SusWoodStoves – Sustainable wood stoves through stove, building integration and value chain optimisation

Newsletter 1-2022

Introduction

The overall objective is sustainable wood stoves through stove, building integration and value chain optimisation.

The sub-objectives are:

1. Speciation and quantification of particulate and gaseous emission levels from wood stoves for representative stove technologies and operating conditions
2. Reduction of climate and health related emission levels through emission reduction and energy efficiency measures
3. Optimum building integration of stoves
4. Assessment of value chain performance of existing and improved stove technologies and connected systems for different stove-building configurations in Norway
5. Techno- and socio-economic assessments of the current and future role of wood stoves in the Norwegian energy market
6. Development of a roadmap for sustainable wood stoves in Norway
7. Education of highly skilled candidates within this area and training of industry partners
8. Monitoring of activities and state-of-the-art within this area and dissemination of knowledge to the industry partners, and other interested parties when applicable

Previous projects have increased significantly the knowledge about wood log combustion in stoves to enable improving wood stoves with respect to emissions and energy efficiency, as well as combustion stability and optimum room and building integration. However, to ensure a sustainable wood stove future both in the existing building stock and the residential buildings of the future, further knowledge building within emission reduction, energy efficiency increase, proper building integration, and value chain, techno-economic and socio-economic assessments is needed. This will secure the continued use of wood stoves as an important, comfortable and sustainable heat source in the existing building stock (replacing old/poor stoves) and the residential buildings of the future, providing also substantial socioeconomic benefits. Therefore, SusWoodStoves is established, and is working according to the following hypotheses:

1. The best wood stoves today are much better than some emission factors for new wood stoves in the Norwegian emission inventory indicates - still, they can be significantly further improved (reduced emissions, increased efficiency) by better understanding and controlling the wood log combustion process
2. Proper wood stove design and material choices can much reduce the influence of the typical heat production peak on thermal comfort
3. Wood stoves have the potential to be suitable for heating any kind of residential building if properly designed, sized, selected, installed and operated
4. The best wood stoves have a natural place in a sustainable future
5. Further improvements can be shaped in such a way to maximize benefits for climate change and health, increase the overall sustainability performance of the wood stove value chain in Norway, and make a quantifiable step forward in the country transition to a sustainable bioeconomy

The methodology chosen to address the project objectives and hypotheses are based on:

1. Collection and assessment of existing data
2. Laboratory experiments to provide additional needed data
3. Field measurements and questionnaires to collect end-user behaviour data
4. Use of the derived knowledge combined with modelling and simulations for improvement of wood stoves with respect to energy efficiency, emissions (climate and health focus) and satisfying thermal comfort

- a Knowledge-building Project for Industry (KSP-K) co-funded by the Research Council of Norway through the ENERGIX-programme.
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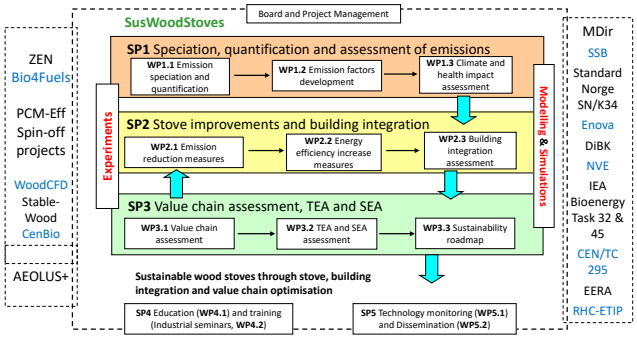
5. Simulations based on advanced and up-to-date climate and sustainability impact models, with feedback to the stove improvements activities.

The Work Breakdown Structure of SusWoodStoves is:



SusWoodStoves management and work break down structure and project links and information flow.

SusWoodStoves will run for four years (2021-2024) and has a total cash budget of 18.6 million NOK, which is 80% financed by the Research Council of Norway through the ENERGIX program and 20% financed by the industrial partners.

The SusWoodStoves consortium

The project consortium covers all the necessary aspects and includes large and central industrial players in the wood stove area in Norway.

SINTEF Energy Research leads the project and focus on speciation and quantification of particulate and gaseous emission levels and reduction of climate and health related emission levels. **NTNU** (Norwegian University of Science and Technology) supervise two PhD candidates and Master candidates, with the main focus being building integration of stoves, assessment of value chain performance of stoves and techno- and socio-economic assessments.

The industrial partners contribute with finances as well as stoves and their extensive industrial knowledge generated through their commercial activities within the wood stove area: Jøtul AS, Nordpeis AS, Norsk Kleber AS and Norsk Varme.

The constellation of project partners is very strong, bringing together leading research organisations within the field and major industrial players.

Project background

SusWoodStoves, with its focus on sustainable wood stoves, is a response to the open Research Council of Norway KSP call and the topic Environment-friendly energy and its focus on the long term, sustainable development of the energy system, that enhance the competitiveness of Norwegian trade and industry and accelerate the transition to a low-emission society, including reducing anthropogenic greenhouse gas emissions. It is also directed towards the ENERGIX program plan and its focus on sustainable utilisation and consumption of renewable energy resources - as biomass, reduction of Norwegian and global emissions of greenhouse gases - from bioenergy, enhancement of Norway's security of supply - through increased use of domestic biomass resources, strengthened innovation in Norwegian trade and industry and the public sector - for the wood stove value chain, further development of Norwegian research and educational institutions - to be able to support innovation efforts in the wood stove industry.

Bioenergy is important in Norway and the current national bioenergy strategy is influenced by e.g. Klimakur 2030, Klimameldingen, Bioøkonomistrategien, Energi21 and Skog22. Wood log combustion has long traditions in Norway, constituting above 40% of the total use of biomass for stationary energy purposes, and accounting for about 12% of the domestic heating.

Using wood logs is important for security of supply in Norway, where we today rely heavily on the electricity grid to deliver the needed space-heating for our houses, which are typically wooden (with relatively low thermal mass). With a high nominal power, wood stoves can significantly reduce power peaks in the electricity grid, prevent blackouts and act as backup heating system. In a context of increasing electricity use in households, including electric cars, reducing peak electric power is strategic as it enables to prevent or postpone large investments to reinforce the distribution grid. New houses, as well as retrofit/upgrading of old houses, have increasingly focused on improved energy efficiency (e.g. the Norwegian passive house standard, the TEK17 regulation and nearly-zero energy buildings from 2020, NZEB). The space-heating effect (power) required for these highly-insulated buildings is drastically reduced, which means that wood stoves for these buildings should be able to deliver a close to constant heating effect to the building as low as ~1 kW, which is much lower than for a new stove in an old house.

Combining heat production, storage and distribution in an optimum way, would make it possible to achieve a substantially more stable heat release and distribution, and with lower heating effect. This was a key focus of the knowledge-building projects StableWood (2011-14) and WoodCFD (2015-18), the predecessors to SusWoodStoves. The StableWood studies confirmed that wood stoves have a place in future's buildings, while WoodCFD progressed the knowledge and especially modelling tools significantly, to enable

improving wood stoves with respect to emissions and energy efficiency, as well as combustion stability and optimum room and building integration. Additionally, FME CenBio (2009-17) made a first effort to assess the wood stove value chain, comparing old and new wood stoves, at nominal and part load operation.

SusWoodStoves builds on the previous work, and will through further knowledge building within emission reduction, energy efficiency increase, proper building integration, and value chain, techno- and socio-economic assessments, contribute to ensuring a sustainable wood stove future both in the existing building stock and the residential buildings of the future.

Project overview

The project is divided into 5 subprojects (SP), each subproject is itself divided into several work packages (WP).

- Speciation, quantification and assessment of emissions - SP1
- Stove improvements and buildings integration - SP2
- Value chain assessment, TEA and SEA - SP3
- Education and training - SP4
- Technology monitoring and dissemination - SP5

Speciation, quantification and assessment of emissions - SP1

Addressing sub-objective 1 (Speciation and quantification of particulate and gaseous emission levels from wood stoves for representative stove technologies and operating conditions) and hypothesis 1 (the best wood stoves today are much better than some emission factors for new wood stoves in the Norwegian emission inventory indicates - still, they can be significantly further improved (reduced emissions, increased efficiency) by better understanding and controlling the wood log combustion process).
SP1 leader: Chief Scientist Øyvind Skreiberg, SINTEF Energy Research

Stove improvements and buildings integration - SP2

Addressing sub-objective 2 (Reduction of climate and health related emission levels through emission reduction and energy efficiency measures) and 3 (Optimum building integration of stoves) and hypothesis 1-3 (1) the best wood stoves today are much better than some emission factors for new wood stoves in the Norwegian emission inventory indicates - still, they can be significantly further improved (reduced emissions, increased efficiency) by better understanding and controlling the wood log combustion process, 2) proper wood stove design and material choices can much reduce the influence of the typical heat production peak on thermal comfort, 3) wood stoves have the potential to be suitable for heating any kind of residential building if properly designed, sized, selected, installed and operated)
SP2 leader: Associate Professor Laurent Georges, NTNU

Value chain assessment, TEA and SEA - SP3

Addressing sub-objective 4 (Assessment of value chain performance of existing and improved stove technologies and connected systems for different stove-building configurations in Norway), 5 (Techno- and socio-economic assessments of the current and future role of wood stoves in the Norwegian energy market) and 6 (Development of a roadmap for sustainable wood stoves in Norway) and hypothesis 4 (the best wood stoves have a natural place in a sustainable future) and 5 (further improvements can be shaped in such a way to maximize benefits for climate change and health, increase the overall sustainability performance of the wood stove value chain in Norway, and make a quantifiable step forward in the country transition to a sustainable bioeconomy).
SP3 leader: Professor Francesco Cherubini, NTNU

Education and training - SP4

Addressing sub-objective 7 (Education of highly skilled candidates within this area and training of industry partners).
SP4 leader: Professor Francesco Cherubini, NTNU

Technology monitoring and dissemination - SP5

Addressing sub-objective 8 (Monitoring of activities and state-of-the-art within this area and dissemination of knowledge to the industry partners, and other interested parties when applicable).
SP5 leader: Chief Scientist Øyvind Skreiberg, SINTEF Energy Research, who also is the SusWoodStoves project leader

Progress in 2022

In 2022 the focus is on continued mapping of emissions and energy efficiency performance of the best wood stoves, and based on this establishing revised emission factors for this category of wood stoves. Additionally, primary emission reduction measures to further decrease the emission levels are in focus as well as energy efficiency increase by improved operation and control. The PhD study on advancing methods for climate change and air quality impacts in LCA is progressing well and in August the PhD study on data-driven analysis of the real building

performance using wood stoves will start. Overall, the project activities are well on their way.
In 2021 efforts were focused on establishing the project, detailing the annual work plan for 2021 and recruiting the two PhD candidates. The scientific work including experimental activities was in good progress. A critical review and discussion on emission factors for wood stoves was in progress showed large variations in a number of the emission factors used for wood stoves in different countries' national emission inventories. There is a real need to establish more reliable and representative emission factors for the different wood stove categories and to differentiate within a category based on technology development level. This goes especially for the modern and clean burning wood stove category (based on staged air combustion), where technological development has much reduced emissions of unburnt during the last two decades. Wood stove technology are continuously developing, and the future of wood stoves and the further development potential should be based on the performance of the stoves on the market today, and not on an average of the technologies that are in operation today.

SusWoodStoves workshop and Steering Committee meeting

The second workshop and SC meeting were arranged in Trondheim, 2-3 June 2022. This was the first physical consortium meeting in the project, with many interesting presentations and discussions on the workshop agenda.

PhD work 1

The PhD position in data-driven analysis of the real building performance using wood stoves has been filled, by Abolfazl Mohammadabadi, who will start his study in August. The position is connected mainly to SusWoodStoves SP2.

PhD work 2

The PhD position in advancing methods for climate change and air quality impacts in LCA has been filled, by Sofie Sødal Eiksund. The position is connected mainly to SusWoodStoves SP3.

SusWoodStoves in EERA Bioenergy Newsletter

An article entitled "Emission factors, their reliability and needs for improvement – The case of wood stoves" presents a summary of and conclusions from a SusWoodStoves critical review in the upcoming EERA (European Energy Research Alliance) Bioenergy Newsletter, Issue 17.

SusWoodStoves at IConBM2022

A work entitled "A critical review and discussion on emission factors for wood stoves" was presented at IConBM2022, 5-8 June, Naples, Italy. The presentation highlighted the need for continuous revision of emission factors for new wood stoves in national emission inventories and recommended that the typical modern wood stove category should be divided into sub-categories reflecting the continuous improvement of wood stoves with respect to decreasing emission levels.
A corresponding article has been accepted for publication in proceedings. The abstract is given below:

"Small scale heating appliances such as wood stoves, significantly contribute to domestic heating and energy security in many European countries. However, emissions from wood stoves remain a significant concern, even though modern wood stoves are continuously improved to reduce emissions due to incomplete combustion. Most State-Of-The-Art (SOTA) stoves after the 1990s, achieve significantly lower emissions than stoves produced in the period 1940-1990. The main reason being the introduction of emission limits and test standards both in Norway and other European countries. SOTA stoves today, including catalyst stoves and the more recent downdraft concepts, all apply a strategic and more or less optimized staged air supply. In stoves without catalyst, optimized air supply and combustion chamber geometry as well as combustion chamber insulation, are the main reasons modern stoves achieve better burnout. When comparing national emission inventories, we find unacceptable large variations in emission factors for most reported compounds in all official stove categories. There are in some cases plausible reasons for such differences, but for some cases the differences can hardly be justified. Both stove categories, old and new, suffers from differences of up to two magnitudes, when comparing emission factors used in the national emission inventories in the Nordic countries. Hence, there is a real need to correct and align these for inclusion in national emission inventories, which should be reflecting real-life emissions as accurately as possible. As stoves are continuously being improved, we also suggest yearly updates accounting for such improvements, in the annual national emission inventories reports."

In addition, main findings of this study will be disseminated in the upcoming EERA Bioenergy Newsletter, Issue 17.

SusWoodStoves at EERA Bioenergy webinar

A presentation entitled "Norwegian WtE and wood stoves research for the European future" was presented at an EERA Bioenergy webinar (arranged by SP4 Stationary Bioenergy), 16 November 2021, and highlighted the continued importance of these two traditional bioenergy sectors in the European renewable energy future.

SusWoodStoves in EERA Bioenergy Newsletter

An article entitled "Sustainable wood stoves through stove, building integration and value chain optimisation" presents SusWoodStoves in a EERA (European Energy Research Alliance) Bioenergy newsletter, Issue 15 June 2021.

SusWoodStoves publications

Øyvind Skreiberg (2022). Emission factors, their reliability and needs for improvement – The case of wood stoves. Accepted for publication in EERA Bioenergy Newsletter 17.

Øyvind Skreiberg, Morten Seljeskog, Franziska Kausch (2022). A critical review and discussion on emission factors for wood stoves. IConBM2022, 5-8 June, Naples, Italy.
A corresponding article has been accepted for publication in proceedings.

Franziska Kausch, Morten Seljeskog, Øyvind Skreiberg. Nye utslippskrav for vedovner fra 2022. SINTEF blogg 5 april 2022.

Christina Tellefsen, Brede Børud, Morten Seljeskog, Øyvind Skreiberg, Sigrid Bagge Slang. Dagens rentbrennende ildsteder er mye mer effektive enn de gamle. Ektevarme.no, 31 mars 2022.

Øyvind Skreiberg. Vedfyring på hytta. Boligmagasinet nr. 1, 2022, side 22-23.

Silje Skogvang, Øyvind Skreiberg m.fl. Denne fyringsmetoden er verst for klimaet: – Feil fyring kan gi store konsekvenser. Dagsavisen Fremtiden 19 desember 2021.

Øyvind Skreiberg. The 10 commandments of wood burning stoves. SINTEF blog 16 December 2021.

Øyvind Skreiberg. Vedfyringens 10 bud. SINTEF blogg 16 desember 2021.

Øyvind Skreiberg. SINTEF Energi jobber for fremtidens vedfyring. Varmenytt, desember 2021.

Lena-Christin Kalle, Øyvind Skreiberg m.fl. Dette kan koste deg garantien på peisen. Nettavisen 9 desember 2021.

Øyvind Skreiberg. Wood stoves and wood-burning – how to ensure "hygge", heating comfort and eco-friendliness. SINTEF blog 28 November 2021.

Franziska Kausch, Øyvind Skreiberg, Morten Seljeskog. Slik kan du fyre med god samvittighet. SINTEF blogg 18 november 2021.

Øyvind Skreiberg. Norwegian WtE and wood stoves research for the European future. EERA Bioenergy webinar, 16 November 2021.

Morten Seljeskog, Franziska Kausch. Vedfyring: Hvordan kan du gjøre det på en miljøvennlig måte? Smart forklart SINTEF-podkast 4 november 2021.

Øyvind Skreiberg. Vedfyringens rolle i fremtiden. Biomassens og bioenergiens bidrag i fremtidens bærekraftige energisystem. SINTEF blogg 29 oktober 2021.

Rikke Åserud, Steinar Johannesen, Svein Sanne, Øyvind Skreiberg, Christian Kildahl Hansen (2021). Mye å spare på å lukke peisen. Hus & Bolig nr. 3, 2021.

Øyvind Skreiberg (2021). Sustainable wood stoves through stove, building integration and value chain optimisation. EERA Bioenergy Newsletter 15:12-13.

Øyvind Skreiberg. New project: Sustainable wood stoves through stove, building integration and value chain optimisation. SINTEF blog 11 May 2021.

Øyvind Skreiberg, Morten Seljeskog. Dette må du vite om å fyre i den gamle vedovnen på hytta. Adresseavisen 2 april 2021.

Øyvind Skreiberg, Morten Seljeskog. Hvordan fyre smart i den gamle ovnen på hytta? Gemini 30 mars 2021.

Øyvind Skreiberg. Vedovner og vedfyring – Hvordan sikre hygge, varmekomfort og miljø- og klimavennlighet. Forklaring med video. SINTEF blogg 24 mars 2021.

Øyvind Skreiberg. Status of wood stove technology and further emission reduction potential. Innoasis Science Talks, 9 February 2021.

Franziska Kausch, Øyvind Skreiberg, Morten Seljeskog. These simple tips will help you reduce your wood-burning stove's environmental footprint. SINTEF blog 8 February 2021.

Øyvind Skreiberg. Folk kan bli flinkere til å fyre rett med ved. Stavanger Aftenblad 22 januar 2021.

Øyvind Skreiberg. Vedfyring i et større perspektiv. SINTEF blogg 13 januar 2021.

Øyvind Skreiberg. Vedfyring i et større perspektiv. Stavanger Aftenblad 13 januar 2021.

Other news

Standardisation work

To ensure more efficient and sustainable products to the market the Ecodesign directive and the energy labelling regulation came into force 1st of January 2022 with stricter requirements to local space heaters, including wood stoves.
Besides requirements to efficiency also requirements are set to PM (particulate matter), CO, OGC (unburned hydrocarbons) and NOx emissions.
Ecodesign is supposed to be complemented by harmonised products. The harmonisation of the standard for roomheaters fired by solid fuels is still on hearing.
Opposite to the Norwegian standard NS3058/59, the actual and new proposed standard EN16510 does not require testing at low heat output which means the actual use of the stove is not tested. Without a harmonised test standard three test methods are available: heated filter, dilution tunnel and electrostatic precipitator. It can be assumed that only the heated filter method will be used, resulting in an underestimating of the real PM emission to air.
Franziska Kausch and Morten Seljeskog at SINTEF Energy Research are representing Norway in wood stove testing standardisation work.

Wood stoves sales are booming

High electricity prices have led to a boom in the sale of wood stoves in Norway, and the wood stove producers face the challenge of producing stoves fast enough. In addition to being the main heat source for many, wood stoves are an important security of supply backup for many more. When the electricity price goes through the roof, as it more frequently does in parts of Norway since we are part of the European electricity market, people tend for economic reasons to use more wood logs and less electricity for heating. This also results in a higher demand for wood logs and the suppliers have problems satisfying the demand, even if also the wood log price becomes higher. With heating oil being banned for space heating in Norway, the only real alternative to electricity for houses not connected to a district heating grid, is in fact wood stoves, which are completely dominating when it comes to non-electricity based space heating in Norway.

IEA Task 32 Biomass Combustion

A new IEA triennium (2022-24) has now started, and a number of new activities are planned in Task 32. The number of member countries in Task 32 in the new triennium restricts the activities, and final planning of activities was a topic on the most recent task meeting, in December 2021 and continued in January 2022.

There will be a focus on wood stoves also in the next triennium. The planned activities are:

- Substitution of fossil fuels in industry – case stories
- Overview of carbon capture connected to biomass combustion: technical options including small scale, systems and case stories
- CO_2-neutrality and sustainability of biomass combustion
- State-of-the-art of low emission biomass combustion for district heating plants
- The nitrogen cycle for biomass combustion plants
- State-of-the-art of residential biomass boiler systems
- Workshop on residential biomass combustion
- Strategies for reducing the impact on air quality from small scale wood combustion

The main activities in the previous triennium (2019-21) were:
- Workshop on improved combustion in stoves and small biomass boilers

To be finalized in the new triennium:
- Testing methods and real-life performance of pellet stoves
- Technical guidelines for design of low emission stoves
- Survey of national strategies for reducing the impact on air quality from residential and commercial wood combustion
- Biomass for process heat in industry

Moved to the new triennium:
- Workshop on experiences with combustion of pulverised non-woody solid biofuels
- Workshop on experiences with wood chips for large scale CHP production

Earlier, relevant deliverables were:
- Aerosols from biomass combustion
- Advanced test methods for firewood stoves
- Particle emission measurement techniques
- State of the art on innovative CHP concepts
- Strategic study for renewable heat
- Bioenergy for heat - the Hot Cases
- Workshop on Solid Recovered Fuels
- Workshop on Biomass Combustion Generated Nanoparticles
- Workshop on New Emission Measurement Methods

One recent and interesting task event regarding wood stoves was a webinar entitled "Residential Wood Combustion – Towards Low Emission Systems" arranged for presenting an upcoming task report with the title "Design of Low Emission Wood Stoves".

For information about IEA Bioenergy Task 32 activities, see the webpage and newsletters, and for IEA Bioenergy news, see the newsletters. Øyvind Skreiberg from SINTEF Energy Research is the Norwegian participant in IEA Bioenergy Task 32.

IEA Bioenergy publications/resources

Some recent publications:
2021 country reports on implementation of bioenergy, here, including for Norway.
Land use for bioenergy: synergies and trade-offs between Sustainable Development Goals, here.
How can biomass supply for bioenergy deliver multiple benefits and contribute to sustainable development goals?, here.
IEA Tracking Clean Energy Progress – biofuels/bioenergy, here.
Sustainability governance of bioenergy and the broader bioeconomy, here.
Applying a science-based systems perspective to dispel misconceptions about climate effects of forest bioenergy, here.
Bioenergy for climate change mitigation: Scale and sustainability, here,
The role of bioenergy for climate and sustainable development targets, here.
Campaigns questioning the use of woody biomass for energy are missing key facts, here.

IEA publications

Some recent publications:
Net Zero by 2050 A Roadmap for the Global Energy Sector, here.
Energy Technology Perspectives 2020, here.

EERA Bioenergy – SP4 Stationary Bioenergy

In 2020 an updated Strategic Research and Innovation Agenda (SRIA) was made for the whole EERA Bioenergy, and it serves as a guiding document for the EERA Bioenergy activities. For more info on EERA Bioenergy, visit the website, and see the newsletters. Julien Blondeau from the Free University of Brussels in Belgium is the leader of SP4 Stationary Bioenergy in EERA Bioenergy.

RHC technology and innovation platform

The European Technology and Innovation Platform on Renewable Heating & Cooling (RHC-ETIP) brings together stakeholders from the biomass, geothermal and solar thermal sector - including related industries such as District Heating and Cooling, Thermal Energy Storage, Hybrid Systems and Heat Pumps - to define a common Research, Development and Innovation strategy for increasing the use of renewable energy technologies for heating and cooling. Previously concrete work has been carried out by the Biomass Panel in the RHC-ETIP connected to giving input to the SET-plan issues paper on renewable fuels and bioenergy, as well as work connected to the Implementation of the biomass technology roadmap of the Biomass Panel. The aim of the latter was to update the progress in R&I priorities identified by the Biomass technology roadmap. This work continues through different efforts. Øyvind Skreiberg from SINTEF Energy Research is a member of the Biomass Panel Steering Committee.
For the three years period 2019-21 there has been a special focus on work to be carried out in horizontal working groups (HWG) that focus on contributing to 1) vision (finalized in 2019), 2) research and innovation priorities (finalized in 2020) and 3) deployment and implementation strategy (in 2021) documents. Øyvind Skreiberg has chaired the HWG 100% Renewable Buildings, where a number of members from the different RHC-ETIP panels have contributed to the HWG. The work progressed well and HWG 100% Renewable Buildings submitted in 2019 their contribution to HWG Vision 2050, which finalized the Vision 2050 based on input from all the HWGs, including also 100% Renewable Districts, 100% Renewable Cities and 100% Renewable Industry. In 2020, focus was on defining research and innovation priorities, and a Strategic Research and Innovation Agenda (SRIA) was finalized. In 2021, the focus was on developing an Implementation and deployment strategy, where a co-creation workshop was arranged dedicated to industry and research experts as well as public authorities, to identify and verify research & innovation trends and priorities of renewable heating and cooling sectors recently. The Implementation and deployment strategy has been finalized.
As a continuation of the SET-Plan work, workgroups were established to provide specific input to the SET-Plan work, e.g. Action 5 Energy Efficiency in Buildings with the sub-action 5.2 Heating and Cooling Technologies for Buildings and Action 8 Renewable Fuels and Bioenergy. The work and an endorsed implementation plan were finalized. Øyvind Skreiberg was involved in the Action 5 work, representing the Biomass Panel. The work is now continued, focusing on the implementation of the SET-Plan, both for Action 5 and 8.
Recently, a website was established for the Action 5 on buildings.

See the RHC-ETIP news webpage for other news.

Recent events

IEA Task 32 Webinar: Residential Wood Combustion – Towards Low Emission Systems, 6 May 2021.

30th European Biomass Conference & Exhibition, 9-12 May 2022, Marseille, France. + e-conference
http://www.eubce.com/

IConBM 2022, International Conference on BIOMASS, 5-8 June 2022, Naples, Italy.
https://www.aidic.it/iconbm2022/

Upcoming events
31st European Biomass Conference & Exhibition.
http://www.eubce.com/

IEA Bioenergy events.
https://www.ieabioenergy.com/iea-bioenergy-task-events/

Links (click on the links or logos to get there)
WoodCFD
SKOG22
Energi21
Renewable Heating and Cooling ETIP
EERA Bioenergy
IEA Task32 Biomass Combustion
IEA Task45 Climate and Sustainability Effects of Bioenergy within the broader Bioeconomy

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NTNU

JØTUL

Nordpeis

NORSK KLEBER 1893

norsk varme
Bransjeforening for miljøvennlige ildsteder og skorsteiner

The Research Council of Norway

SusWoodStoves

Increased sustainability for the wood stove value chain

Background
Wood log combustion is important in and for Norway and contributes much to residential space heating and relieves the pressure on the electricity grid, as well as provides energy security when the electricity grid goes down. However, wood log combustion contributes also to air pollution, and there is a need to increase the sustainability through stove, building integration and value chain optimization, which is the main project focus.

Goals
1) Speciation and quantification of particulate and gaseous emission levels from wood stoves for representative stove technologies and operating conditions,
2) Reduction of climate and health related emission levels through emission reduction and energy efficiency measures,
3) Optimum building integration of stoves,
4) Assessment of value chain performance of existing and improved stove technologies and connected systems for different stove-building configurations in Norway,
5) Techno- and socio-economic assessments of the current and future role of wood stoves in the Norwegian energy market,
6) Development of a roadmap for sustainable wood stoves in Norway,
7) Education of highly skilled candidates within this area and training of industry partners,
8) Monitoring of activities and state-of-the-art within this area and dissemination of knowledge to the industry partners, and other interested parties when applicable.

Project title: Sustainable wood stoves through stove, building integration and value chain optimization (SusWoodStoves)
Project leader: SINTEF Energy Research
Partners: NTNU, Jøtul AS, Nordpeis AS, Norsk Kleber AS, Norsk Varme
Project period: 2021-2024
Type: Knowledge building project for the industry
Financing: 18.6 mill. kroner (15.1 from Research Council of Norway)
Project number: 319600