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Gas Expertise in the University of Vaasa

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22.3.2018

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VEBIC

Vaasa Energy Business Innovation Centre

- Research platform for multidisciplinary research
  - Technology, business, societal issues
- Laboratories:
  - Fuel laboratory
  - Three engine laboratories
  - Geoenergy storage

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VEBIC

Vaasa Energy Business Innovation Centre

- Two boards:
  - VEBIC advisory board
    - Some 30 executives representing business and public administration
  - VEBIC scientific board
    - Five international academics support and contribute to the strategic research agenda

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VEBIC financing

- University of Vaasa
- Tekes
- ABB
- Citec
- Danfoss/Vacon
- Leinolat
- Pohjanmaa Chamber of Commerce
- Vaasa Parks
- Vaasan Sähkö
- VEO
- Wapice
- Wärtsilä Finland
- Syrenius foundation
- Ministry of Education and Culture

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Laboratory concept

- Wärtsilä supplies two large engines for the research laboratory use
- Smaller engines, as well, plus large electric equipment
- Fuel laboratory in close cooperation with engine laboratory and regional chemistry laboratories
  - Unique combination of fuel and engine research

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Research objectives 1/2

- Flexible power generation
  - Hybrids, digitalization
  - Fuel flexibility, renewable fuels and blends, combustion
- Improvement of energy economy and emissions performance
- Fault diagnostics and tolerance, enhanced reliability

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Research objectives 2/2

- Improved electric equipment and automation of engine-driven power plants
- Validation of new systems
- Research services for the academic community, domestic and international companies and research institutes

- Gas engine power plants are excellent regulation power producers when more and more intermittent power generation is used (e.g. wind, solar)

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FLEX^{e}/Hercules-2

- 2015-2018
- UV studied how to abate methane slip of gas engines by improving the catalyst and catalyst endurance.
- The main target was to study hydrogen inclusion into noble metal catalysts and to investigate how it will regenerate the catalyst.
- The engine tests were performed in co-operation with VTT and conducted in Espoo in 2016 and 2017.
- As a result, hydrogen seems to improve the methane slip abatement.
- More results and other means are still needed.

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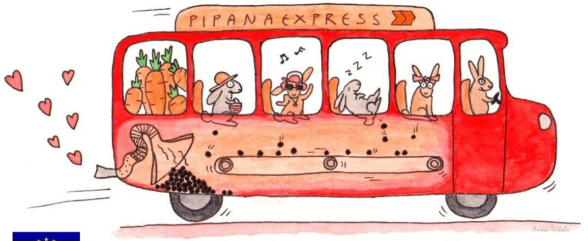
BIL – Biokaasulla liikenteeseen



- 2016–2017
- Economic and material preconditions for the extension of biogas production in the Ostrobothnia region
- Awareness of the possibilities of using biogas in all kind of vehicles
- The use of rural renewable resources promoted
- Closely related to the bio- and circulation economy and the GHG reduction

- Contact:

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TransAlgae

www.biofuelregion.se/transalgae

Production of algae for a fossil free future

- Botnia-Atlantica innovation project 04/2016–03/2019
- SLU (lead), Biofuel Region, Nattviken Invest, NIBIO, Mid Sweden University, Novia UAS & University of Vaasa
- Cultivation of algae in wastewater and flue gases for products and energy
- Novia investigates biogas, mainly as biochemical methane potential (BMP) and pretreatment effects
- Since energy balance is still problematic, using the whole algae or waste from extraction by anaerobic digestion is necessary
- Contact, biogas in TransAlgae (Novia): Project leader andreas.willfors@novia.fi +358447805738

BMP equipment at Novia UAS in Technobothnia, Vasa, two units of AMPTS II, Bioprocess Control

EUROPEAN UNION Interreg Botnia-Atlantica European Regional Development Fund

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Biogas tractor research

- In a project called: Biokaasupilottiympäristön ja osaamisen jakamiskonseptin luominen Suupohjaan
- 2017-2019
- Future legislation of biogas use in off-road machines
- Measurements of exhaust pollutants of a biogas driven tractor

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SUUPOHJAN AMMATTI-INSTITUUTTI

ETELÄ-POHJANMAAN LIITTO
REGIONAL COUNCIL OF SOUTH OSTROBOTHNIA

Vipuvoimaa EU:lta 2014–2020

Euroopan unioni
Euroopan aluekehitysrahasto

Gas CoE – National Gas Cluster of Excellence, 01/2017-12/2018

- Advanced power plant engine technology for future energy systems in VEBIC
  Experimental gas research and demo activities

- Ready plans for gas pipes and storages
  - Biomethane
  - Liquified petroleum gas (LPG)
  - Gas mixtures

- Next generation gas engine research: max. pressure 20 bar, stable temperature

- Building 2018-2019

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Research services – gas 1/2

- Academic research, pilots
- High-speed and medium-speed engine experiments
  - Performance and emissions
- After treatment systems
  - Conversion efficiency
  - Endurance tests

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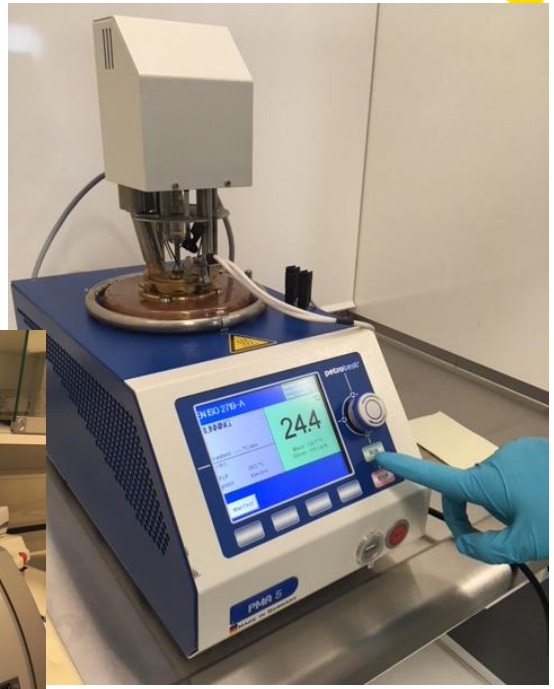
Research services 2/2

- Fuels and lubricants
  - Comprehensive analyses
  - Improvements with modifications



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Thank you!

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