# PROJECT STATOIL: FROM SCEPTICISM TO SUCCESSFUL SOLUTION

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**In 2012, 2,500 employees of Statoil Norway moved into a new office building in Fornebu, near Oslo. The building features a unique climate system developed by TROX Auranor in a joint venture with HVAC contractor Haaland Klima/Randem & Hübert. The system has been a great success and 'fully meets the requirements of an innovative ventilation and air conditioning system', says Thor Andresen of AJL Consulting.**

And he continues: 'I was very sceptical at first because I knew that the product Statoil wanted wasn't available on the market.' What Statoil wanted was a very flexible system, for supply and

extract air, with a high degree of automation, for cooling and heating and with integral lighting and sprinklers. Together with the HVAC contractors TROX Auranor developed a unique type of multi-service chilled beam for VAV systems, tailored to the demands of the customer. The new 3,200 active chilled beams, which are combined with variable volume flow controllers, were adapted to the architecture of the building and manufactured exclusively in Norway.

**High degree of flexibility**

As a special feature, the building layout is a grid of 3 x 3 m zones which can be flexibly used, both for cellular offices or meeting rooms and as an open plan office. Each zone or module has a ceiling installed active chilled beam which is a supply air and extract air combination that can be used for heating and cooling, has integral lights and sprinklers and can be controlled individually. The active chilled beams provide volume flow rates of 35 m3/h to 225 m3/h such that the supply air flow can be reduced when rooms are not fully occupied whereas meeting rooms with many people can be supplied with sufficient fresh air. 'This is simply great', says Andresen. Using water to dissipate thermal loads is much more efficient than using air, and it works even for high thermal loads. The air-water systems are fitted with intelligent sensors and controls that increase or reduce the supply air flow based on occupancy. The construction of the building is clever insofar as the basic installation can remain as it is even when rooms or walls are moved. It may be necessary to reprogram the controls such that a room thermostat is linked to the correct chilled beam; also, new thermostats may have to be installed in case an open plan office is made into cellular offices, but this is all that is needed.

**High satisfaction level among room occupants**

'There haven't been any problems with the ventilation and air conditioning', confirms Andresen. 'Complaints about draughts in open plan offices have been few and far between. In such a huge building with 2,500 people, this is unprecedented. We solved this by reducing the cooling and supply air flow rate in the affected spots.'

**Advance testing**

The system owner wanted to have the product lab tested ahead of the project and parallel to product development; the tests were carried out in Brandbu and supervised by an independent body, SINTEF, the technical supervising agency in Norway. Diffusion patterns, air speeds and automation were tested, and dynamic tests with heat were carried out; this ensured that all installations worked as intended. The fact that everything was fully tested saved a lot of time in the subsequent process.

In addition to the lab tests, a trial room section was set up in an external warehouse, with a meeting room and four 3 x 3 m rooms with all installations, such that ventilation and air conditioning could be tested under real conditions. The resulting system proved to be effective and efficient. When the Statoil building was constructed, the architects made use of BIM, or Building Information Modelling. This indicated any conflicts at an early stage such that they could be analysed and eliminated. This saved a lot of time later on, and the building was eventually completed on time.

**Smooth installation**

The Statoil building covers 65,000 m2 and was completed within only 20 months. TROX Auranor supplied the chilled beams for each section just in time, on palettes in special transport containers and without packaging. An environmentally friendly solution. The prefabricated elements facilitated installation considerably.

**A perfect solution also for other buildings**

While the active chilled beams were specially developed for Statoil Fornebu, they are in fact suitable for all kinds of office buildings where a high degree of flexibility is required. This is why Statoil also chose this solution in 2013 for a building in Bergen.

As previously mentioned, this product was originally not available on the market. 'Now it is, and more and more buildings will need such a flexible solution. If you look at the operating costs, the investment will pay off for many buildings', says project manager Erik Christensen. 'In buildings which are not as flexible, the installation will have to be adapted when the usage of the building changes, and this can be complicated. Not with our solution, though.'

'I have been involved in property management for 25 years, and this was the first building I took over where the climate control system actually worked', concludes Erik Christensen. He has been totally convinced of this unique ventilation and air conditioning solution.