Fuels, Combustion Chemistry, and Internal-Combustion (IC) Engine Technologies: Research and Impact on Finland –seminar Program

9:30	Opening, Arkke Eskola, University of Helsinki
9:40	**Issues of various alternative fuels for IC-engines**, Katriina Sirviö, University of Vaasa
10:05	**Optical diagnostics: a look inside the IC-engine cylinder**, Martti Larmi, Aalto University
10:35	**Future sustainable shipping and energy production including engines**, Christer Wik, Wärtsilä Oyj
11:00	**Investigating the ignition mechanism in ultra-lean gas engines using detailed chemistry simulations**, Anders Brink, Åbo Academy University
11:25	Break
12:15	**Industry taking action on climate change**, Jenni Nortio, Neste Oyj
12:40	**Plenary presentation on Combustion Modelling**, Snehasish Panigrahy / Henry Curran, NUI Galway, Ireland
13:25	**Large-Eddy Simulation of dual-fuel ignition: phenomena and control**, Ville Vuorinen, Aalto University
13:45	Closing

Transportation Energy – Motivation

- Transportation is the largest oil-consuming sector today, accounting for a fifth of global energy demand and a quarter of energy-related CO_2 emissions. Over the outlook period 2018 – 2040, the car fleet increases by 80% to over 2000 million with some 300 million electric cars on the road in 2040. However, the car fleet needs fuel less than 20% higher than today. **This is a result of *energy efficiency* gains, and to a lesser extent, the uptake of electric cars (= HEV + PHEV + BEV). Higher efficiency leads to better use of biofuels, for which sustainable feedstock is limited.** IEA 2018: World Energy Outlook 2018
- The EU's transportation sector depends very significantly (> 94 %) on oil, of which 93 % is imported, with Russia the main source.
- There is significant, world-wide interest to produce sustainable advanced biofuels from nonedible sources, including waste oils and animal fats as well as lignocellulosic agricultural and forestry residues.

IC-engines & fuels – Companies and Research in Finland

- In Finland we have significant *marine, power/power-plant, and off-road* IC-engine research, development and manufacturing companies (Wärtsilä, AGCO Power).

- Renewable diesel and ethanol production are growing businesses in Finland and elsewhere. Neste is the world's leading supplier of renewable diesel. Recently UPM started own renewable diesel production from crude tall oil (a residue of pulp production) while St1 has concentrated on ethanol production from waste streams.

- In Finnish Universities we have significant research in areas of biofuels and their production, combustion chemistry and kinetics, as well as in IC-engine simulations and diagnostics. Here today we have presentations on these areas.

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