

# Is it expensive to build sustainable?

- Report by BUUS CONSULT on the relation between building costs and sustainability





# Is it expensive to build sustainable?

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## What can the experience from DGNB-certified projects tell us?

'Building sustainable is expensive.' This statement has followed the debate and the development of sustainable building construction for many years. But is there any evidence at all to back up the statement that it costs more to build sustainable? In general, it has been difficult to relate to this generalizing claim, as it requires a pool of comparable data – and as known, all constructions are different, where a large number of factors determine the economy of the construction. Additionally, there are different perceptions of what sustainability is and when a building can be described as sustainable.

The previous DGNB-certified buildings probably give us the best data basis for testing the claim. Here we have comparable data, which are third-party controlled, and we have access to both the building's economy for construction and the estimated total economy, as well as different measures of the degree of sustainability. Sustainability is not an ultimate quantity, and it is thus not a matter of sustainable or unsustainable. The title of this analysis could therefore also have been 'is it more expensive to build more sustainable?'

This note examines, on the basis of selected DGNB-certified projects, whether there are trends in the connection between the projects' finances and their degree of sustainability – and thus what this can tell us about the claim that it is expensive to build sustainable.



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# Data basis

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The studies here are based on 37 certified buildings. The buildings are all included as a part of the SBI report *Climate impact from 60 buildings (SBI 2020:04)*, which aims to provide a better knowledge base about the climate impact of new buildings. All buildings included in the SBI report have been quality checked and are calculated in the same version of the calculation tool LCAbyg to ensure quality and comparability. Today, there are more than 80 new buildings, which have been finally certified, but in this report we only look at the 37 projects from the SBI report to be able to include climate impact in the studies on as valid a basis as possible.

The 37 projects are divided into 8 multi-story residential buildings, 21 office buildings and 8 terrace houses. The projects are built in the period from 2012-2019. The developers are public, common, private and pension funds. The projects are geographically distributed throughout the whole country and are of varying size from approx. 500 m<sup>2</sup> to approx. 40,000 m<sup>2</sup>. However, the majority of the projects are in the order of 2-10,000 m<sup>2</sup>. The construction costs for the 37 buildings range from approx. DKK 6,000 per m<sup>2</sup> to approx. DKK 24,000 per m<sup>2</sup>, with 34 of the buildings being within the range of approx. DKK 8,000 per m<sup>2</sup> to approx. DKK 14,000 per m<sup>2</sup>. 3 of the buildings are certified to DGNB Platinum, 27 of the buildings are certified to DGNB Gold, while 7 of the buildings are certified to DGNB Silver. All the buildings have been built and have obtained their final DGNB certification.







# Method

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As described in the introduction, the purpose is to examine any trends in the relationship between the sustainability of a building and its economic conditions. The overall DGNB score is used here as a measure of sustainability, which is an expression for a building's overall performance in relation to a large number of parameters for sustainability. A very special and current focus area is the buildings' CO2 footprint/climate impact and therefore this is also used in the analysis as another measure of the degree of sustainability. The total climate impact is based on life cycle assessments and includes production of building materials during construction and replacement along the way, energy consumption for building operations as well as waste treatment and disposal at demolition. The life cycle assessments are based on a 50-year consideration period. For a more detailed description of the method used for calculating the climate impact and the material composition of the buildings, please refer to the above-mentioned SBi report.

Both the building costs (construction costs) and the total economy in the form of the net present value have been used as a measure of the buildings' finances. The construction costs represents the total costs associated with the construction of the building, while the net present value represents the building's total costs for construction, operation and maintenance, possible replacement of building parts, cleaning as well as expenses for the supply of energy and water. The construction costs in DGNB are based on either lists of offers or accountings of the construction and represents therefore the actual realized construction costs. The construction costs are corrected in DGNB in relation to the site, in order to even out regional differences. The costs are used as fixed prices and are not adjusted for inflation.

The use of the net present value instead of the construction costs does not give rise to other conclusions and it has therefore been chosen to include results based solely on the construction costs in this note.

All sizes are considered per square meter.

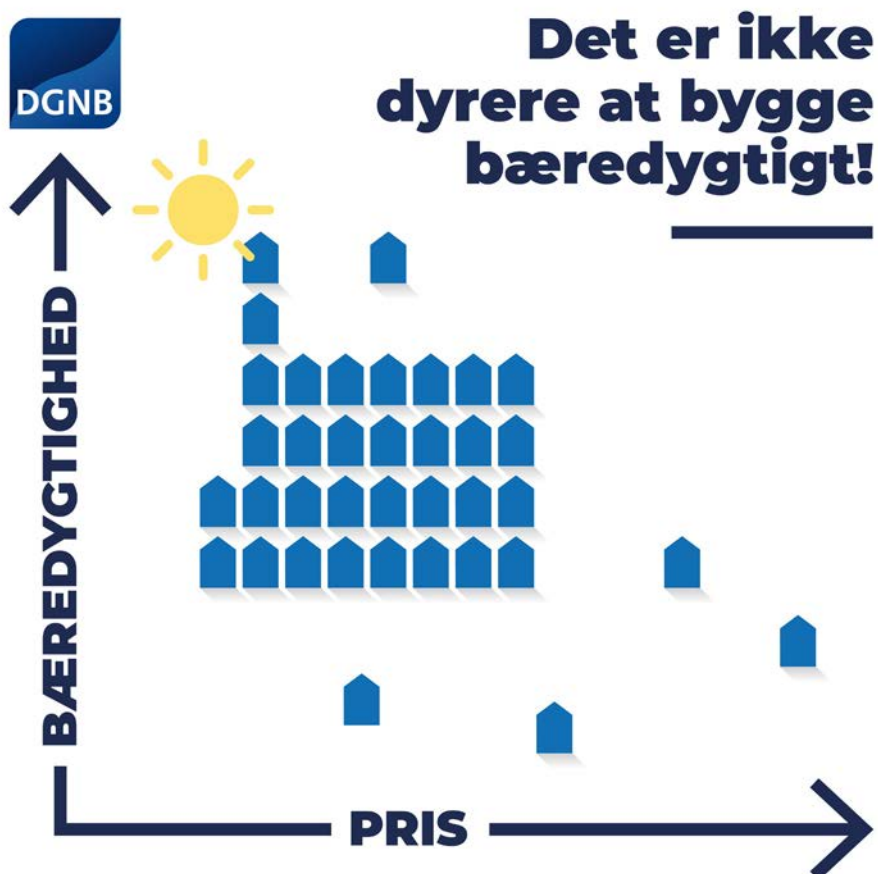
There are several factors which are important to keep in mind when assessing and interpreting the results:

- Only DGNB-certified projects are considered, which means that the projects have all had a certain focus on sustainability (but different levels of ambition). Therefore, the study does not show whether it is more expensive to certify versus not to certify.
- This note only examines general trends. The choice of sustainability may thus have made the individual project more expensive, without this being visible in these studies.
- The buildings are generally relatively "ordinary" buildings and therefore the conclusions of the note are not necessarily comprehensive for demonstration/spearhead projects with extraordinary efforts.
- The buildings have been developed and built over a number of years and are thus certified according to different versions of the DGNB manual. Therefore, there are small differences in the criteria behind the allocation of DGNB points. However, this is not considered to have a significant influence on examining general trends, as in the case here.
- The constructions costs are included as a part of the DGNB system, where a cheaper construction basically achieves more points in relation to the total economy. This therefore affects the comparisons of the DGNB scores and constructions costs but is not considered to have significant impact on the overall conclusions.

# Results

Presented below are the results for DGNB score vs. construction costs and total climate impact vs. constructions cost for all 37 buildings. In the appendix, the same results are divided into the three building types: multi-story residential buildings, office buildings and terrace houses.

## DGNB-score vs. building cost

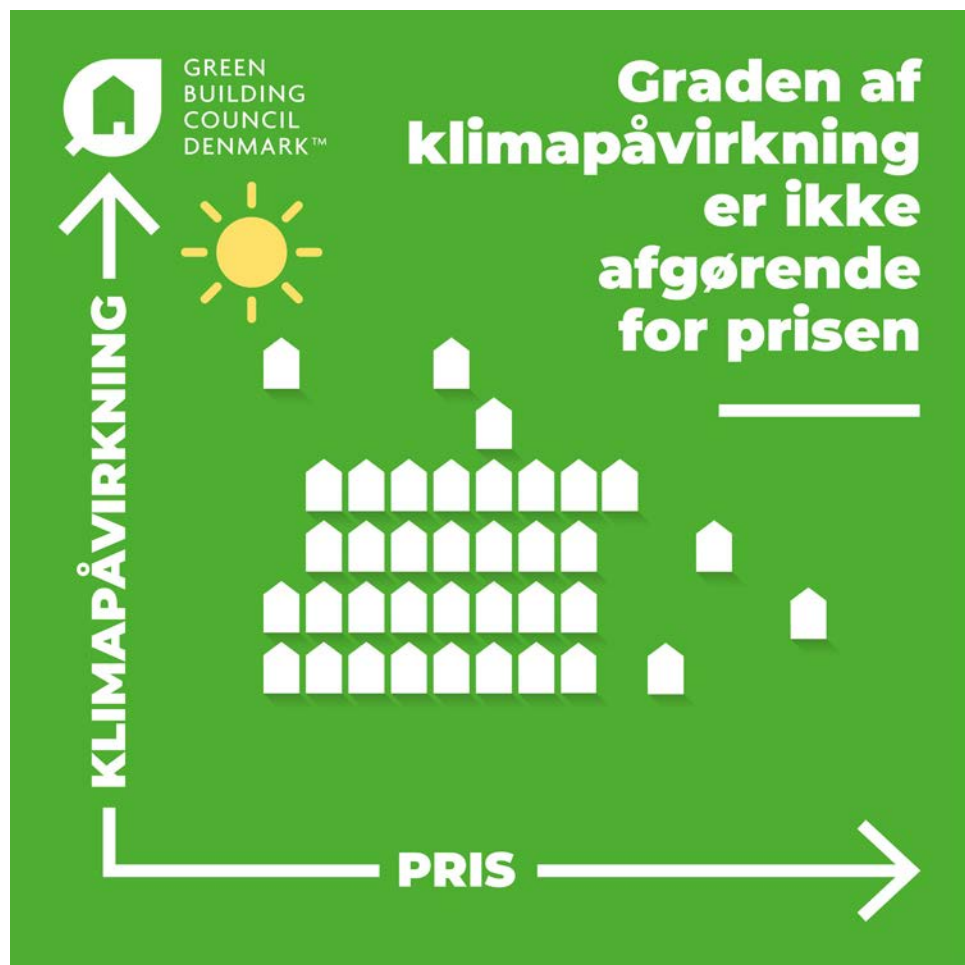


*Translation:* "It is not more expensive to build sustainable!". For further precision of the figure see p. 12

The comparison of the buildings' DGNB score with the buildings' construction costs shows no clear correlations between them and thus not a tendency that it is generally more expensive to build more sustainable (higher DGNB score). It is noticeable that several of the buildings with high scores are among the buildings with the lowest construction costs. From this it cannot be deduced that it is cheaper to build more sustainable, but that it is possible to achieve a high(-er) DGNB score and at the same time keep construction costs down. The results here show no evidence that the DGNB score has a decisive influence on the total construction costs.



## Climate impact vs building cost



*Translation:* "The climate impact is not conclusive for the price." For further precision of the figure see p. 14

The comparison of the climate impact and the constructions costs shows no clear correlations between them and thus not a tendency that it is generally more expensive to achieve a lower climate impact. A large part of the constructions are close in relation to construction costs, while their overall climate impact is wide-ranging. Therefore, there are buildings with both relatively high and low climate impact, which are built for similar construction costs per square meter.

# Conclusion

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Comparing the degree of sustainability, DGNB score and the buildings' overall climate impact, with the construction costs for the 37 DGNB certified buildings shows no tendency that it should be more expensive to build more sustainable and thus does not support the thesis that it is expensive to build sustainable.

The studies of the DGNB score show that it is possible to achieve a high DGNB score and at the same time keep construction costs down. The studies of the total climate impacts similarly show that it is possible to build with a low climate impact and at the same time have low construction costs. This may indicate that there will often be cost-free CO2 savings that can be realized.

Overall, the experience from the DGNB certified projects therefore shows no sign that it is more expensive to build sustainable, or that the degree of sustainability is a decisive parameter for construction costs. It is factors other than sustainability that are crucial to the cost.

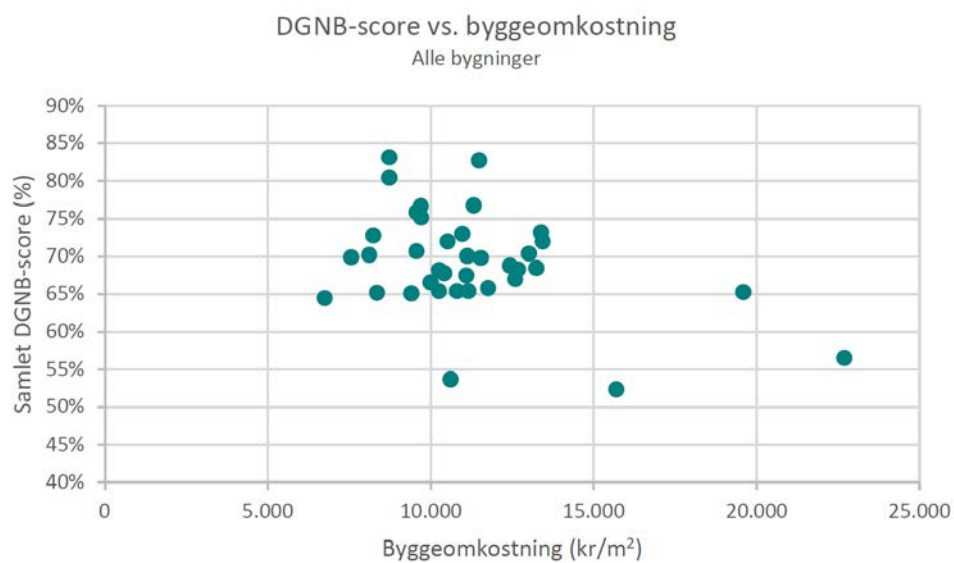




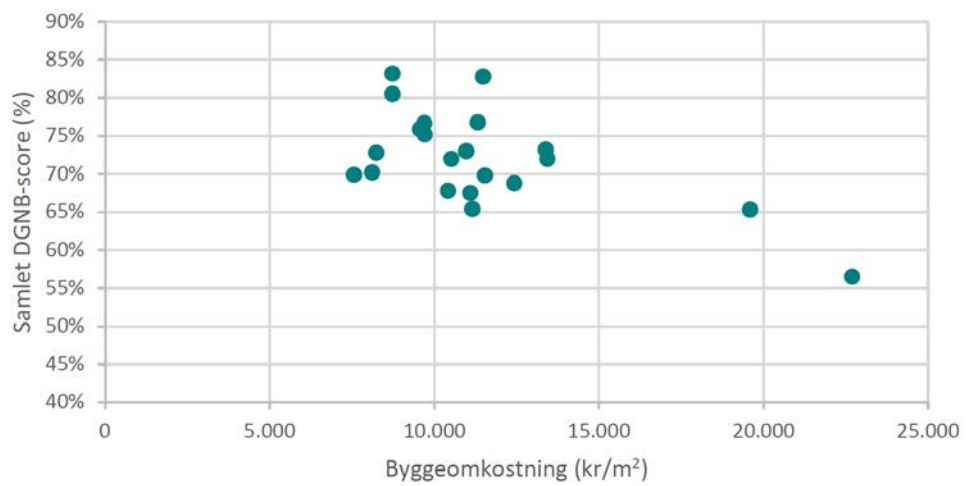
# Appendix - other results

As mentioned, it has been examined whether other scenarios emerge or whether other conclusions can be drawn if the three different building types are considered separately. This is not immediately the case, but based on this, the results are here included for all buildings together (corresponding to the above) and separately for multi-story residential buildings, office buildings and terrace houses, respectively.

## DGNB-score vs building cost

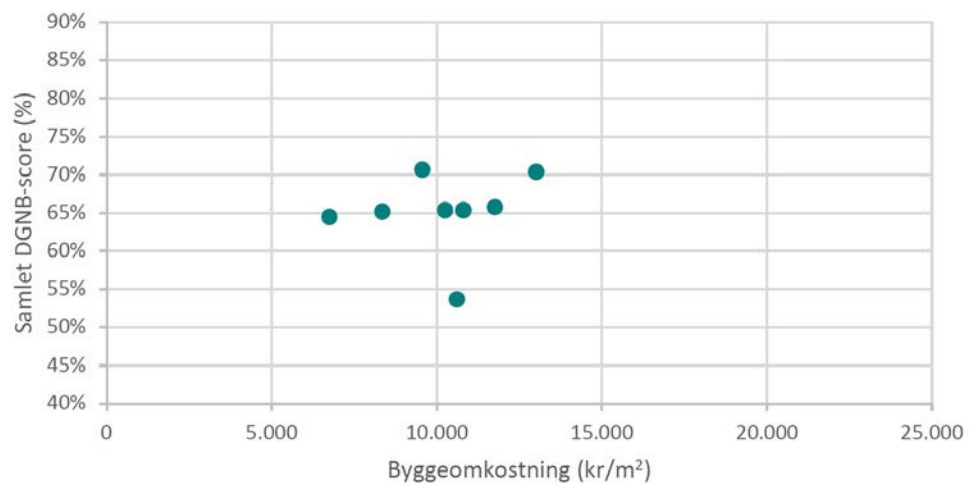


DGNB-score vs. byggeomkostning  
Kontorbygninger



DGNB-score vs building cost for office buildings

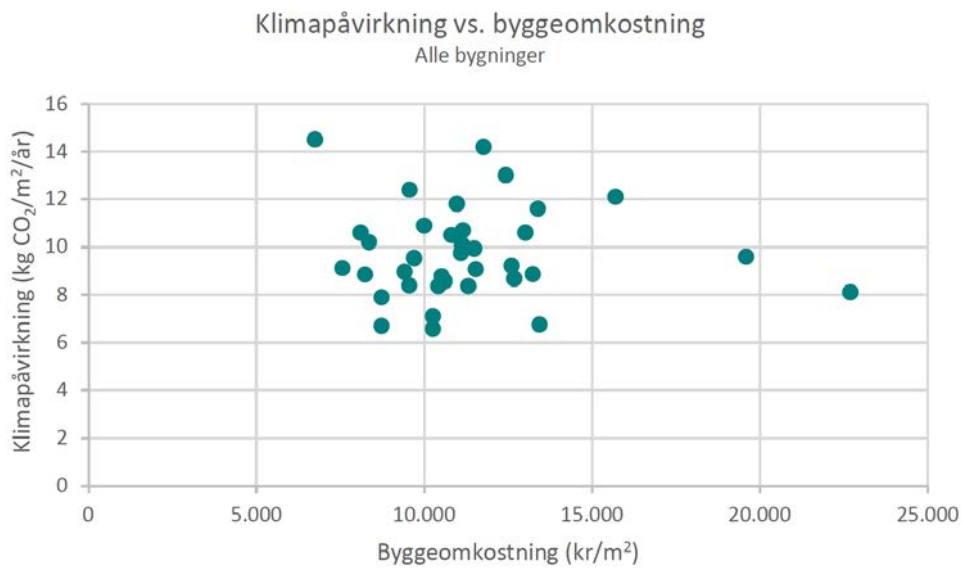
DGNB-score vs. byggeomkostning  
Rækkehuse



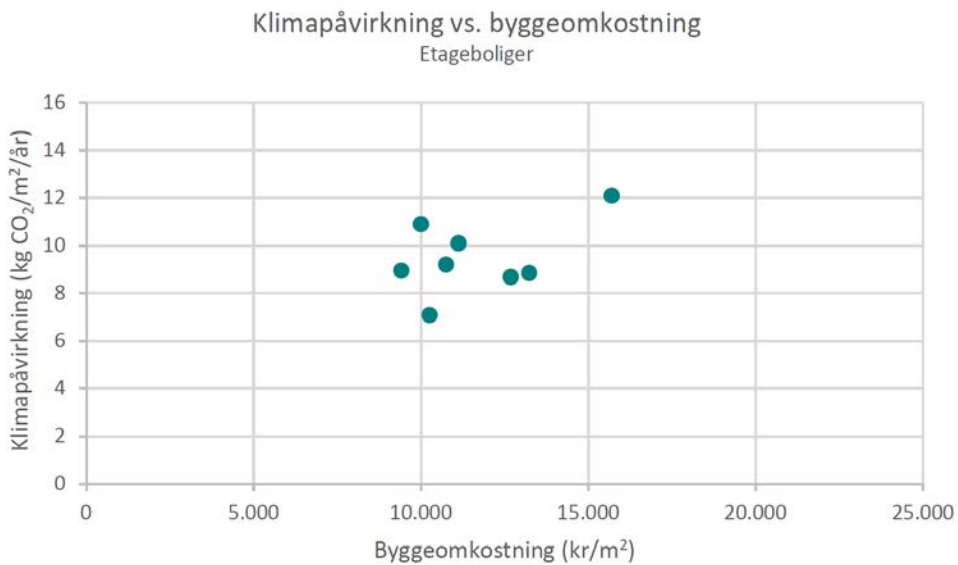
DGNB-score vs building cost for terrace houses

# Appendix - other results

## Climate impact vs building cost

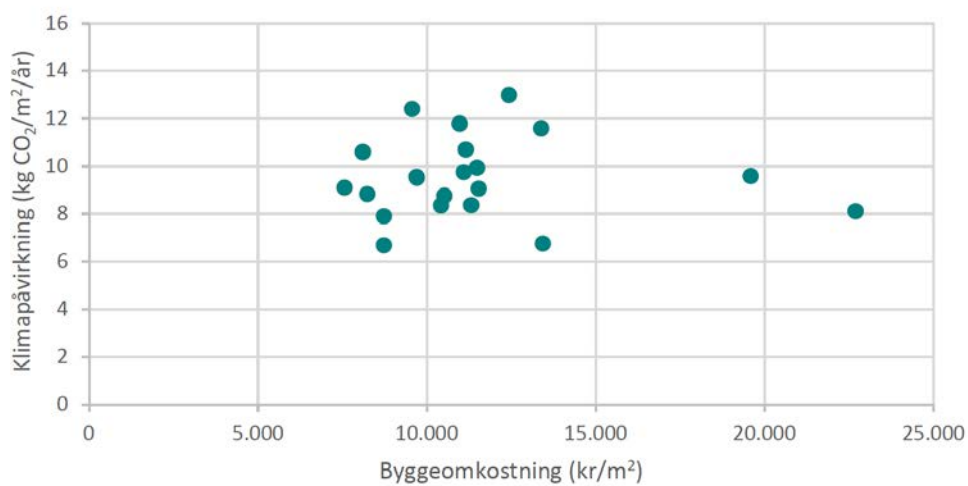


Climate impact vs building cost for all buildings



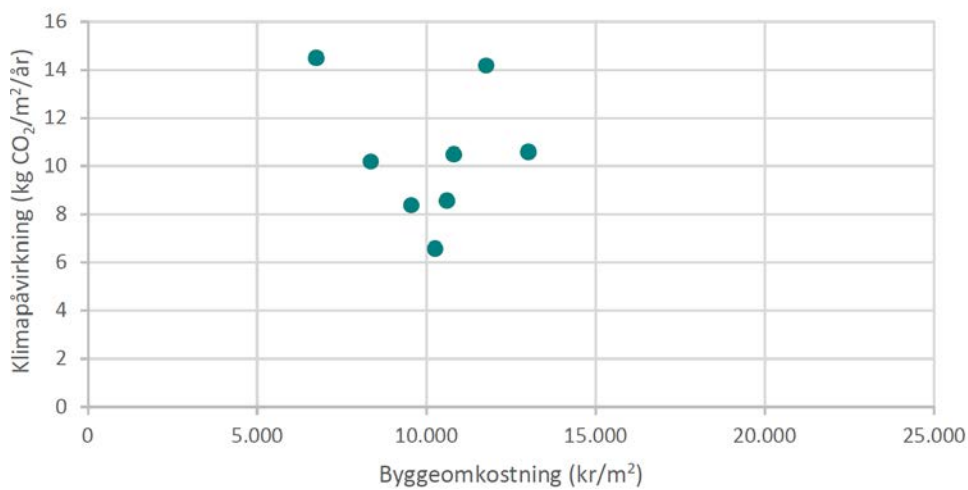
DGNB-score vs building cost for multi-storey residential buildings

Klimapåvirkning vs. byggeomkostning  
Kontorbygninger



DGNB-score vs building cost for office buildings

Klimapåvirkning vs. byggeomkostning  
Rækkehuse



DGNB-score vs building cost for terrace houses

## Contact us for more information on how DGNB can contribute to sustainable development

See below how DGNB and Green Building Council Denmark are connected.



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Green Building Council Denmark (DK-GBC) is a non-profit organization that works to promote sustainability in the built environment. DK-GBC was founded in 2020 by a broad section of the entire Danish building sector, including investors, developers, consultants, suppliers, financial companies, accountants and law firms - all with a desire to promote sustainability in the built environment.

DK-GBC is responsible for the daily development, adaptation and operation of DGNB in Denmark. DK-GBC also educates DGNB consultants and auditors.

DK-GBC is the parent organization of the organization DGNB.dk

All publications made by DK-GBC are open-source. You can find manuals for buildings, guides and other publications on our website.

Learn more about Green Building Council Denmark, our courses, educations and events on [www.dk-gbc.dk](http://www.dk-gbc.dk)



DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) is both the term for the international sustainability certification and for the German non-profit organization that has developed the certification. About 150 experts from companies and public institutions have contributed to the development and adaptation of the Danish version of the sustainability certification DGNB.

Today, it is possible to certify new constructions and extensive renovations of office buildings, hospitals, multi-storey buildings and townhouses, educational and children's institutions, existing office buildings and urban areas. If a project does not fall into one of these categories, it can be certified under the FLEX scheme.

DGNB.dk is responsible for the certification process in Denmark.

Learn more about the DGNB certification, see the certified buildings and the educated consultants on [www.dgnb.dk](http://www.dgnb.dk).

And you are always more than welcome to contact us at [info@dk-gbc.dk](mailto:info@dk-gbc.dk).





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### Premium members

