Cold Climate HVAC 2018
The 9th International Cold Climate Conference
Sustainable new and renovated buildings in cold climates
Kiruna – Sweden 12-15, March 2018
Welcome to Kiruna and the Cold Climate HVAC 2018 conference!

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Conference Co-Chair  
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Åsa Wahlström  
Senior Advisor  
Lund University  
Building Services  
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<td>12:00 - 16:00</td>
<td>Pre conference tour</td>
<td>8:00 - 9:30 Bus ride to mine Keynote speakers Guided tour</td>
<td>Keynote speaker</td>
<td>Fieldtrip</td>
<td>9:00 - 13:30 Post conference Outdoor activities Lunch</td>
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<td>15:00 - 16:30</td>
<td>Meet and greet</td>
<td>9:30 - 10:00 Coffe, exhibition</td>
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<td>Coffe, exhibition</td>
<td>14:00 - 23:00 Post conference tour Abisko Guided Tour Aurora Hunting</td>
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<td>17:00 - 17:15</td>
<td>Opening</td>
<td>10:00 - 12:00 Paper sessions</td>
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<td>17:15 - 19:00</td>
<td>Keynote speakers</td>
<td>12:00 - 13:00 Lunch, exhibition</td>
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<td>19:00 - late</td>
<td>Welcome reception</td>
<td>13:00 - 14:30 Paper sessions</td>
<td>Paper sessions</td>
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<td></td>
<td>14:30 - 15:00 Coffe, exhibition</td>
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<td>15:00 - 17:00 Paper sessions</td>
<td>Fieldtrip</td>
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Scientific committe dinner Conference dinner
Monday

12:00 – 16:30 Pre conference tour to Esrange space center (Separate registration required)

15:00 – 17:00 Meet & Greet at Scandic Ferrum

17:00 Opening, Nåjdens sal, Kirunas Folkets Hus

17:15 Keynote speaker: Lars Bäckström – Head of Urban Development, Kiruna Municipality

  Lars will be presenting some general information about Kiruna and the business life in Kiruna and the ongoing city transformation due to the expanding iron ore mine.

18:00 Keynote speaker: Kristina Mjörnell – Business and innovation area manager for Sustainable Cities and Communities, RISE Research Institutes of Sweden, Adjunct Professor in Building Physics, Lund University.

  Kristina will be presenting transdisciplinary aspects on renovation in cold climates.

19:00 – 21:00 Welcome reception at Kiruna City Hall, Busses leave from Scandic Ferrum
Tuesday

Group 1

8:00 Bus leaves from Scandic Ferrum to the Iron ore mine.
8:30 Guided tour

9:30 Keynote speaker: Ulf Svennemyr and Håkan Ylvin – Project managers, Sweco
Ulf and Håkan will be presenting experiences from relocation of heritage buildings due to
the expanding iron ore mine in Kiruna.
10:30 Bus leaves to Scandic Ferrum

Group 2

9:00 Bus leaves from Scandic Ferrum to the iron ore mine

9:30 Keynote speaker: Ulf Svennemyr and Håkan Ylvin – Project managers, Sweco
Ulf and Håkan will be presenting experiences from relocation of heritage buildings due to
the expanding iron ore mine in Kiruna.
10:30 Guided tour
11:30 Bus leaves to Scandic Ferrum

11:30 Lunch at Scandic Ferrum

13:00 – 14:30 Parallel paper sessions, detailed program on next page

   - Renovation of buildings
   - Building simulation
   - Indoor environment and health

14:30 – 15:00 Afternoon coffee, exhibition

15:00 – 17:00 Parallel paper sessions, detailed program on next page

   - Efficient HVAC components, Energy and power efficiency and low energy buildings
   - Buildings in operation
   - Moisture safety and water damage, Trans disciplinary connections and social aspects
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<th>Time</th>
<th>Renovation of buildings</th>
<th>Building simulation</th>
<th>Indoor environment and health</th>
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<tr>
<td>13:00</td>
<td><strong>1111:</strong> Energy Efficient Construction Materials for Cold Climate Homes&lt;br&gt;Gül Nihal Gügül</td>
<td><strong>1121:</strong> Assessment of thermal bridging heat loss by means of the infrared thermography technique&lt;br&gt;Małgorzata O'Grady, Agnieszka Lechowska, Jacek Schnotale, Annette Harte</td>
<td><strong>1131:</strong> Assessment of indoor air quality and hygrothermal conditions of boarders during autumn, winter and spring in two of Estonian straw-bale houses&lt;br&gt;Jane Raamets, Aime Ruus, Mari Ivask</td>
</tr>
<tr>
<td>13:18</td>
<td><strong>1112:</strong> Tenants’ priority of renovation measures and their willingness to pay higher rent to implement these&lt;br&gt;Kristina Mjörnell, Carolina Hiller</td>
<td><strong>1122:</strong> An Evaluation on the Effect of Window Shading on Thermal Mass to Reduce Overheating&lt;br&gt;Carlos Jimenez-Bescos</td>
<td><strong>1132:</strong> Study on the Concentration Level and Influence Factors of the Indoor Particles in the Office Building&lt;br&gt;Liang Yu, Ji Jia</td>
</tr>
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<td>13:36</td>
<td><strong>1113:</strong> Upgrading of a Typical Norwegian Existing Wooden House According to the EnerPHit-Standard&lt;br&gt;Bozena Dorota Hrynyszyn, Laurina Cornelia Felius</td>
<td><strong>1123:</strong> Method for probabilistic energy calculations – Passive house case study&lt;br&gt;Stephen Burke, Johnny Kronvall, Magnus Wiktorsson, Per Sahlin, Anders Ljungberg</td>
<td><strong>1133:</strong> Investigating recommended temperature zones and clothing assumptions in the assessment of classrooms’ thermal environment&lt;br&gt;Despoina Teli, Jan-Olof Dalenbäck</td>
</tr>
<tr>
<td>13:54</td>
<td><strong>1114:</strong> Adding glazing as an energy saving renovation measure in cold climates&lt;br&gt;Birgitta Nordquist, Kimmo Hilliaho, Petter Wallenten</td>
<td><strong>1124:</strong> Validation of a zonal model to capture the detailed indoor thermal environment of a room heated by a wood stove&lt;br&gt;Martin Thalfeldt, Laurent Georges, Øyvind Skreiberg</td>
<td><strong>1134:</strong> Indoor temperature variations in Swedish households: implications for thermal comfort&lt;br&gt;Despoina Teli, Sarka Langer, Lars Ekberg, Jan-Olof Dalenbäck</td>
</tr>
<tr>
<td>14:12</td>
<td><strong>1115:</strong> The most cost-effective energy solution in renovating a multi-family house&lt;br&gt;Elaheh Jalilzadehzhari, Krushna Mahapatra</td>
<td><strong>1125:</strong> TEKNOsim 6 Test Results according to CIBSE TM33 Tests for Software Accreditation and Verification&lt;br&gt;Marwan Abugabbara, Saqib Javed</td>
<td><strong>1135:</strong> Wood as an exposed building material for indoor climate adaptation&lt;br&gt;Kristine Nore, Dimitrios Kraniotis</td>
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<tr>
<td>Time</td>
<td>Session 1</td>
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<td>15:00</td>
<td>1211: Passive house construction above the Arctic Circle</td>
<td>1221: Inverse model identification of the thermal dynamics of a Norwegian zero emission house</td>
<td>1231: Determination of Maximum Moisture Zone on Enclosing Structures</td>
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<td></td>
<td>Stefan Dehlin, Catrin Heincke, Peter Koskinen</td>
<td>Pierre Vogler-Finck, John Clauß, Laurent Georges, Igor Sartori, Rafael Wisniewski</td>
<td>Владимир Гагарин, Владимир Козлов, Кирилл Зубарев</td>
</tr>
<tr>
<td>15:18</td>
<td>1212: In-situ thermal resistance testing of a high performance building envelope in the Canadian Arctic</td>
<td>1222: Sustainable architecture in northern subarctic and arctic climate</td>
<td>1232: Moisture Safety of Tall Timber Facades</td>
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<td></td>
<td>Carsen Banister, Michael Swinton, Travis Moore, Dennis Krys</td>
<td>Ulf Nordwall, Thomas Olofsson</td>
<td>Joakim Norén, Anna Pousette, Karin Sandberg</td>
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<td>Carsen Banister, Michael Swinton, Travis Moore, Dennis Krys</td>
<td>Marianne Forman, Nils Lykke Sørensen</td>
<td>Qian Wang, Suleyman Dag</td>
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<tr>
<td>15:54</td>
<td>1214: Sol-air thermometer measurement of heat transfer coefficient at building outdoor surfaces</td>
<td>1224: Atrium in residential buildings – a design to enhance social interaction in urban areas in Nordic climates</td>
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<td></td>
<td>Anders Ohlsson, Ronny Östin, Thomas Olofsson</td>
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<td>Itai Danielski, Malin Krook, Kerstin Veimer</td>
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<tr>
<td>16:12</td>
<td>1215: What should the minimum ventilation rate be in a Demand Controlled Ventilation strategy?</td>
<td>1225: Does the Obligatory Ventilation Control fulfill its Purpose?</td>
<td>1235: Comparative evaluation of residents perspectives on household energy use based on housing tenure: survey results from Northern Sweden</td>
</tr>
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<td></td>
<td>Mads Mysen, Aileen Yang, Sverre Holøs, Kari Thunshelle, Peter Schild</td>
<td>Kristina Fyhr, Caroline Markusson, Svein Ruud</td>
<td>Greesh Nair, Thomas Olofsson, Annika Nordlund, Christine Hudson</td>
</tr>
<tr>
<td>16:30</td>
<td>1216: Dynamic thermal performance and controllability of dry fan-coil unit</td>
<td>1226: Evaluation study of the performance of dual core energy recovery system for dwellings in the Arctic</td>
<td>1236: Black Carbon Concentrations Inside and Outside Occupied Residences</td>
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<td>Taha Arghand, Anders Trüschel, Saqib Javed, Jan-Olof Dalenbäck</td>
<td>Boualem Ouazia, Ganapathy Gnanamurugan</td>
<td>Aneta Wierzbicka, Hamza Licina, Yuliya Omelekhina, Patrik T. Nilsson, Anders Gudmundsson</td>
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Wednesday

8:00 Keynote speaker: Arne Bergh – Creative Director, ICEHOTEL, Jukkasjärvi

Arne will talk about the icehotel and the new design and construction of ICEHOTEL 365, a new year round icehotel.

9:30 – 10:00 Morning coffee, exhibition

10:00 – 11:30 Parallel paper sessions

- Energy and power efficiency and low energy buildings
- Heat pump and geothermal systems
- Buildings in operation, Building simulation

11:30 Lunch at Scandic Ferrum

13:00 – 14:30 Parallel paper sessions

- Renovation of buildings
- District and city energy systems
- Building simulation

14:30 – 15:00 Afternoon coffee, exhibition

Fieldtrip to Icehotel Jukkasjärvi, guided tour.

- Group A: Bus leaves Scandic Ferrum 15:00, bus leaves Icehotel 17:00
- Group B: Bus leaves Scandic Ferrum 15:30, bus leaves Icehotel 17:30
- Group C: Bus leaves Scandic Ferrum 16:00, bus leaves Icehotel 18:00

Conference dinner at Camp Ripan (separate registration required) busses leave Scandic Ferrum 18:30
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<th>Session 1</th>
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| 10:00 | 2111: Increasing buildings automation systems efficiency with real-time simulation through machine self-learning algorithms  
Andris Krūmiņš, Nikolajs Bogdanovs, Romualds Beļinskis, Kristine Mežale, Miks Garjāns | 2121: Design of Horizontal Ground Heat Exchangers in Sub-Arctic Conditions  
Robbin Garber-Slaght, Jeffrey Spitler | 2131: Vertical temperature gradients in apartments with hydronic radiator heating  
Mats Dahlblom, Birgitta Nordquist, Petter Wallentén, Lars-Erik Harderup, Lars Jensen |
| 10:18 | 2112: Analysis of various ventilation solutions for residential and non-residential buildings in Latvia and Estonia  
Jurgis Zemitis, Anatolijs Borodinecs, Kalamees Targo | 2122: Baby, It’s Cold Outside: Lessons Learned From Geothermal Heat Pump Installations in the United States  
Katherine Johnson | 2132: Renovation of an office building with prefabricated wooden element - Case Hedensbyn  
Karin Sandberg, Anders Gustafsson, Mohsen Soleiman-Mohseni |
| 10:36 | 2113: Performances of gas-water direct-contact heat transfer  
Feng Li, Lin Duanmu, Lin Fu, Xiling Zhao | 2123: Artificial Neural Network Analysis of the Solar-Assisted Heat Pumps Performance for Domestic Hot Water Production  
Alireza Zendehboudi, Xianting Li, Siyuan Ran | 2133: How to extend the service-life of a school building  
Antti Knuuti |
| 10:54 | 2114: Impacts of Energy Efficient Constant Output Heating on the Moisture Conditions of Unoccupied Summer Cottages in Finland  
Caroline Haglund Stignor, Ola Gustafsson, Jon Persson | 2134: A Net ZEB case study – Experiences from freezing in ventilation heat exchanger and measured energy performance  
Björn Berggren |
| 11:12 | 2115: Setback efficiency of limited-power heating systems in cold climate  
Tuule Mall Kull, Raimo Simson, Jarek Kurnitski | 2125: Cold Climate Heat Pump using Tandem Vapor-Injection Compressors  
Bo Shen, Omar Abdelaziz, Van Baxter, Edvard Vineyard | 2135: Real Time Measurement of Dynamic Metabolic Factor (D-MET)  
Jakub Wladyslaw Dziedzic, Da Yan, Vojislav Novakovic |
| 11:30 | 2116: Experimental comparison of performance between single and dual core energy recovery ventilation systems  
Boualem Ouaiza, Ganapathy Gnanamurugan, Chantal Arsenault, Heather Knudsen | 2126: How does low relative humidity affect perceived air quality, thermal comfort and symptoms in modern office buildings in cold climates?  
Merethe Lind, Sverre Holøs, Kari Thunshelle, Aileen Yang, Mads Mysen |
2211: Operational modelling of energy efficiencies of buildings
Paul Beagon, Fiona Boland, James O'Donnell

2212: Optimizing the life cycle costs of building renovations
Thomas Olofsson

2213: Improving the indoor climate and energy saving in renovated apartment buildings in Estonia
Jussi Rönty, Paula Alaköntä, Riikka Holopainen

2214: Fast simulation platform for retrofitting measures in residential heating
Antti Haapala, Jörg Wöhrsdiek

2215: Designing the city - a climate-conscious concept for smart energy pathways for future residential building
Inger Andresen, Igor Sartori

2216: Life City - A Climate‐Conscious Concept for Smart and Sustainable Built Environment
Philipp Schön, Assogno Scozze, Dominik Werner, Rens Helder

2217: A comparison between four dynamic energy modelling tools for simulation of space heating demand of building renovations: An empirical study
Koji Harada, Akira Minami, Ken‐Ichiro Shinozaki, Ken‐Inji Hasegawa, Peter Kjærgaard

2218: Hydrogen heating systems with low temperature
Hybrid heating systems for space heating of multi-family residential buildings - a questionnaire survey
Jørgen Trundstad, Paul Feinberg, John Gjøen, Peter Kjærgaard

2219: Simulation of ventilation rates and heat losses during airing in large single zone buildings in cold climates
Anders Nyberg, Lina Andersson, Magnus Mattsson

2220: Potential of renewables in the campus of Lund University
Vand NIK

2221: Smart EV Charging Systems to Improve Energy Flexibility of Zero Emission Neighbourhoods – A state-of-art overview
Johan Ceder, Pierre Vogler-Frank, Laurent Georges

2222: Effect of pre-heating on anti-icing performance of hydronic heating pavement with low temperature
Liane Thuvander, Paula Femenias, Johan Gren, Peter Raheb Mirzanamadi, Carl‐Eric Hagentoft, Pär J ohansson

2223: Impacts of common simulation assumptions in Sweden on the energy balance of multi-family residential buildings
Karin Nykvist, Sven Skoog, Jan‐Olof Dalénback

2224: A comparison between four dynamic energy modeling tools for simulation of space heating demand of building renovations: An empirical study
Ken‐Ichiro Shinozaki, Ken‐Inji Hasegawa, Peter Kjærgaard

2225: Energy pathways for future residential building renovations
Inger Andresen, Igor Sartori

2226: Smart ventilation systems to improve energy performance of zero emission housing
Lars Gräf, Thomas Olofsson

2227: Smart energy systems to improve energy performance of zero emission housing
Lars Gräf, Birgit Linnell

2228: Energy after large scale building retrofits
Lars Gräf, Birgit Linnell

2229: Fast simulation platform for retrofitting measures in residential heating
Antti Haapala, Jörg Wöhrsdiek

2230: District and city energy systems: Operation and development of buildings
Thomas Olofsson
Thursday

8:00 – 9:30 Parallel Fieldtrips
   - Study visit to the mine ventilation system
   - Study visit to the new city hall
   - Architectural tour

9:30 – 10:00 Morning coffee, exhibition

10:00 – 11:30 Parallel paper sessions
   - Renovation of buildings
   - Other aspects of buildings in cold climates
   - Codes, regulations, standards and policies

11:30 Lunch at Scandic Ferrum

13:00 – 14:30 Parallel paper sessions
   - Energy and power efficiency and low energy buildings
   - Heat pump and geothermal systems, Construction management

14:30 – 15:00 Afternoon coffee, exhibition

15:00 -17:00 Keynote speaker: William Semple, Architect, University of Alberta, NORDEC Consulting and Design, Ottawa

   William will talk about Environmental and Cultural Sustainability in the Canadian North: Engaging Indigenous Communities in the Design and Construction of Energy Efficient Culturally Appropriate Northern Housing

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<th>Session 2: Other aspects of buildings in cold climates</th>
<th>Session 3: Codes, regulations, standards and policies</th>
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</thead>
</table>
| 10:00 | 3111: The challenge of energy efficiency in Kiruna's heritage buildings  
Andrea Luciani, Sofia Lidelöw, Shimantika Bhattacharjee, Tomas Örn | 3121: User related input data for building energy usage calculations of low energy schools in Sweden  
Branko Simanic, Dennis Johansson, Birgitta Nordquist, Hans Bagge | 3131: Needs of support for Swedish property owners to implement more energy-efficiency improvements during renovations  
Åsa Wahlström |
| 10:18 | 3112: Renovating the housing stock built before 1945: Exploring the relations between energy efficiency, embodied energy and heritage values  
Paula Femenias, Liane Thuvander, Pär Johansson, Paula Wahlgren, Petra Eriksson | 3122: Sensitivity analysis of melting and freezing of snow on roof  
Anker Nielsen | 3132: Criteria for Sustainable Buildings in Sweden  
Åsa Wahlström, Catarina Warfvinge |
| 10:36 | 3113: How low can the district heating supply temperature be in residential neighborhoods in Norway?  
Maria Justo Alonso, Igor Sartori | 3123: The method of determining climatic loads on the enclosing structures taking into account global climate change  
Dmitry Zheldakov, Vladimir Gagarin | 3133: Normalisation of measured energy use in buildings – a review of the Swedish regulations  
Maria Wall, Henrik Davidsson, Niko Gentile, Björn Berggren |
| 10:54 | 3114: An assessment of the QUB/e method for fast in situ measurements of the thermal performance of building fabrics in cold climates  
Johann Meulemans | 3124: Determination of Clay-Sand Plaster Hygrothermal Performance: Influence of Different Types of Clays on Sorption and Water Vapour Permeability  
Erik Altmäe, Aime Ruus, Jane Raamets, Ernst Tungel | 3134: Environmental sustainability building criteria for an Open Classification System  
Nicolas Francart, Eje Sandberg, Martin Erlandsson, Björn Berggren |
| 11:12 | 3115: Challenges in transdisciplinary research - example from a study on people as part of energy and ventilation systems in residential buildings (PEIRE)  
Martti-Jaan Miljan, Jaan Miljan | 3135: Review of Current Practice of Building Foundations in the Canadian North  
Christine Harries |
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<tr>
<td>13:00</td>
<td>3211: Integration of BIPV/T system with HRV for improved performance under extreme cold climates</td>
<td>3221: Detailed performance assessment of variable capacity inverter-driven cold climate air source heat pumps</td>
<td>3231: Influence of the Thermal Environment of a Bathroom after Renovation on Blood Pressure of Residents</td>
</tr>
<tr>
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<td>Riccardo Toffanin, Hua Ge</td>
<td>Jeremy Sager, Tom Mackintosh, Martin Kegel, McDonald Eric, St-Onge Guillaume</td>
<td>Chiemi Iba, Shuichi Hokoi, Nobuyuki Masugi, Daisuke Ogura, Satoru Takada, Kenji Iida</td>
</tr>
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<td>13:18</td>
<td>3212: Demand controlled ventilation in residential buildings</td>
<td>3222: Utilisation of Ice Rink Waste Heat by Aid of Heat Pumps</td>
<td>3232: Assessment of the effects of using wood stoves on indoor air quality in two types of Norwegian houses</td>
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<td>Huijuan Chen, Caroline Markusson</td>
<td>Juris Pomerancevs, Jørgen Rogstam, Agnese Līckrastiņa</td>
<td>Mathieu Hamon, Guangyu Cao, Øyvind Skreiberg, Laurent Georges, Morten Seljeskog, Roger Khalil, Alexis Sevault, Hans Martin Mathisen</td>
</tr>
<tr>
<td>13:36</td>
<td>3213: Is it possible to build near zero energy single family buildings in very cold arctic climate?</td>
<td>3223: Creating a state of the art, passive house, university hospital north of the polar circle</td>
<td>3233: Should we differentiate ventilation requirements for different user groups?</td>
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<td>Svein Ruud</td>
<td>Christian koch, Martine Buser</td>
<td>Nora Holand, Aileen Yang, Sverre Holås, Kari Thunshelle, Mads Mysen</td>
</tr>
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<td>13:54</td>
<td>3214: The energy performance of green roof in sub-arctic climate</td>
<td>3224: Mixing Hot and Cold: Fiery soul Architects creating Sustainable Buildings in the Arctic</td>
<td>3234: Effect of filter type in ventilation systems on NO2 concentrations in classrooms</td>
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<td></td>
<td>Jutta Schade, Farshid Shadram</td>
<td>Thongchai Lapthananchaiwong, Christian Koch</td>
<td>Aileen Yang, Kristian Fredrik Nikolaisen, Sverre Holås, Kari Thunshelle, Franck René Dauge, Mads Mysen</td>
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<td>Shimantika Bhattacharjee, Sofia Lidelöw, Jutta Schade</td>
<td>Soheila Bahrami, Juan Negreira, Stefan Olander, Anne Landin</td>
<td>Liang Yu, Xiaotong Wang</td>
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Friday

Morning
Parallel activities
  Dog-sledding and lunch (Separate registration required)
  Ice-fishing, short snowmobile ride and lunch (Separate registration required)
  Snowmobile ride and lunch (Separate registration required)

Afternoon
Guided tour to Abisko (Separate registration required)
  The bus leaves Kiruna at 14:00 and arrives in Abisko at 15:30. In Abisko there will be a guided walk along the canyon. Dinner in Abisko at 18:00. The bus leaves for Kiruna at 20:30 PM. During the drive back to Kiruna there will be stops to look for northern light “Aurora Hunting”.
<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Angela Sasic</td>
<td>Chalmers University of Technology</td>
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<td>Berit Time</td>
<td>SINTEF</td>
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<td>Bert Phillips</td>
<td>UNIES Ltd.</td>
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<td>Bill Semple</td>
<td>University of Calgary</td>
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<td>Björn Marteinson</td>
<td>University of Iceland</td>
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<td>Boualem Ouazia</td>
<td>National Research Council Canada</td>
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<td>Carey Simonson</td>
<td>University of Saskatchewan</td>
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<td>Carl-Erik Hagentoft</td>
<td>Chalmers University of Technology</td>
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<tr>
<td>D.Y. Zheldakov</td>
<td>Res. Inst. of building physics of RAACS, Moscow</td>
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<td>Eckhard Groll</td>
<td>Purdue University</td>
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<td>Erich Binder</td>
<td>WorleyParsons LTD</td>
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<td>Guangyu Cao</td>
<td>Norwegian University of Science and Technology</td>
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<td>Hans Martin Mathisen</td>
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<td>Ivo Martinac</td>
<td>Royal Institute of Technology, Stockholm</td>
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<td>Jan Sundell</td>
<td>Tsinghua University</td>
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