

**AHO 08.08.2017**

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# KLIMA 2050

**RISK REDUCTION THROUGH CLIMATE ADAPTATION  
OF BUILDINGS AND INFRASTRUCTURE**


# ➔ What is a Centre for Research-based Innovation (SFI) ?



Klima 2050 is a centre for research-based innovation (SFI) financed by the Research Council of Norway and the partners in the consortium

The SFI status shall enhance the capability of the business sector to innovate by focusing on long-term research based on forging close alliances between research-intensive enterprises and prominent research groups.

# Aim



*Klima 2050 will reduce the societal risks associated with climate changes and enhanced precipitation and flood water exposure within the built environment.*

SINTEF Building and Infrastructure is host and leader (Berit Time)

NTNU, NGI, BI, MET Norge og partners from industry and public sector

Web page: [www.klima2050.no](http://www.klima2050.no)



# KLIMA 2050

## CONSORTIUM

### Private sector

**SKANSKA**

**MESTERHUS**

Multiconsult

Finans Norge

SKJÆVELAND  
GRUPPEN

NORGESHUS

weber  
SAINT-GOBAIN

isola

powel

### Public sector



Statens vegvesen



AVINOR

Jernbaneverket

STATSBYGG

TRONDHEIM KOMMUNE

### Research & education

SINTEF

BI

NTNU

Meteorologisk  
institutt

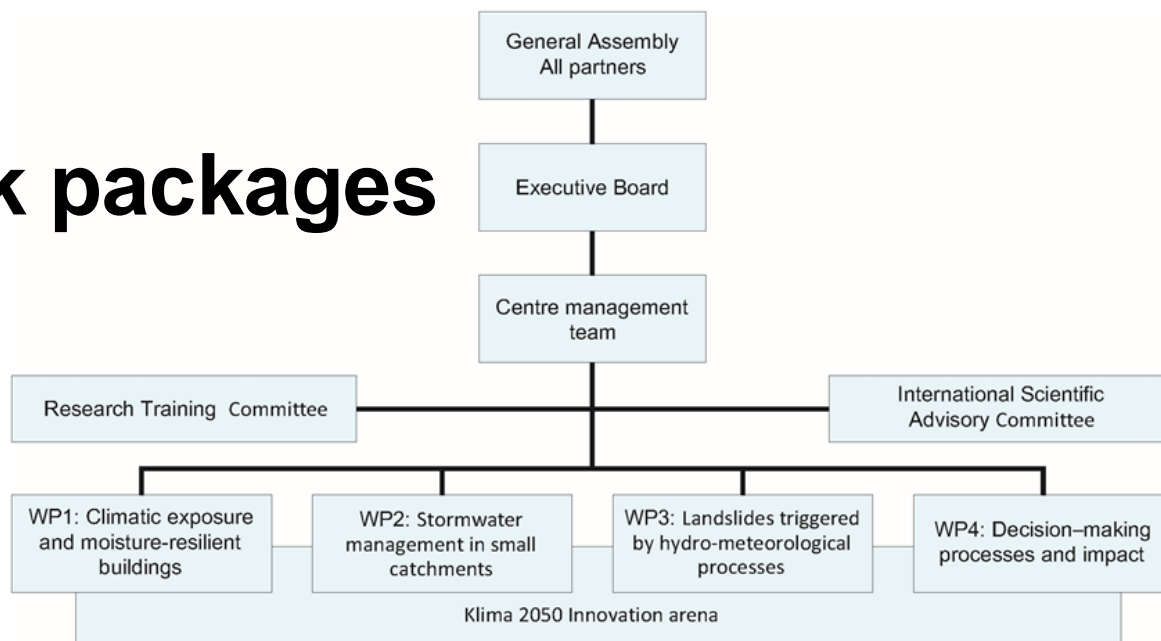
NGI



# Klima 2050 in figures

- Start up: April 2015
- Host: SINTEF Building and Infrastructure
- 20 partners from private sector, public sector and research
- Duration: 5 + 3 years
- Budget: ~ 220 mill NOK (cash and in-kind)
  - Ca. 45 % from the Research Council of Norway
  - Ca. 25 % from private sector
  - Ca. 30 % from research and public sector
- Min. 15 PhDs/Post.docs
- Min. 50 Master Thesis
- One adjunct professor is financed by the Centre
- Finally 20 - 30 professors and researchers from NTNU, NGI, BI, met.no and SINTEF are actively involved

# Work packages



1. Climatic exposure and moisture-resilient **buildings** (Tore Kvande, NTNU)
2. **Stormwater** management in small catchments (Edvard Sivertsen, SINTEF Byggforsk)
3. **Landslides** triggered by hydro-met. processes (Jose Cepeda, NGI)
4. **Decision-making** processes and impact (Åshild Hauge, SINTEF Byggforsk)
5. **Innovasjonsarena** (SINTEF Byggforsk)

Both extreme weather and gradual changes is in focus.  
BI is involved in WP 4 og 5.

# Work packages and Research tasks

## WP1 Climate exposure and moisture-resilient buildings

WP1.1 Performance requirements for buildings

WP1.2 Maintenance and upgrading of existing buildings

WP1.3 Blue-green roofs and terraces

WP1.4 Building systems

WP1.5 Building structures in contact with the ground/terrain

## WP3 Landslides triggered by hydro-meteorological processes

WP3.1 Development of analytical and numerical codes

WP3.2 Environmentally sustainable methods for improving drainage and stabilizing soil

WP3.3 Protection of critical infrastructure from landslides

WP3.4 Early warning systems

WP3.5 Management of landslide risk

## WP2 Stormwater management in small catchments

WP2.1 Analysis of inventory databases including flooding damage data

WP2.2 Flood risk management modelling

WP2.3 Blue-green solutions in urban environment

WP2.4 Innovative technical solutions for stormwater management

## WP4 Decision-making processes and impact

WP4.1 Decision processes: organisation, competence and cooperation

WP4.2 Business models and capabilities

WP4.3 Socio-economic analysis

# Stormwater management – blue-green-grey solutions in urban environment

## Field tests on roof (Høvringen, Trondheim)

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### Tester blågrønne tak i full skala

The Høvringen-prosjektet gir oss en unik mulighet til å teste ut ulike typer blågrønne tak i full skala. Dette er et viktig skritt for å finne de beste løsningene for å håndtere overvann i byene våre. Prosjektet er ledet av SINTEF og samarbeider med flere partnere i Trondheim. Vi forventer at resultatene vil gi oss verdifulle innsikter i hvordan blågrønne tak kan bidra til å gjøre byene våre mer bærekraftige og tålerligere.



Ill.: Campus-prosjektet



Photo; Vidar Ruud / NTB



November 2016





# WP4: DECISION-MAKING PROCESSES AND IMPACT

- Publications 2016-2017
- Plans for 2017-2018

Technology alone cannot solve the problems – research on implementation and decisions are needed.



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## WP 4:

WP4.1 Decision processes: organisation, competence level and cooperation **SINTEF**

WP4.2 Business models and capabilities **BI**

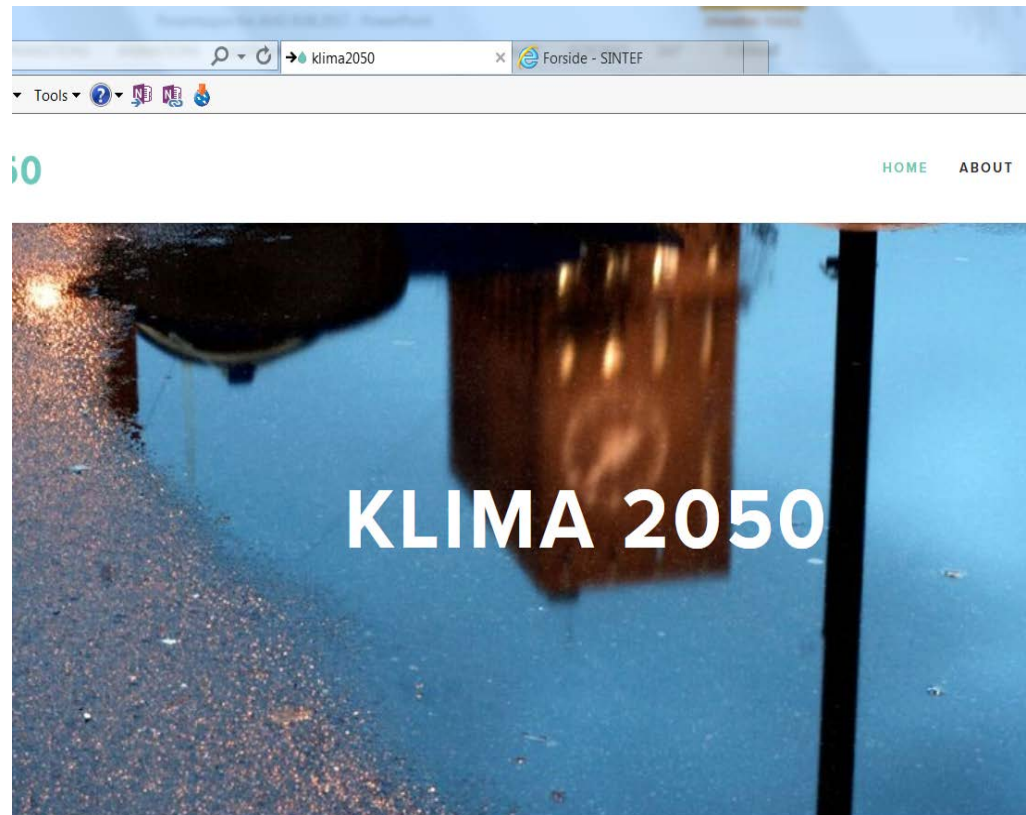
WP4.3 Socio-economic analyses **BI**



# Publications

<http://www.klima2050.no/>

Publications from WP4,  
SINTEF:



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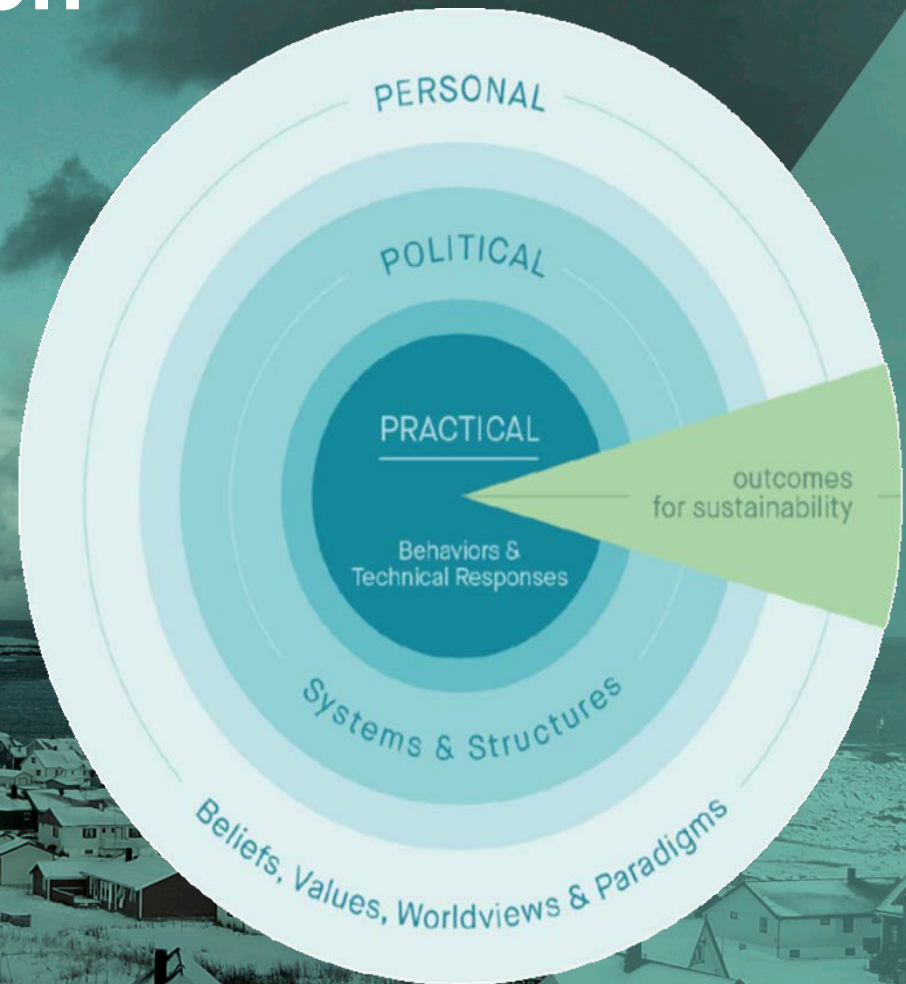
# Barriers and drivers for climate adaptation:

- Aim: Overview / identify and categorize barriers and opportunities for climate adaptation of buildings and infrastructure.
  - Literature review
  - 7 Expert interviews (1-2 participants) + 1 focus group interview (working with implementation of climate adaptation)
- 
- The results are also published in conference paper and journal paper:  
[Journal of Disaster Resilience in the Built Environment](#)



# 3 categories of factors affecting climate adaptation

Three spheres of transformation  
(O'Brien and Sygna, 2013)



# Report: Analysis of guidance material

- What characterize the user guides on climate adaptation of buildings and infrastructure in Norway?
  - Topics, target groups, publishers.
- 84 webpages/ documents analysed
- Qualitative interviews on user guides.
- Findings presented at two conferences, and paper published in journal [Climate Services](#).





# Work in progress 2017-2018 wp 4.1

User studies in municipalities: Identify needs and develop strategies for decision processes on climate adaptation, based on **case studies** of two municipalities with focus on:

- Climate services (networks, consultations, information, guidance documents etc).
- Municipal plan, municipal part plan, zoning plan.
- Cooperation between municipality and private actors.

1. Network for climate adaptation in Trøndelag
2. Climate services ([www.ovase.no](http://www.ovase.no))





## WP4.2 Business models and capabilities, and 4.3 Socio-economic analyses **BI**

- Theoretical framework: Lena Bygballe and Ragnhild Kvalshaugen, prof.
- **PhD study = post doc?** User studies in organizations.
- Insurance mechanisms and Cost-benefit analysis: Christian Riis, prof.
- Report: "Naturskadeforsikring – et alternativ" Spin off-project for KS.  
*Renewal of funding due to natural events adapted to the municipal needs.* (Christian Riis)
- **Post doc on cost-benefit analysis from 2018**



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