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REPORT

# ANNUAL REPORT

2015

Berit Time  
(editor)



→ KLIMA  
2050



→   
**KLIMA  
2050**

Klima 2050  
Annual Report 2015  
Berit Time (editor)  
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**KLIMA**  
**2050**

## **SFI Klima 2050**

**Annual Report 2015**



## Summary

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This report is the Annual Report of Klima 2050 for 2015.

Klima 2050 - Risk reduction through climate adaptation of buildings and infrastructure is a Centre for Research-based Innovation (SFI) financed by the Research Council of Norway and the consortium partners. The SFI status enables long-term research in close collaboration with private and public sector, as well as other research partners aiming to strengthen Norway's innovation ability and competitiveness within climate adaptation. The composition of the consortium is vital in order to being able to reduce the societal risks associated with climate change.

The Centre will strengthen companies' innovation capacity through a focus on long-term research. It is also a clear objective to facilitate close cooperation between R&D-performing companies and prominent research groups. Emphasis will be placed on development of moisture-resilient buildings, stormwater management, blue-green solutions, measures for prevention of water-triggered landslides, socio-economic incentives and decision-making processes. Both extreme weather and gradual changes in the climate will be addressed.

The host institution for SFI Klima 2050 is SINTEF, and the Centre is directed in cooperation with NTNU. The other research partners are BI Norwegian Business School, Norwegian Geotechnical Institute (NGI), and Norwegian Meteorological Institute (MET Norway).

The business partners represent important parts of Norwegian building industry; consultants, entrepreneurs and producers of construction materials. The consortium in 2015 includes: Skanska Norway, Multiconsult AS, Mesterhus/Unikus, Norgeshus AS, Saint-Gobain Byggevarer AS and Isola AS. The Centre also includes important public builders and property developers: Statsbygg, Statens vegvesen, Jernbaneverket og Avinor AS. Key actors are also The Norwegian Water Resources and Energy Directorate (NVE) and Finance Norway.

Main activities in 2015 have been start up scientific work, recruitments and organizing the center. Digital platforms are established for internal and external communication, see our website [www.klima2050.no](http://www.klima2050.no).



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# 1 Vision and Main Goal

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## 1.1 Vision

The Centre for Research-based Innovation Klima 2050 shall be synonymous with excellence within risk reduction through climate adaptation of buildings and infrastructure exposed to enhanced precipitation and flood water. Klima 2050 shall be an effective instrument for the development and implementation of adaptive innovations for the Centre partners and society.

## 1.2 Main Goal

*Klima 2050* will reduce the societal risks associated with climate changes and enhanced precipitation and flood water exposure within the built environment. Emphasis will be placed on development of moisture-resilient buildings, stormwater management, blue-green solutions, measures for prevention of water-triggered landslides, socio-economic incentives and decision-making processes. Both extreme weather and gradual changes in the climate will be addressed.

The Centre will be recognised for its research training within the field of climate adaptation of the built environment. Through education of graduate students, training of highly qualified research personnel through PhDs and training of professionals in the sector, the Centre will stimulate new solutions and further research and development in the building, construction and transportation (BCT) sector long after the term of the Centre's existence.



Figure 1- Societal influence sectors of Klima 2050's research



## 2 Research plan

*Klima 2050* focus on the four main research areas (work packages) WP1- 4 given in Figure 2. The fourth work package, *WP4: Decision-making processes and impact*, is an important premise for research and innovation and will form a "societal funnel" bringing together the first three work packages of research into implementable and sustainable solutions leading to innovation and added value for the consortium and the building, construction and transportation sector. The societal influence of the Centre research is illustrated in Figure 2.

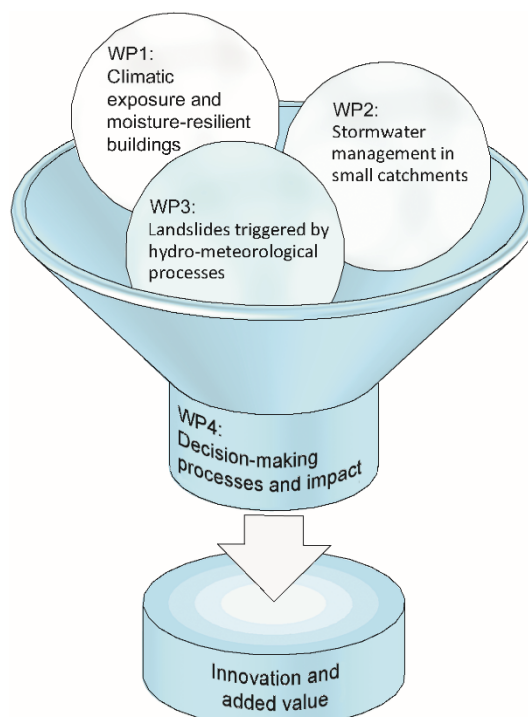


Figure 2 - Interplay among Klima 2050 four work packages, innovation and added value

### WP1 Climate exposure and moisture-resilient buildings

#### Goals

Buildings are particularly prone to water exposure and urban flooding and the severe consequences of forecasted climate exposure are documented by many researchers. The focus on reduction of greenhouse gas emissions in the building sector has led to an increased interest in development of building techniques which focus on reduction of energy need. Examples of energy optimisation to the detriment of climate exposure robustness already exist. Therefore *Klima 2050* will further develop principles, methods and solutions for a future climate-robust sustainable building stock, considering both existing and new buildings. Furthermore, blue-green roofs and terrace systems should be developed for Nordic climate. The buildings themselves would then be a beneficial solution in an effort to reduce the risk of urban flooding. The ambition of the Centre is therefore to develop:

- Climate exposure indicators as tools for performance requirement levels
- Climate adapted innovative roofs prepared for greater user flexibility (i.e. larger spans and increased complexity, including building integrated photo voltaic systems)
- Innovative sustainable and climate-robust building systems (e.g. moisture robust outer walls) with a particular focus on durability and maintenance.

- Building structures in contact with the ground/terrain.
- Blue-green roofs and terraces adapted to Nordic climate with special emphasis on the “blue” (water retention) function.
- Optimized operation and maintenance of building envelopes, implementable by personnel end-users in the building sector.

*Knowledge gaps to be filled by Klima 2050:*

- Consistent and advanced testing strategies for buildings and building components facing heavy rain and severe moisture conditions (e.g. stress test techniques and experimental test methods) as fundament for development of optimal building envelopes.
- Accurate methods for the vulnerability assessment of high-performance building envelopes and components as a mean for development of new innovative envelope solutions.
- Appropriate risk and vulnerability assessment methods to improve the understanding of building performance in a more severe climate.
- Optimal high performing blue-green roofs and terraces in a severe Nordic climate.
- Reliable procedures for optimal managing and operation of building envelopes.

## **WP2 Stormwater management in small catchments**

### *Goals*

Society requires innovation which will support a resilient and robust stormwater infrastructure, capable of meeting the challenges provided by a changing climate. This implies development of new and innovative principles, products, solutions and processes for better stormwater management. A more holistic approach considering the water cycle, involving the different stakeholders and including the important interrelationship between buildings and water infra-structure must be considered. *Klima 2050* will include improvements of technical character and of institutional and organisational character. The Centre members aim to provide:

- Better risk estimation for properties and infrastructures prone to flooding, which also builds upon better cost damage estimates.
- Better understanding of the consequences of implementing blue-green solutions in the urban landscape with focus on the Nordic climate.
- Innovative technical solutions for sustainable onsite stormwater treatment, with focus on local water balance and enhanced ecosystem services.
- Improved climate change adaptation capabilities for stormwater infrastructure owners (this will serve as a case in WP4).

*Knowledge gaps to be filled by Klima 2050:*

- Better evaluation methods and estimates regarding the financial cost of damage due to flooding in small catchments and urban areas.
- Establish a risk management framework for properties prone to flooding.
- Better understanding of the implications of blue-green solutions in a Nordic climate including design parameters, detention capacity, effects on local water balance and across climate zones in Norway.
- The technical solutions must mitigate flooding and pollution from stormwater to the recipient, thereby developing innovative and sustainable technical solutions for more effective handling of stormwater in a changing environment.

## WP3 Landslides triggered by hydro-meteorological processes

### Goals

Climatic change will increase the frequency and intensity of landslides triggered by increased rainfall, changes of hydrological cycles, more extreme weather, intense rain within shorter periods of time, and melting of snow and of frozen soils, or combinations of these. Other factors that may affect the future landslide risk levels include increased susceptibility of surface soil to instability, anthropogenic activities, such as deforestation, growing urbanization, uncontrolled land-use and increased exposure of population and infrastructure. There is, therefore, an urgent need for developing new solutions for reducing and managing the landslide risk. *Klima 2050* will develop principles, methods and solutions for reducing the risk posed by landslides triggered by hydro-meteorological processes (hereafter shortened to "water-triggered landslides") on populated areas and transportation infrastructure in a future climate regime. WP3 will cooperate closely with both WP2 and 4. When assessing risk as a combination of hazard, vulnerability and exposure of the elements at risk, innovative solutions can be measures to reduce the hazard and vulnerability, and/or reduce the exposure. *Klima 2050* will develop:

- Innovative structural measures for stabilizing existing slopes and embankments.
- Climate-adapted design procedures for natural and man-made slopes.
- Smart and cost-effective methods for protecting the constructed facilities and infrastructure from the impact of landslides.
- Further development of early warning systems, coupling the very short term rainfall forecasting with observations and regional geotechnical models to localize susceptible initiation of slides and debris flows.

### Knowledge gaps to be filled by *Klima 2050*:

- Consistent and verifiable procedures for the mapping of hazard, susceptibility, vulnerability and risk for debris flows at a local or regional scale.
- Accurate methods for the vulnerability assessment of critical infrastructure to water-triggered landslides, including interactions with other hazards and cascading risks.
- Reliable local/regional early warning systems for debris- and mudflows.
- Reliable regional geomechanical models for real-time assessment of landslide hazard during a storm event.
- Environmentally friendly methods for the improvement of drainage and slope stabilization.
- Cost-effective and sustainable methods for constructions to act as barriers and/or diversion structures to protect the elements of risk from landslides, particularly in challenging terrain.
- Relevant procedures for managing landslide risk at various levels (municipality, regional).

## WP4 Decision-making processes and impact

### Goals

Studies indicate that the Norwegian planning and building legislation at a superior level adequately addresses climate change perspectives, but that the implementation at lower levels fails. The society's capacity to handle the impacts of climate change are closely related to societal organisation, available resources, tools, liability clarifications, cooperation, and information, and to the level of knowledge and competence in relation to climate change. The CRI will therefore aim at developing new, integrated and innovative decision-making models for local authorities and stakeholders of the BCT sector. Combined with knowledge from the other WPs, this will ensure predictable results that will ensure a sustainable and climate adapted built environment. The ambition is develop knowledge about:

- Present practice about climate adaptive decision-making processes and lack of use available information.
- Decision-making models and processes and subsequent societal implications, identification of drivers and consequences of practice.
- How to improve and implement an innovative and more integrative approach for climate adaptive decision-making processes.
- Inter-disciplinary dissemination of knowledge and information; measures and methods.
- Design of implementable mechanisms that internalize damage risk in local decision-making processes.

*Knowledge gaps to be filled by Klima 2050:*

- Knowledge about and implementation of climate adaptive measures in local authorities.
- Knowledge about the influence of i.a. liability, business models, risk management, norms and attitudes in the implementation of knowledge in institutions.
- Intersectoral consideration of the consequences of impact (e.g. the deforestation of a hill-side might increase the risk of water-triggered landslides and potential damage to buildings and infrastructure in the same area, and affect private property, the municipality, and the road and railway authorities).
- Methodologies for risk- and vulnerability analysis as a basis for decision processes.
- Liability clarifications and the effect of the law.

### 3 Organisation

#### 3.1 Organisational structure

Klima 2050 is organized as a joint unit between the research partners SINTEF (host), NTNU, BI, NGI and Met.no. Centre Director Berit Time is supported by Principle Investigator, Centre Administrative Coordinator and the Centre Management Group composed of the Work Package leaders, the leader and the facilitator of the Innovation Arena and Administrative Coordinator.

Klima 2050 encompasses the value chain of market and public players within the Norwegian construction business. The Centre has a General Assembly and an Executive Board. The General Assembly includes all partners, and Kim Robert Lisø, Skanska, is the chairman. The Board is comprised of the Centre management and partner representatives. The user partners have majority on the Board and board members are selected from different groups of user partners.

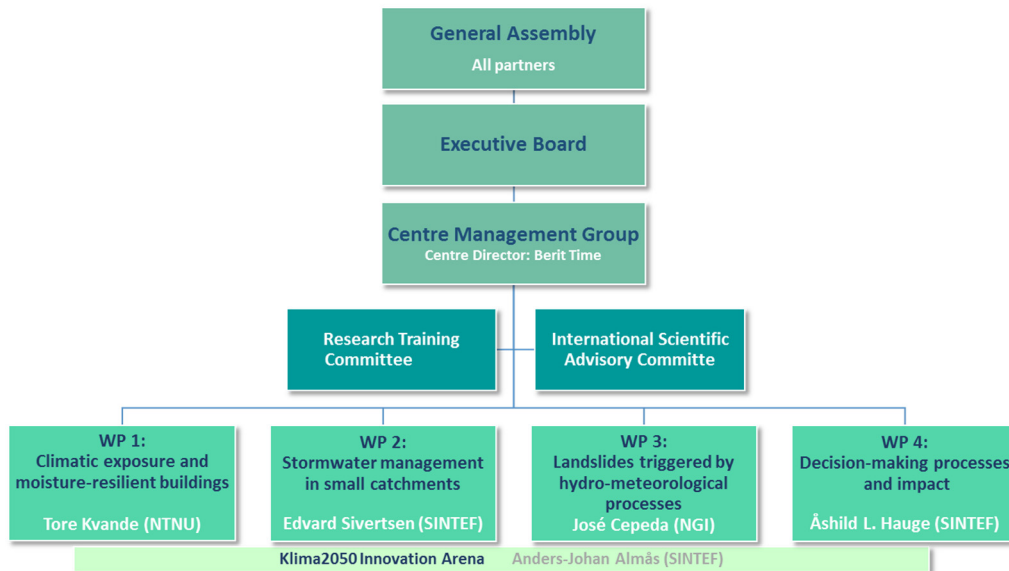


Figure 3 - Organisation chart, Klima 2050

#### Centre Board

The Centre Board consists of

- Grethe Bergly, Multiconsult (Chair)
- Anne Britt Leifseth, NVE
- Håvard Zachariassen, Statsbygg
- Marit Brandtsegg, Statens vegvesen
- Dag Runar Båtvik, Norgeshus
- Rune Stene, Skanska Norge
- Carl Thodesen, NTNU
- Hanne Rønneberg, SINTEF (Deputy Chair)



Figure 4 - The Centre Board at the first Centre Board Meeting September the 4<sup>th</sup> 2015

### Centre Management Group



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### 3.2 Partners

**Isola AS** is a leading producer of roofing, windows, and a wide range of different membranes for the building industry. Isola's business concept is to be the leading moisture problem solver for the construction industry regarding roofs, walls and slab on ground.

**Finance Norway** represents some 200 financial institutions operating in the Norwegian market. The institutions operate within different sectors of financial activity. Of special relevance for their participation in Klima 2050 is our involvement in casualty insurance.

**Mesterhusgruppen** is represented in Klima 2050 by Mesterhus and Unikus.

**Mesterhus** is Norway's largest home builder. The basic idea of Mesterhus is making high-quality home buildings built by the local master builder with knowledge, seriousness and craftsmanship.

**Unikus** is an architectural and engineering company with extensive experience and knowledge in building design, specialized in dwellings, low-rise buildings and kindergartens. Unikus cooperate closely with Mesterhus.

**Multiconsult AS** is a leading company of consulting engineers and designers in Norway and Scandinavia, with expertise spanning a wide range of disciplines including building and infrastructure. We manage complex projects within fields such as oil and gas, buildings and properties, industry, transport, infrastructure and landscape, energy and the environment.

**Norgeshus AS** is one of the largest housing manufacturer in Norway and is responsible for both single family houses and housing sites development. Their architects and engineers have extensive experience and knowledge in building design and are specialized in dwellings.

**Saint-Gobain Byggevarer AS** is a company in Saint-Gobain Weber, which is owned by Saint-Gobain, one of the largest manufactures of building materials in the world. Saint-Gobain Weber is a leading producer of prebatched mortar, and develops solutions for construction and refurbishments. The specter of products includes façade solutions, Leca-solutions and masonry solutions.

**Skanska Norway AS** is a part of Skanska, which is one of the world’s leading project development and construction groups, with expertise in construction, development of commercial and residential projects as well as public-private partnerships. Skanska create sustainable solutions and aim to be a leader in quality, green construction, work safety and business ethics.

**Avinor AS** is responsible for planning, developing and operating the Norwegian airport network. This responsibility includes operations and maintenance of runways and terminal buildings.

**Jernbaneverket** is the Norwegian government’s agency for railway services. The responsibility includes runways and terminal buildings. Jernbaneverket’s task is to provide Norway’s train companies with a safe and efficient transport system.

**The Norwegian Water Resources and Energy Directorate (NVE)** is a directorate under the Ministry of Petroleum and Energy. NVE’s mandate is to ensure an integrated and environmentally sound management of the country's water resources, promote efficient energy markets and cost-effective energy systems and contribute to efficient energy use. The directorate plays a central role in the national flood contingency planning and for the prevention of damage caused by landslides.

**The Norwegian Public Roads Administration (Statens vegvesen)** is responsible for the planning, construction and operation of the national and county road networks, in addition to vehicle inspection and requirements, driver training and licensing.

**Statsbygg** is the Norwegian government's key advisor in construction and property affairs, building commissioner, property manager and property developer. Statsbygg provides appropriate, functional premises to public sector enterprises, as well as implementing architectural solution, governmental planning interests, preservation of heritage sites and the environment concerns according to prevailing socio-political objectives.



Figure 5 - Klima 2050 Consortium 2015



### 3.3 Cooperation between the Centre's partners

*Annual Partner Meetingpoints* of the Centre has been defined. The plan shown in Figure 6 is continuously being updated as meetings are being scheduled.

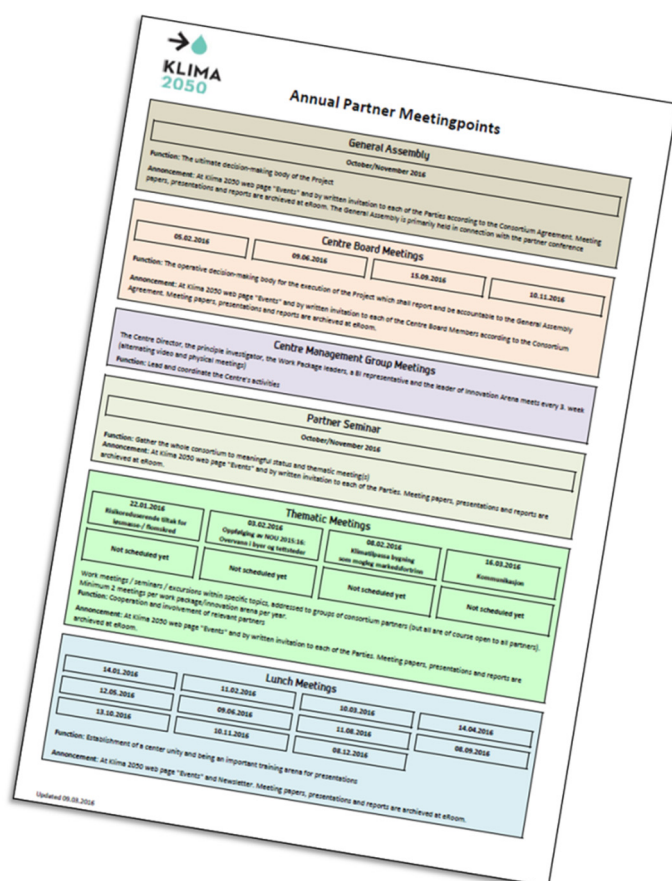


Figure 6 - An overview of Klima 2050 Annual Partner Meeting Points

*Lunch Meetings (Lunsjpresentasjon)* are arranged the second Thursday every month. The function of the meetings is the establishment of a center unity and being an important training arena for presentations and feedback on activities. The meetings are arranged as a video presentation between two meeting rooms in Trondheim and Oslo. Coffee and waffles are served. The meetings started up in September and there have been 4 presentations with approximately 20 participants each time. The meetings are announced at Klima 2050 web page "Events" and within the research organisations. Presentations are archived at Klima 2050 eRoom.

*Thematic Meetings (Temasamlinger)* are half day/one day meetings for the partners in the consortium. The function of the thematic meetings are cooperation and involvement of relevant partners. It is a measure to promote and ensure a close cooperation between partners in the consortium. We have an ambition to arrange approximately 8 thematic meetings yearly. Two meetings were held towards the end of the year. The topic *Forsikring som instrument for innovativ klimatilpasning og vannskadebegrensning* (16<sup>th</sup> of November) and *Blågrønne tak; Erfaringar, utfordringar og utprøving* (3<sup>rd</sup> of December) were discussed and explored. The meetings are announced at klima2050.no "Events" and by written invitation to

relevant persons at each partner. A *Klima 2050 Note*, se Figure 7, is distributed after each meeting, containing a brief summary including following up points, copy of given presentations, list of participants and invitation. This is archived at Klima 2050 eRoom.

An annual partner event will be held for gathering the whole consortium to a meaningful status and result dissemination. Annual General Assembly meeting(s), Centre Board meetings (4 times a year) and Centre Management Group meetings (every 3<sup>rd</sup> week) are also part of the partner meeting points.

The Centre has established an eRoom for sharing of documents and relevant literature among the Centre partners. The web page [www.klima2050.no](http://www.klima2050.no) was established at the startup of the Centre 13<sup>th</sup> of April 2015. The web page is used for announcements (see “News” and “Events”) and also all publications in RCN/Cristin categories are listed on the web (see “Publications”).



Figure 7- *Klima 2050 Note* is one of the Centre publication categories.

#### *Research Working Plan – Partner involvement and cooperation*

Klima 2050 has worked out the first working plan for the research activities in the Centre. The first working plan (for 2015 – 2016) was worked out in close cooperation with the partners. It is based on the project description, input from meaningful discussions in separate meetings with all partners before and in the startup meeting April the 13<sup>th</sup>. Also after the startup meeting, the Centre Management Group arranged partner meetings with all partners of the consortium, in order to discuss and gain new input to drafts of the first annual working plan. A final opportunity for input was given at the Klima 2050 workshop the 17<sup>th</sup> of June. The Centre Board approved the research working plan in September.

## 4 Scientific activities and results

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Klima 2050 will focus on four main research areas (work packages) described in chapter 3. The fourth work package, WP4: Decision-making processes and impact, is an important premise for research and innovation, and will form a "societal funnel" bringing together the first three work packages of research into implementable and sustainable solutions leading to innovation and added value for the consortium and the building, construction and transportation sector.

WP 1: Climate exposure and moisture-resilient buildings

WP 2: Stormwater management in small catchments

WP 3: Landslides triggered by hydro-meteorological processes

WP 4: Decision-making processes and impact

The Intergovernmental Panel on Climate Change concluded that most of the global warming observed over the last 50 years is attributable to human activities, and that anthropogenic climate change is likely to persist for centuries to come. Society therefore has to cope with future negative effects of climate change. Scenarios for climate change in Norway indicate an increased occurrence of extreme weather. Together with a warmer climate, intense precipitation over parts of Norway will also increase. We must prepare for increased precipitation with subsequent increased strain on drainage systems, more water damage to buildings, several landslides and more flooding.

Unfortunately, the built environment is particularly vulnerable to climate change. Changes in climate will increase the need for maintenance and the renewal of robust key societal infrastructure. New knowledge, methods and tools for implementing solutions is of outmost importance for a safe, sustainable and cost-effective development of the Norwegian society. Klima 2050 will reduce the societal risks associated with climate changes and enhanced precipitation and flood water exposure within the built environment. Emphasis will be placed on development of moisture-resilient buildings, stormwater management, blue-green solutions, measures for prevention of water-triggered landslides, socio-economic incentives and decision-making processes. Both extreme weather and gradual changes in the climate will be addressed.

The Centre will be recognised for its research training within the field of climate adaptation of the built environment. Through education of graduate students, training of highly qualified research personnel through PhDs and training of professionals in the sector, the Centre will stimulate new processes, solutions and further research and development for the built environment long after the term of the Centre's existence.

Activities in 2015 have been startup of scientific work and organising the Centre. Digital platforms are established for communication (eRoom and [www.klima2050.no](http://www.klima2050.no)).

## 5 International cooperation

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The Centre has had a collaboration with Angela Sasic Kalagasidis and Pär Johansson at Building Physics Group – Chalmers, Civil and Environmental Engineering about an application to FORMAS (the Swedish Research Council). The project “*Storm water flooding in urban areas: risk mitigation by utilizing roofs as storm water buffers*” was granted and a PhD-position was announced in 2015.

SINTEF is participating in the EU-FP7-project DESSIN (Demonstrate Ecosystem Services Enabling Innovation in the Water Sector) which is highly relevant for the Centre activities. The research project demonstrates and promotes innovative solutions for water scarcity and water quality related challenges and demonstrates a methodology for valuation of the ecosystem services. DESSIN is centered on five demonstration sites with special focus on urban areas across Europe, where solutions are being tested and validated. SINTEF is coordinating the activities at Hoffselva in Oslo, where different treatment technologies will be tested to treat combined sewer overflows associated with rain events that currently are discharged directly to the river untreated. The objective is to improve the water quality in the Hoffselva, thus increasing its usefulness as a recreation spot. The value of having a recreational area in the neighborhood will be measured both before and after the improvement of water quality.

SINTEF and NGI have also participated in altogether 6 highly relevant EU- Horizon 2020 applications.

## 6 Recruitment

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Two PhD students started up just before the launch of Klima 2050. Another 4 PhD-positions were announced in 2015 (3 at NTNU and 1 at BI). The three positions at NTNU have been obsessed. One more PhD-student was associated with the Centre in 2015 (Birgitte G. Johannessen). 10 masterstudents were involved within the Centre activities.



Bridget O'Brien Thodesen, NTNU  
PhD project: Blue-green roof solutions in cold climates  
Maternity leave from July 2015



Lars Gullbrekken, NTNU  
PhD project: Climate adaptation of wooden roofs



Birgitte Gisvold Johannessen, NTNU  
PhD project: Green roofs for reduction of stormwater runoff in cold climate  
The project is funded by The Research Council of Norway and Trondheim Local Authority under the Public sector PhD-scheme.



Aynalem Tasachew, NTNU  
PhD project: Modelling flood risk in small catchments  
Contract signed. Starts 1<sup>st</sup> of January 2016



Vladimir Hamouz, NTNU  
PhD project: Blue-green solutions for stormwater management in urban environments in cold climate  
Contract signed. Starts 1<sup>st</sup> of January 2016



Petter Fornes, NTNU  
PhD project: Landslides triggered by hydro-meteorological processes  
Contract signed. Starts 1<sup>st</sup> of Mars 2016

## 7 Communication and dissemination

[www.klima2050.no](http://www.klima2050.no) has been established as the main platform for communication. It is used for news, dissemination for results and also all publications in RCN/ Cristin categories are listed on the web (see Publications) and in the appendix.

The number of publications for 2015 according to publication categories is listed in Table 1.

Table 1 Klima 2050 publications 2015 according to publication categories

Nr.	Title	Number
<b>Research-oriented</b>		
1	PhD Thesis	
2	Scientific Journals with peer review	
3	Conference Proceedings	1
4	Handbooks	
5	Klima 2050 Report	
6	M.Sc. Thesis	
7	Building Research Design Guides	
<b>User-oriented</b>		
8	Klima 2050 Note	2
9	Technical Journals	5
10	Presentations, lectures, courses and seminars	25
<b>Public-oriented</b>		
11	Popular scientific articles, debates and chronicles	1
12	Press releases and news stories	18
13	Other publications	6

Klima 2050 has been the subject of considerable media interest during 2015. We have had many inquiries from media including nationwide news channels. An example is given in Figure 8.



Figure 8 - The article published by NRK Viten based on results from the Xentre "*Framtidens vær kan skape trøbbel for norske hus*" was launched on [www.nrk.no](http://www.nrk.no) December 2015. 122 000 readers used more than 4 minutes each reading the article.

A Klima 2050 communication plan has been made and approved by the Centre Board. An extended version with main focus on public-oriented communication will be made.

## Appendices

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### Accounts

<b>Funding</b>		<b>Costs</b>	
	Amount		Amount
The Research Council	8869	SINTEF (host institution)	9741
SINTEF (host institution)	2948	Research partners	3917
Research partners	1676	Private partners	3818
Private partners	4918	Public partners	263
Public partners	5013		
Transfer to coming years	-5685		
<b>Sum</b>	<b>17739</b>	<b>Sum</b>	<b>17739</b>

*All figures in 1000 NOK*

## Publications

### *Conference Proceedings*

Gullbrekken, L, Kvande, T & Time, B (2015) *Roof-integrated PV in Nordic climate - Building physical challenges*. The 6th International Building Physics Conference - IBPC 2015. *Energy Procedia*. Vol. 78, p. 1962-1967.

### *Klima 2050 Note*

Hauge, Å (Ed.) *Temasamling | Forsikring som for innovativ klimatilpasning og vannskadebegrensning*. Klima 2050 Note 2. Oslo, 2015

Time, B (Ed.) *SFI Klima 2050 | Research Working Plan 2015-2016*. Klima 2050 Note 1. Trondheim, 2015

### *Technical Journals*

Kvande, T: Teglmur i regnvêr. *Byggeindustrien* 16/2015 s 102-103

Sægrov, S: Ned med vannet! *Byggeindustrien* 15/2015 s 224

Kvande, T: Nytt klima: Nye laster. *Byggeindustrien* 11/2015 s 36

Gullbrekken, L: Problematiske tak. *Byggeindustrien* 10/2015 s 43

Thorolfsson, S.T: Blågrønne overvannsløsninger. *Byggeindustrien* 9/2015 s 42

### *Presentations, lectures, courses and seminars*

Time, B: Hva er nytt fra forskningen? Norsk bygningsfysikkdag. Oslo, 19.11.2015

Time, B: Reduksjon av risiko ved klimaendringer for det bygde miljø på land - hvordan tenker vi? Klimakonferansen for fiskeri- og havbruksnæringen. Trondheim 17.11.2015

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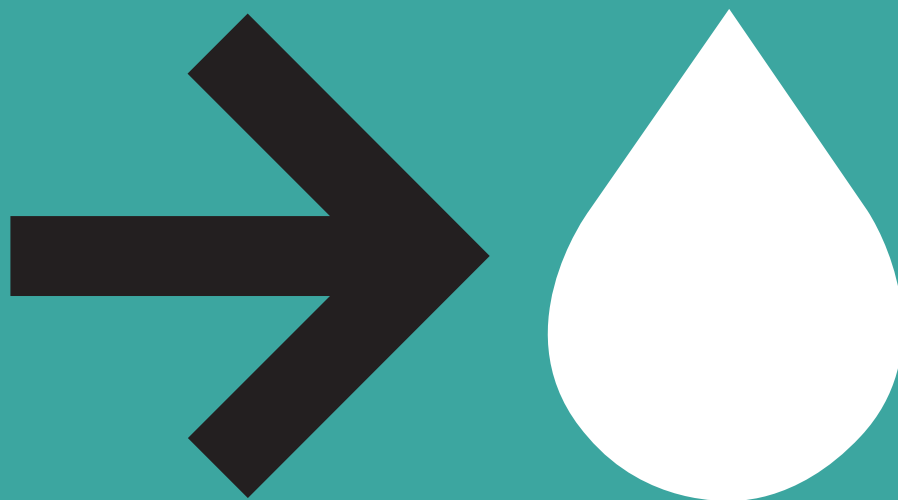
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**Key Personell**

<b>Name</b>	<b>Institution</b>	<b>Main research area</b>
Alfredsen, Knut	NTNU	Stormwater management
Almås, Anders-Johan	SINTEF	Moisture resilient buildings
Asphaug, Silje	SINTEF	Moisture resilient buildings
Azrague, Kamal	SINTEF	Stormwater management
Bygballe, Lena	BI	Decision-making processes and impact
Cepeda, José	NGI	Water triggered landslides
Christensen, Stein Olav	SINTEF	Settling and stability analyses
Eidsvig, Unni	NGI	Water triggered landslides
Flyen, Cecilie	SINTEF	Decision-making processes and impact
Geving, Stig	NTNU	Moisture resilient buildings
Grynning, Steinar	SINTEF	Moisture resilient buildings
Hauge, Åshild L.	SINTEF	Decision-making processes and impact
Heyerdahl, Håkon	NGI	Water triggered landslides
Hygen, Hans Olav	Meteorologisk Institutt	Meteorological processes
Kalsnes, Bjørn	NGI	Water triggered landslides
Kvande, Tore	NTNU	Moisture resilient buildings
Kvålshaugen, Ragnhild	BI	Innovation strategies
Labonnote, Nathalie	SINTEF	Stormwater management
Le, Thi Minh Hue	SINTEF	Landslides – numerical modelling
Lisø, Kim Robert	Skanska	Moisture resilient buildings
Muthanna, Tone	NTNU	Stormwater management
Nordal, Steinar	NTNU	Water triggered landslides
Riis, Christian	BI	Socio-economics
Sivertsen, Edvard	SINTEF	Stormwater management
Strout, James	NGI	Water triggered landslides
Sægrov, Sveinung	NTNU	Stormwater management
Thakur, Vikas	NTNU	Landslides and slope stability etc.
Time, Berit	SINTEF	Moisture resilient buildings
Ugarelli, Rita	SINTEF	Stormwater management





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### Research & education

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