Preparing society for the extreme weather that is coming

Hans ravaged the summer of 2023, and the costs associated with the damage are estimated at NOK 1.6 billion so far. Climate scientists predict more extreme weather in the years to come. Through research and innovation at Klima 2050, a centre for research-based innovation (SFI), society is prepared for the weather of the future.

Here we see major precipitation damage on the way in a residential area. (Photo: NVE)

Man-made climate change is likely to persist for a hundred years to come, and in Norway this means more extreme weather. Together with a warmer climate, intense precipitation over parts of Norway will increase. We must prepare for greater precipitation with greater strain on the sewage systems, more water damage to buildings, more landslides and flood damage.

"Through the Climate 2050 research centre, we have gained more knowledge and expertise about climate adaptation of buildings and urban areas, and we have developed several innovations for prevention. Both young and old. Everything from products, processes, tools and new ways of working," says Berit Time, chief scientist at SINTEF.

SFI Climate 2050 is a research centre that was established in 2015 and consists of 19 partners from research environments, the public and private sectors. The centre has received NOK 96 million from the Research Council of Norway and has worked for eight years to reduce societal risks associated with climate change, more precipitation and flood damage in the built environment. That is, buildings, roads and urban areas.

"We are seeing the effect of the climate changing. The more we learned during the project, the more necessary we saw that it will be to prepare for the weather of the future already now. Taking action now will save society a lot of money in the future," says Time.

Climate change adaptation in the municipalities

The centre has developed moisture-proof buildings, solutions for stormwater management, blue-green solutions (solutions that delay runoff and provide a safe diversion of stormwater to rivers and lakes), and measures to prevent water-triggered landslides. In addition, they have researched socio-economic incentives and decision-making processes for climate change adaptation.

Here, an emergency response team is working during an incident. The map they are studying is from Varsom Xgeo, an expert tool used for emergency preparedness, monitoring and warning of floods, landslides and avalanche risks. (Photo: Unni Eidsvig)

"We have worked with stormwater management and avalanche problems with an emphasis on prevention and warning. The goal is to use the knowledge and expertise both in the business community and in the municipalities. Especially in the small municipalities, there is a lack of knowledge and expertise about climate adaptation," Time explains.

Through the "Trøndelag Network for Climate Adaptation", the centre works closely with the municipal sector to ensure that the municipalities gain new expertise, and that they are actually left with concrete knowledge that will have an effect on their work in the municipalities.

Important collaborations across municipalities and the business community

Climate change adaptation is large and complex, both organisationally, politically and operationally. Time appreciates the opportunity they have been given to work interdisciplinary and with major issues. In collaboration with, among others, the Skjæveland Group, Skanska, Mesterhus, Multiconsult, Norgeshus and Isola, they work to develop the knowledge, methods and tools needed to ensure a sustainable and cost-effective development of Norwegian society.

"The construction industry has close to 400,000 employees who work with infrastructure, development, construction, consulting, as contractors and with the delivery of components," says the chief scientist.

SINTEF has also collaborated with the Norwegian Meteorological Institute and Finance Norway. The Norwegian Meteorological Institute has weather data that helps them form a picture of the future climate. Finance Norway has insurance data that provides an overview of insurance claims over time, and can thus be a guide for what kind of preventive measures for climate change adaptation should be initiated and where.

The largest insurance companies in Norway want to share their claims data with municipalities through the Knowledge Bank, despite competition-sensitive considerations. This is unique in a world context

"When both municipalities and different industries have to learn new ways of working in order to adapt to the future climate challenges, there are many considerations to take into account. That's why it's been absolutely fantastic to be able to work so interdisciplinary over a long period of time," says Time.

Research training secures knowledge and new solutions in the future

With NTNU at the forefront, Climate 2050 has been a leader in research education related to climate adaptation. The centre educated 18 PhDs, had 7 postdocs, and 135 master's candidates submitted their exam papers.

Heavy rainfall has caused the river to overflow its banks and flood the road in Skjolden. (Photo: NVE)

Through education and the development of highly qualified researchers and professionals, the centre will raise the level of knowledge about climate adaptation of buildings and infrastructure in industry and society. The centre's partners will stimulate new solutions and further research and development in the building, construction and transport sector long after the centre's lifetime.

Some results related to the centre:

Toolbox for stormwater management: Skjæveland Gruppen AS has developed a toolbox that contains various solutions for urban outdoor spaces, rain beds, permeable covers, living, green walls, retention reservoirs and floodways.

Municipal sub-plan on climate adaptation: Climate change adaptation has become part of the overall climate work in Trondheim municipality. Through the centre, expertise has been developed that has resulted in new and better solutions, products and processes for climate change adaptation that the municipality implements on an ongoing basis.

Avalanche monitoring: The Norwegian Public Roads Administration and the railway need better warning routines. The centre has developed new knowledge about satellite monitoring of avalanches, the use of radar data for local precipitation monitoring and measurement systems for real-time stability monitoring of exposed slopes.

Climate-adapted building system: Together with Norgeshus, they have established a separate methodology for climate adaptation of homes. The solution provides, among other things, reduced material use, safer moisture protection, a more efficient construction process and financial gains.

Rainproof facades: Together with Statsbygg, an alternative solution has been developed to prevent rain ingress by cutting the façade panels of buildings at an angle.

Products for new roof solutions: In collaboration with Isola, new technology and a new membrane and retention system for blue-green roofs have been developed that can contribute to significant delays in runoff from such roofs.

Here you can read about all the results of the centre (in Norwegian).

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