Denmark aims for reducing CO₂ emissions by 70% by 2030, while a major share of the CO₂ reductions from industries should be achieved by converting industrial process heating to heat pump-based systems. The Danish industry has therefore a strong interest in high-temperature heat pump systems and is represented by 6 partners in the Annex 58.

The Danish working group is coordinated by the Center for Refrigeration and Heat Pump Technologies at the Danish Technological Institute (DTI). DTI is a leading research and development institute for industrial heat pump systems with advanced testing laboratories and has a strong focus on developing optimal solutions for technology suppliers and end-users. Besides the Annex on HTHP systems, DTI is coordinating and contributing to various national and international R&D activities focusing on decarbonizing industrial process heating and accelerating the transition towards more sustainable industrial productions. DTI is coordinating both the national working group as well as the international Annex 58.

FENAGY and Johnson Controls are involved as technology suppliers. Johnson Controls is a leading company for industrial heat pumps and refrigeration systems, providing sustainable solutions for a wide range of customers. FENAGY is an emerging company providing CO₂ systems for applications in industrial heating and cooling and district heating.

Rambøll is a leading engineering-, design- and consultancy company providing services within industrial heat pumps and refrigeration systems and is actively involved in the transformation of the energy systems towards increased sustainability. Viegand & Maagøe is a consultancy company actively creating the green transition and is involved in various consultancy projects concerning heat pumps, as well as development projects facilitating the electrification of the Danish industry.

DTU Mechanical Engineering is involved as research institution with the section of Thermal Energy, which is acknowledged for their expertise in modelling of heat pump and refrigeration systems, energy systems and industrial processes. DTU Mechanical Engineering has a long-track record of R&D projects in the field of industrial heat pumps and electrification of industry.

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Most relevant ongoing or finalized R&D projects of the national team partners:


• **SteamHP - Water vapor-based heat pump systems**, 2019 – 2022, Project partners: DTI, Rotrex, Johnson Controls, Pentair, Krammer Innovation

• **High-temperature Heat Pump for Tunnel Oven**, 2020 – 2022, Project partners: DTI, Flexmatic, CS Techcom, SANONOVO, Hamburg Vacuum


• **CO2MIX4Heat – Future heat pump for small and medium sized district heating using CO2 and mixtures as refrigerant**, 2021 – 2023, Involved partners: DTI, Danfoss, Fenagy, Güntner, Aarhus University, Dansk Fjernvarme, Vahterus

• **THERMCYC – Advanced thermodynamic cycles utilising low-temperature heat sources**, 2014 – 2019, Involved partners: DTU Mechanical Engineering & Chemical Engineering, DTI, Viegand & Maagøe, AP Møller Mærsk, Danfoss, Arla, Alfa Laval Sweden, Technische Universität München, Delft University of Technology, Aalborg University, Alfa Laval Aalborg and MAN Diesel & Turbo


• **Symposium about High-Temperature Heat Pumps**, Approximately every second year: 2017, 2019 and 2022, Organizing Committee: DTI, DTU, SINTEF

• **Electrification of processes and technologies in the Danish industry**, 2019 – 2021, DTI, Viegand Maagøe, DFD, CP Kelco, SAN Electro Heat, Labotek

• **Electrification of the food and beverage industry**, 2020 – 2022, Project partners: Landbrug og Fødevarer, Dansk Industri, Dansk Energi, DTU, Viegand Maagøe