IEA HPT TCP National Workshop Programme – Heat pumps in Norway - May 10, Oslo
0930 - 0935 **Welcome to Oslo**  
Rolf Iver Mytting Hagemoen, Secretary General, Norwegian Heat Pump Association,

0935- 0950 **A short introduction to the Technology Collaboration Programme on Heat Pumping Technologies by IEA (HPT TCP)**  
Stephan Renz, chairman HPT TCP

0950 - 1010 **The heat pump market in Norway**  
Rolf Iver Mytting Hagemoen, Secretary General, Norwegian Heat Pump Association,

1010 - 1030 **Potential for energy efficiency and heat pumps in Norwegian buildings**  
Synne Krekling Lien, researcher, SINTEF Community

1030 – 1050 **Analysing energy upgrading projects of single-family houses towards a Norwegian nZEB level**  
Laurent Georges, Associate Professor at NTNU

1050 - 1110 **Coffee break**
IEA HPT TCP National Workshop
Heat pumps in Norway

1110 - 1200 High-Temperature Heat Pumps (Annex 58)
Michael Bantle, senior researcher (PhD), SINTEF Energy Research

Why High Temperature Heat Pump?
Michael Bantle

Annex 58: High-Temperature Heat Pumps - State of the art, demonstration cases and development perspectives
Ole Marius Moen

SkaleUp: Industrial high temperature heat pump for simultaneous process cooling and heating
Christian Schlemminger

DryFiciency closed loop heat pumps: Operation experience and outlook
Michael Bantle

Outlook/Discussion: Steam producing heat pumps for electrification of process heat of up to 180degC

1200 - 1300 Lunch
IEA HPT TCP National Workshop
Heat pumps in Norway

1300 – 1400 **Geothermal heat pumps in Norway (Annex 52)**
Kirsti Midttømme, Chief Scientist, NORCE

**High Temperature borehole Thermal Energy Storage (HT-BTES) – Fjell School (Annex 52)**
Randi Kalskin Ramstad, Dr. ing, Consultant Asplan Viak, associate professor II NTNU

**Internet of Things for Heat Pumps (Annex 56)**
Veronika Wilk, Senior Research Engineer, AIT Austrian Institute of Technology
Ellika Taveres-Cachat, SINTEF Community

1400 – 1415 **Short break**
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1415 – 1505 Field studies and monitoring of commercial heat pump systems, what should have been improved? (Annex 52)
Jørn Stene, Dr. ing. Specialist heat pump and cooling systems at COWI AS

1505 – 1515 Short break

1515 – 1545 Heat pumps in district heating to utilize heat from a big data centre
Trond Berntsen, project manager Fortum Oslo Varme AS

1545 – 1600 What to do in Oslo and sights
Rolf Iver Mytting Hagemoen, Secretary General, Norwegian Heat Pump Association,
The heat pump market in Norway
Facts about Norway

• Norway is a country of mountain ranges, huge forests, vast empty expanses and only about 3% arable land.
• The population is approximately 5.3 million, around 1.2 million of whom live in and around the capital city, Oslo.
• Form of government: Constitutional monarchy
• Parliament
• EU membership: No
The Norwegian economy

The biggest source of national income is the extraction and export of offshore oil and gas. Other significant industries include fishing, steel, shipping and tourism.

Per capita GDP: €45,700 (2020)
Electricity production in Norway

1690 hydropower plants
88% of Norwegian production capacity

53 wind farms
10% of Norwegian production capacity

The total renewable share in Norway is 50.4 per cent, compared with 46.7 per cent in 2010.
Norwegian EV market

In 2021: 64.5 percent of all new cars sold were fully electric.
Electric ferries

At the beginning of 2021, there were 31 car ferries in electric operation in Norway.

A year later - at the beginning of 2022, there were 48 in operation.

Since the turn of the year, four more car ferries have been put into electric operation, so that there are now 53.

Another 20 ferries will be put into electric operation during the year.
About Norway and briefly about 2021/2022

- Highest electricity prices ever
- Fossil oil heating is prohibited for most buildings since 2020
- Fossil energy is prohibited in new buildings since 2015
- Gas heating is only available in a few places
- Fossil energy is still used in industry, but this will be phased out
- Electric heating is most common in Norway
- Many houses also have wood stoves
- High electricity prices increase the demand for heat pumps
- There is district heating in the cities and some smaller towns, yet less than in the other Nordic countries
- CO$_2$ price on fossil fuel and refrigerants
Pros and cons for heat pumps

**Pros:**
- Electricity prices low compared to fossil energy
- CO$_2$-taxes on fossil energy
- Fossil energy banned in new buildings
- Fossil oil banned in most buildings
- Energy labelling of buildings, BREEAM, FutureBuild etc promotes heat pumps
- Ambitious building owners choose heat pumps
- Many competent companies, installers and planners
- Subsidies for some heat pumps

**Cons:**
- Direct electric heating is common
- Building regulations does not give initiatives for heat pumps
- NZEB not implemented in building regulations
- Many incompetent companies, installers and planners
- No national strategy for energy efficiency in buildings
2021 vs 2020

• Total sales of heat pumps:
  • 2019 105 124
  • 2020 91 894
  • 2021 125 049

• An increase of 36% compared to 2020

• Fourth quarter 2021 compared to fourth quarter 2020
  • Air-to-air  + 60,70 %
  • Air-to-water  + 33,70 %
  • Brine-to-water + 29,90 %
  • Exhaust air 156,2%

• 2021 compared to 2020
  • Air-to-air  + 38,00 %
  • Air-to-water  + 2,5 %
  • Brine-to-water + 8,0 %
  • Exhaust air 29,9%
Distribution of heat pumps in Norway

- In the period 1987 - 2020, almost 1.4 million heat pumps were sold in Norway
- Air-to-air: approx. 1.25 million
- Air-to-water: over 50,000
- Brine-to-water: over 55,000
- Ventilation heat pumps: over 20,000

- More than 1.1 million heat pumps are in operation - more than 10 TWh of ambient heat.
Trend projection for heat pump sales

Number of heat pumps sold per year

Number of heat pumps sold by type, trend projection

- Air-to-water
- Brine-to-water
- Exhaust air
- Air-to-air (right axis)
How many heat pumps are in operation?

Heat pumps in operation in homes vs. the housing stock (detached houses, terraced houses and holiday homes), 2020

Building mass

Heat pumps in operation in total

Number of heat pumps in operation, 2020 - estimate

Air-to-air

Air-to-water

Brine-to-water

Exhaust air