



**FOLKETINGET  
STATSREVISORERNE**



**FOLKETINGET  
RIGSREVISIONEN**

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# **The construction of the Niels Bohr Building**

# 1. Introduction and conclusion

## 1.1. Purpose and conclusion

1. This report concerns the construction of the Niels Bohr Building, a research and laboratory building that is being built for the University of Copenhagen. This new building will improve the physical setting of the university's Faculty of Science. The Danish Ministry of Transport and Housing, including the Building and Property Agency and the Danish Road Directorate, is the builder. The Niels Bohr Building is constructed under the provisions of the dialogue-based model in the SEA-scheme.

The projected costs of the Niels Bohr Building have increased several times, and construction has suffered several delays. When the project was started with the accession of Document no. 109 30/5 2013, the budget was approx. DKK 1.8 billion (2020 prices), and the building was to be completed and handed over to the University of Copenhagen late in 2016. The Danish Road Directorate's most recent estimate suggests total costs of approx. 4.2 billion (2020 prices) and completion in November 2020. This means that construction costs have increased by approx. DKK 2.4 billion and that the building will be completed approx. four years later than originally planned.

According to the Ministry of Transport and Housing, the cost overruns and delays in the construction work are, among other things, caused by problems related to a ventilation contractor, who is no longer working on the project. Issues relating to this matter are covered in a consultant's report commissioned by the ministry in 2017, and are therefore not included in this study. Furthermore, changes made during construction have increased costs and caused delays; for example, the material for ventilation shafts in the building has been changed from steel to PVC.

This report addresses management of these changes. Having full insight into the original project is a prerequisite for being able to manage changes in projects. We have therefore also examined whether the basis and scope of the construction project had been resolved, before construction was started. The Building and Property Agency and the University of Copenhagen were to prepare the project basis together. The Building and Property Agency is the builder and is as such responsible for the project basis as well as for managing changes to the construction of the building.

### The SEA-scheme

This government lease scheme defines the role of the Danish Building and Property Agency as a property enterprise that provides services to public entities like, for instance, the Danish universities.

According to the SEA-scheme, the future rent is calculated based on the total price of the construction work. A future user of a building can ask for changes to the construction of the building during the construction phase. The implementation of requested changes releases either reductions or increases of the future rent. Changes made can be described in a supplementary agreement.

The purpose of the study is therefore to assess, whether the Ministry of Transport and Housing, including the Building and Property Agency and the Danish Road Directorate, has managed changes to the construction of the Niels Bohr Building in a satisfactory manner. The report answers the following questions:

- Has the Building and Property Agency ensured an adequate project basis for the construction work?
- Has the Building and Property Agency ensured that decisions to make changes to the building were made on an adequately informed basis?

The role of the Danish Road Directorate is addressed in the report only to the extent that changes to the construction have had an impact on the construction work after January 2018, when the Danish Road Directorate assumed the responsibility as builder of the Niels Bohr Building.

2. Rigsrevisionen initiated the study in November 2019.



## Main conclusion

**It is Rigsrevisionen's assessment that the Danish Ministry of Transport and Housing's management of changes to the construction of the Niels Bohr Building has been very unsatisfactory. The inadequate change management has contributed to the overall cost overrun of approx. DKK 2.4 billion that has not enhanced the quality of the building. Moreover, the inadequate management of the changes reviewed in this report has contributed to delaying the project by approx. four years, which has also had the consequence that the desired gains for research and education have not yet been realized.**

**The Building and Property Agency had not ensured that all elements in the original project basis for the construction of the building were adequately resolved**

The Building and Property Agency did not ensure that all user requirements and cost reductions incorporated in the project were fully resolved with the University of Copenhagen, before the project proposal was approved. As a consequence, the approved project proposal included several unresolved issues concerning the functionality of the building in terms of, for instance, laboratory equipment and velocity of ducted fume cupboards. The Building and Property Agency had not set funds aside to resolve these issues in the project proposal. Subsequently, these unresolved matters led to significant changes that contributed to the delay of the project and the cost overruns. Several of these are addressed in this report.

**The Building and Property Agency has not ensured that decisions to make changes to the building were made on an adequately informed basis**

The Building and Property Agency has not relied on written business procedures for managing changes to the project. Moreover, the agency has not consistently and in a transparent manner documented significant changes to the project in supplementary agreements. The agency has entered supplementary agreements for only three out of five significant changes reviewed in the study.

The Building and Property Agency has assessed the impact of the above-mentioned three changes on the economy, timing and functionality of the construction work. The agency has however not assessed all the consequences of the changes like, for instance, their impact on running costs.

The Building and Property Agency has also implemented two major changes to the construction work that have not been dealt with in supplementary agreements (the replacement of the fume cupboard contractor and the change of material for the ventilation ducts from steel to PVC). The consequences of these changes for the economy and time schedule of the construction work, have been significantly underestimated in the project basis. The Building and Property Agency estimated that the replacement of the fume cupboard contractor would entail direct costs of approx. DKK 50 million, but the agency failed to estimate the potential additional costs of delays caused by this change. So far, this particular change has resulted in a cost overrun of approx. DKK 220 million. Approx. DKK 200 million of this amount is related to a delay caused by protracted discussions between the Building and Property Agency and the University of Copenhagen concerning the location of the fume cupboards in the building. These discussions postponed a decision on the location of the fume cupboards for approx. four months, which contributed to delaying the construction work.

Due to, among other things, the complexity of some of the changes, it has not been possible for the Danish Road Directorate to draw up a viable time schedule since it took over the responsibility as builder. The construction work is now one year behind the schedule that the Danish Road Directorate presented after it took over as builder.

The Ministry of Transport and Housing has informed Rigsrevisionen that the Building and Property Agency's inadequate change management is very much a result of the particular model of agreement (the SEA-scheme) that is applied to the project. The consequence of this model of agreement is that the Building and Property Agency has not had the same option as builders generally have to commit the client to entering an agreement on changes. Instead, the agency has had to enter into a dialogue with the client until agreement could be achieved. This approach has led to very long processes, and the agency has on several occasions had to choose between continuing the construction work without a formal agreement on a change, or stop the construction work, until formal agreement had been reached.

Rigsrevisionen finds that, irrespective of the framework within which the Niels Bohr Building is being constructed, the Building and Property Agency should have provided a more complete basis for decision concerning the two changes that are not addressed in supplementary agreements. For instance, the agency should have reflected the potential incremental costs for delays that the replacement of the fume cupboard contractor might entail. Rigsrevisionen recommends that the Ministry of Transport and Housing should go through and possibly take steps to adjust the SEA-scheme, if the ministry finds that the Building and Property Agency's unsatisfactory management of changes is a consequence of the SEA agreement model.

The Ministry of Transport and Housing has informed Rigsrevisionen that it agrees with our recommendation to review, and possibly adjust, the SEA-scheme based on experience gained so far.