



Karelia

University of Applied Sciences

Markus Hirvonen



Renewable energy systems and transfer of knowledge

Content

- Karelia in numbers
- Bioenergy and circular economy knowhow
- Bioenergy studies

Karelia

Students

3867

Completed
degrees in
2019

742

International
degree
students

160

Personell

303

Degrees

22

Exchange
students

135



Karelia knowledge base

- Degrees in:
 - Energy and Environmental technology
 - Forestry management
 - HVAC engineering
 - Wood construction engineering
 - Machine building
 - ... and many others
- Renewable energy systems and carbon neutral energy solutions is the umbrella for many different degree programmes

R & D division

- Karelia bioenergy and circular economy personell have established themselves as a reliable and professional partner in many national and international projects
- Energy laboratories
- Small but efficient team of 7 experts in the field of renewable energy solutions with skills in
 - Forestry
 - Renewable energy technologies
 - HVAC integration
 - Circular economy
 - Life Cycle Assessment

Bioenergy feasibility studies

- Long term work with small to medium scale heating plants and district heating networks and biomass supply chains has created extensive know how in the field of biomass to energy solutions
- Especially the co-operation with LUKE / Lauri Sikanen and their team has been extremely valuable and created synergies for both organizations

Examples of completed bioenergy feasibility studies outside of Finland

- Many first nation sites in Canada
- Three sites in Portugal
- Small town in Romania
- Partial feasibility studies in various international projects

Common things with all studies

- Regardless of the site or country that we are operating is the question: **What is the optimal use of biomass in given region?**
 - It always boils down to that basic question
 - It's the same in Finland, Portugal, Canada and Chile etc
- We are providing the answer within the biomass to energy field which can be benchmarked against other utilization alternatives

Different things with the studies

- Every feasibility study is different
 - Biomass stock is different
 - Utilization options / industry is different
 - Cultural acceptance of biomass utilisation varies
 - Cultural acceptance of district heating system varies
 - Legislation varies
 - Price level of competing energy sources
 - Energy balance of the area is different are different
 - **What is done in Finland wont suit all regions or cases**

How to start the project

- Community engagement is vital
- Basic understanding of the biomass heating systems and district heating is needed
- Clear point of contact and resources to acquire building data, actual energy pricing, forestry or feedstock data etc

During the project

- Usually site visit is vital to meet the operators and experience the surroundings in order to truly understand the case
- Biomass feedstock sustainability, fuel supply chains and pricing is one of the most important thing
- Energy balance and proposed district heating system layout is presented and sizing of the boilers and network is being conducted
- A lot of communication with local experts is needed which usually leads to very interesting and valuable conversation and grass root knowledge transfer

The outcomes

- With the knowledge of supply chains and energy production systems we are able to comprehensively assess the feasibility of biomass based energy solutions
- The provided data enables deeper understanding of their own resources and possibilities to reduce the amount of imported fuels and keep the money circulating in local economy
- Luke and Karelia are also among the beneficiaries as we gain deeper understanding of the operational environment that we can use in benefit for all feasibility study cases

Final words

- Proven international co-operation and extensive knowledge base with bioenergy and renewable energy systems
- Open for EU projects of all sorts and also Expert sales services

Thank you 😊



Contacts

Markus Hirvonen

Projektiasiantuntija | Project Specialist

Karelia ammattikorkeakoulu | Karelia University of Applied Sciences

markus.hirvonen@karelia.fi

+358 50 315 6503





**Let's craft a
better tomorrow.
Together.**