realdania By & Byg’s building development projects to demonstrate that it is possible to build healthy and environmentally sustainable new buildings which are also of a high architectural quality, taking into account the historical surroundings and contributing to increased quality of life for local residents and visitors.

However, there is no formula for high-quality architecture, and therefore the approach to the architecture in Realdania By & Byg’s new buildings in historical urban environments has also been very different from project to project. “BLOX” was built in the former commercial port in the heart of Copenhagen, and it differs significantly from its nearest neighbours in terms of architecture and materials. On the other hand, the two new buildings in the “Oluf Bagers Square” project in the heart of Odense have been significantly adapted to the architecture of the adjoining buildings.

In the new building “Tietgen’s Agony”, the challenge was to build on the last unbuilt corner plot in a homogeneous block of flats surrounding Frederik’s Church in the heart of the historical district of Frederiksstad in Copenhagen. Several generations of architects had tried their hand at erecting buildings on this corner plot, but without success. In such a homogeneous block, where only one small piece was missing, it would be tempting either simply to copy the other buildings or to create something entirely different. The final solution was a compromise which simultaneously creates harmony, interaction and innovation. In “Tietgen’s Agony”, the historical adjacent buildings in the block have been interpreted using style elements from the existing buildings, and the classic shapes of the square have been continued, while taking into account the lives of people today. The ground floor has a shop that stimulates life around the building.

Even though the architectural choices are different, all three buildings draw on the history of the area and the surrounding city, and each in their own way contribute to urban development. Both because the buildings themselves offer new experiences, shops, workplaces and homes, and because of the investments by Realdania By & Byg around the buildings. For example, the new “Lille Langebro” bicycle and pedestrian bridge at BLOX; the new squares around BLOX; Oluf Bagers Square; and Tietgen’s Agony, all of which invite residents to settle down and enjoy their city or carry out different activities in places where industry and heavy traffic once prevailed.

In all Realdania By & Byg’s new buildings in historical urban environments, architects have not only focused on the architecture and the urban environment, but also on the sustainability, indoor climate and efficiency of the buildings. For instance, the buildings on Oluf Bagers Square have been built using clay throughout with no insulation material such as glass wool, whereas the BLOX project applied a sustainability instrument that has ensured that the building emits less CO2 than industry standards for this type of building.

All four new buildings have received much recognition, including for their architecture. The year after its completion, Oluf Bagers Square received Odense Byforening’s award for a beautifying building in Odense, in 2010 Tietgen’s Agony received the Society for the Beautification of the Capital’s building diploma, and in 2021 Lille Langebro received the two prestigious British...
architecture awards, the Civic Trust Award and the RIBA International Award for Excellence. Realdania By & Byg received the Danish Association of Construction Clients’ main prize as developer of the year for BLOX in 2018.

Scaling solutions
As a philanthropic investor, Realdania By & Byg is an impartial stakeholder, independent of commercial interests. Therefore, Realdania By & Byg can show new paths that the market may not necessarily be aware of, and can have a more open approach in its building development projects than other property developers. For example, this makes it possible to draw on different types of knowledge, invite different types of advisers and researchers into projects and to try out different materials, products and methods.

To ensure transparency and credible results, and thereby increase opportunities to scale knowledge from the buildings, Realdania By & Byg always relies on external evaluation of its results, preferably from researchers and other independent sources, or encourages debate and conferences, where everyone is free to discuss and clarify the results.

Scaling projects is not necessarily about the market reproducing development properties 1:1. The large scaling potential in the projects is the practice-based knowledge they generate, and this knowledge can provide inspiration for many teaching environments in the industry, and help stimulate debate in the construction industry and among politicians, thereby impacting the framework of more environmentally sustainable buildings. Moreover, the projects can reveal new issues, which can then give rise to new building development projects or studies.

Over time, the development properties have become a “catalogue” of specific solutions and experience to pick from and further develop in other new buildings. Realdania By & Byg itself draws on this experience in its own new building, restoration and urban development projects, and so does the construction industry in Denmark and abroad.

Realdania By & Byg always makes results, experience and lessons learned from its building projects publicly available through publications about the buildings. Realdania By & Byg also organises tours of the buildings both before, during and after they have been erected, and experience is shared through Realdania By & Byg’s business club for industry professionals. Moreover, Realdania By & Byg participates in professional conferences and debates.
The need to develop solutions to make buildings more environmentally sustainable is more important than ever and will only increase in the years to come. A holistic approach and choosing the best solutions at the least cost make it possible to build efficient, healthy and environmentally sustainable new buildings within the budget of a standard construction project.

Testing known assumptions and theories in practice inspires many stakeholders. But the most surprising and inspirational solutions often arise in an open experimental design in which different solutions are tested against each other, and where unforeseen side-effects are allowed to occur.

Solutions and experiences are not scaled by the construction industry and the market on their own: it requires continuous communication about the building projects and solutions. This applies in relation to policy-makers, investors, contractors as well as academic and vocational education institutions.
Property Portfolio in Denmark

The properties are listed chronology, beginning with the oldest first.
Property Portfolio in Copenhagen

Year: 1663-1669:
6. The Harboe Widow’s Convent, Copenhagen

Year: 1742 and later
7. The Fortification Depot, Copenhagen
Year: 1854
8. The Navy Girls’ School, Copenhagen
Year: 1860
9. Risø’s Country House, Frederiksberg
Year: 1907-1908
10. J. F. Willumsen’s Family Home, Hellerup
Year: 1913
11. The Rose House, Hellerup
Year: 1917
12. The Balloon Hangar, Copenhagen

Year: 1937

Year: 1951
14. Arne Jacobsen’s Family Home, Klampenborg
Year: 1952
15. Varming’s Family Home, Gentofte
Year: 1953
16. Clemmensen’s Family Home, Gentofte
Year: 1955
17. Erik Christian Sørensen’s Family Home, Charlottenlund
Year: 1956-1959
18. Jarmers Plads, Copenhagen

Year: 2004-2006
19. Bispebjerg Bakke, Copenhagen
Year: 2006-2010
20. Tietgen’s Agony, Copenhagen
Year: 2006-2018
21. BLOX, Copenhagen
Year: 2011-2016
22. The Kvaesthus Pier and the Sankt Annæ Square, Copenhagen
Year: 2016-2019
23. Lille Langebro, Copenhagen
Sustainable development and CSR

Sustainability in the broadest sense of the word permeates everything Realdania By & Byg does, and in recent years new steps have been taken to ensure that the highest possible level of sustainability is achieved in the projects.

This is important, as buildings have a huge carbon footprint and as buildings highly influence health and the quality of life. The property business has many people working across national borders, so through our philanthropic investments in and active ownership of properties, Realdania By & Byg can make a difference in relation to what others in the market can do and want to do, with the purpose of inspiring others to benefit current and future generations.

Realdania By & Byg’s efforts for social responsibility

Carbon reductions
- Life cycle analysis of our property portfolio
- Implementation of energy management

Securing reasonable employment and wage conditions
- Join charter for social responsibility
- Implementation of internal guidelines

Code of Conduct
- We reduce our carbon emissions
- We reduce our consumption of resources
- We build to ensure a healthy indoor climate

The effect of the solutions is monitored and experiences are shared with Realdania By & Byg’s peers.
For Realdania By & Byg, sharing knowledge and information about properties has been a priority from the beginning. Public dissemination follows as a natural part of the philanthropic mission that underpins all of Realdania By & Byg’s work.

Moreover, increased awareness of a property also raises the value of the property, and communication activities generate documentation of the individual property investment, which can be useful for portfolio management in the future.

Although access to some of the experimental new buildings is limited after completion, Realdania By & Byg always invite visitors to take tours during the development period and often it is also possible to arrange tours in the properties when they are in use as a home, office or exhibition space.

Since 2007, Realdania By & Byg has had a public club programme, which allows the public to gain access to the portfolio of both experimental and historic buildings.

Members of the club pay a symbolic annual fee, and in return they can purchase tickets for property tours at half price. Tours are given by Realdania By & Byg’s own guides, who have extensive knowledge of the individual building and overall portfolio.

Today, the club has about 5,000 members, and each year approximately 200 tours of the properties are given by Realdania By & Byg’s communications team. Upon completion of a project, the public is invited to free open house events, which are often very popular. In recent years, Realdania By & Byg has had around 20,000 visitors annually.

Once or twice a year, Realdania By & Byg visits some of the experimental new buildings with our club members. You are welcome to participate in such visits. If you are not a member, you will have to pay full price for each participant.

See all the planned visits in our online calendar (in Danish only): realdaniabyogbygklubben.dk/arrangementer

Please contact our Club Team if you have questions regarding our guided tours and visits.

klub@realdaniabyogbyg.dk
Publications

Realdania By & Byg publishes material about all its new experimental properties, explaining the objects and results of the project. You can download them for free or buy printed copies at:

www.realdaniabyogbyg.org/publications

Videos

Realdania By & Byg also produces videos about some of its experimental new buildings, texted in English. You can find all our videos at

www.realdaniabyogbyg.org/videos

Go to www.realdaniabyogbyg.org to find the full property list containing a summary, photos, publications and videos about the properties.
Get in touch

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Realdania By & Byg is a member of several international networks, e.g. Iconic Houses and the European Foundation Center. Realdania By & Byg participates in international conferences and is always interested in building new professional relationships that can contribute to sustainable development of the built environment in and outside of Denmark.

Photos
Front page: Kira Ursem
Page 2: Jesper Ray
Page 4: Rasmus Hjortshøj
Page 6: Kira Ursem [top], Helene Høyer Mikkelsen [bottom]
Page 8: Helene Høyer Mikkelsen [left + right]
Page 9: Helene Høyer Mikkelsen
Page 10-11: Jesper Ray
Page 11: Lars Gundersen
Page 12: Rasmus Hjortshøj
Page 13: Lars Gundersen
Page 15: Jesper Ray [top], Christian Richters [bottom]
Page 17: Jakob Bekker-Hansen
Page 20: Jesper Ray [top], Helene Høyer Mikkelsen [bottom]
Page 21: Helene Høyer Mikkelsen [top], Søren Palmelund [bottom]
Page 22: Rasmus Hjortshøj [top], Christian Richters [middle], Jakob Bekker-Hansen [bottom]
Page 26: Realdania By & Byg
Page 30: Lars Gundersen

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Development and preservation

Realdania By & Byg is a subsidiary of the philanthropic association Realdania. Realdania’s purpose is to improve the quality of life in the built environment. Realdania By & Byg contributes to realising Realdania’s purpose through philanthropic investment in, and ownership of, historic buildings, experimental new buildings and urban development projects.

Since our foundation in 2003, Realdania By & Byg has accumulated a portfolio of more than sixty important historic buildings situated all over Denmark, all of which have been – or will be – updated through gentle restoration, and which, with their present-day usage, constitute a living built heritage.

Today, the property portfolio illustrates Danish architectural heritage over a 500-year period. Three to five historic properties are purchased and added to the portfolio every year.

www.realdaniabyogbyg.org