

Luke's Annual Review 2016

GROWTH AND WELLBEING
FROM SUSTAINABLE BIOECONOMY




Luke
LUONNONVARAKESKUS

Content

Luke – Natural Resources Institute Finland	4
A few words from Luke's leaders	5
Year 2016 in numbers	6
Locations in Finland	7
LUKE research programmes:	
Boreal Green Bioeconomy	8
Blue Bioeconomy	9
Innovative food system	10
Biosociety	11
Customer funded activities	12
Statutory and expert services & statistics services	13
Financial highlights	14
Scientific activity	15

LUKE HAS LONG TRADITIONS

1898 MTT Agrifood Research Finland is founded

1917 Finnish Forest Research Institute (Metla)

1971 Finnish Game and Fisheries Research Institute (RKTL)

1993 Information Centre of the Ministry of Agriculture and Forestry (Tike)

2015

MTT, Metla, RKTL and Tike's statistic services are merged. Natural Resources Institute Finland (Luke) is formed.

Luke – Natural Resources Institute Finland

LUKE BOOSTS

-  New biobased products and business opportunities
-  Evidence base for decision making
-  Productivity by digitalization
-  Healthier food profitability
-  Regional vitality by circular economy
-  Well-being from immaterial values

RESEARCH

Luke is research and expert organization with expertise in renewable natural resources and sustainable food production.

INNOVATIVE SOLUTIONS

Luke provides innovative solutions for new business opportunities based on natural resources.

OUR STRENGTHS

Our strengths are in sustainable production and use of natural resources and thorough knowledge of bio-based raw materials.

A few words from Luke's leaders



MARI WALLS

PRESIDENT AND CEO

"This year we have proceeded in building a network of partnerships in Europe. We started an exchange and mobility programme for scientists and are in the process of establishing targeted, programme-based co-operation with our European sister organisations.

We have also invested significantly in research infrastructure. The 3 million euro recirculation aquaculture system at the Laukaa experimental site will provide both research and a world-class, low-threshold facility for testing and developing new techniques and innovations for our business partners."



JOHANNA BUCHERT

EXECUTIVE VICE PRESIDENT, RESEARCH

"In 2016 Luke's research activities resulted in several publications in high-impact international journals like Science and Nature. Scientific excellence in our focus areas, forest bioeconomy and agricultural production, clearly benefit our customers in Finland and internationally. We have also participated actively in public discussions on bio-based economy on both national and EU levels, and sought to provide a scientific base to topical issues like forest biomass availability."

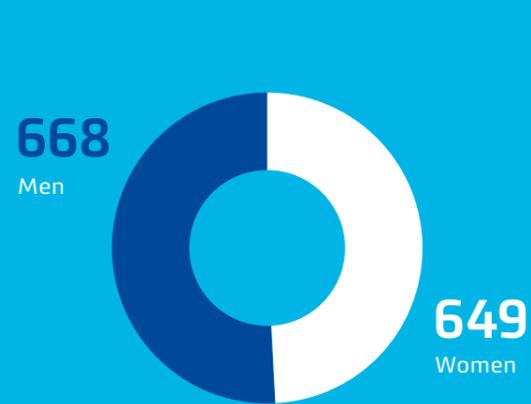


JUTTA KAUPPI

VICE PRESIDENT, CUSTOMER SOLUTIONS

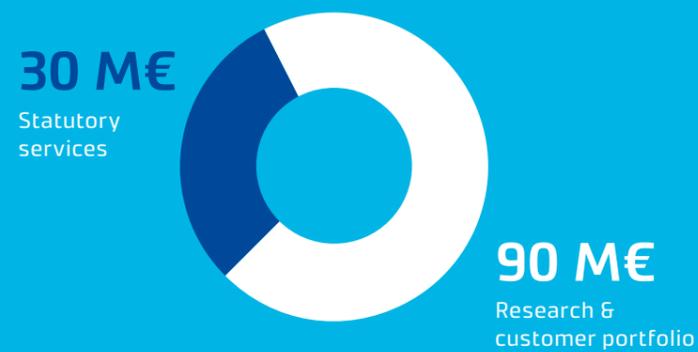
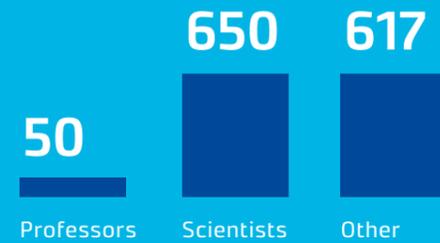
"This has been a year of sustainability. New emerging fields grew interest in investing and assessing economic and sustainable value in natural resources. Luke's tools for measuring these key indicators have benefited investors, banks and other new business areas. We have also helped businesses in finding new components and side streams for bio-based industry. For example, excess heat can be integrated into greenhouses and fish farms. As an exceptionally multidisciplinary research institute we are well-equipped in building up these new industrial symbioses."

YEAR 2016 IN NUMBERS



1317

EMPLOYEES



120 M€

TURNOVER

INTERNATIONAL ACTIVITIES

Nordic and EU countries, North America, South America, Africa and Asia.



25

LOCATIONS IN FINLAND

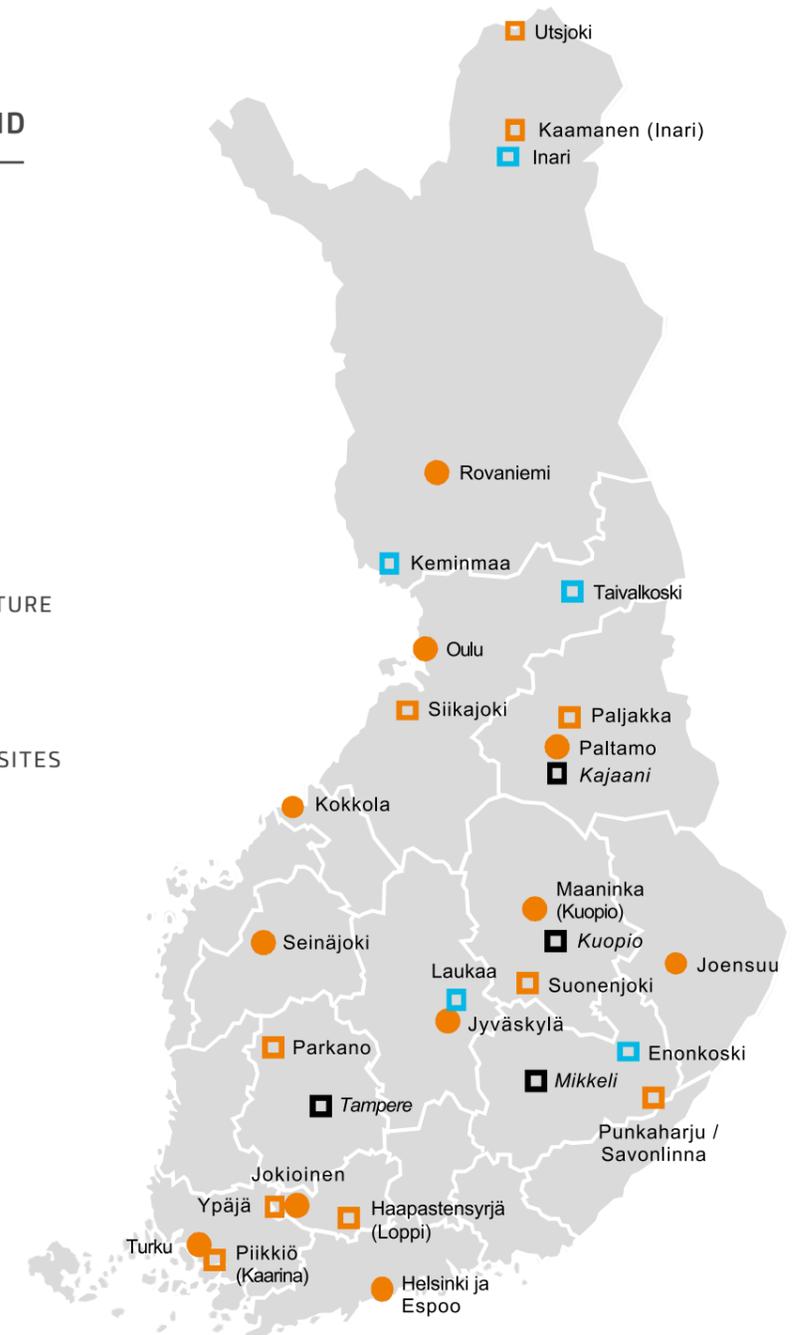
11
RESEARCH LOCATIONS

9
EXPERIMENTAL STATIONS

5
AQUACULTURE INFRASTRUCTURE

4
RESEARCH CO-OPERATIONS SITES

LUKE IS PRESENT AT 11 UNIVERSITY CAMPUSES IN FINLAND.



RESERCH PROGRAMME 1/4

Boreal Green Bioeconomy

promotes sustainable use of renewable resources in a fast-paced operating environment.

Our objective is to secure growing and stable forest and field biomass as raw material, create new products, energy and services from such raw materials and develop the production and refining processes of the bioeconomy. We seek to improve the biodiversity of forest and field ecosystems and to increase flexible planning of biomass use.

KEY PROJECTS

DIABOLO

EU-funded, 33 partners

AIM

To produce more accurate, harmonised and timely information on European forest resources.

IMPACT

The first results of identifying the demand, provision, flows and gaps in forest data at different political levels were presented.

WAMBAF

EU-funded, 9 partners

AIM

To reduce nutrient and mercury export from forestry to streams, lakes and the Baltic Sea.

IMPACT

E.g. new digital wet area maps, guidelines for drainage and riparian forests, including best practises from countries in the Baltic Sea Region.

Forecas 2

development co-operation project, 2 partners

AIM

To build capacities for novel approaches in sustainable management of forest and wood resources in Mozambique.

IMPACT

Providing information and know-how on utilising resources from natural forests in a sustainable way. Wood and other plant-based raw material will be used by local small-scale industries.

NOW

105 million cubic meters



IN THE FUTURE

150 million cubic meters



KEY FIGURES

Funding 34 million euros, 240 projects.

IN 2016 WE FOCUSED IN PARTICULAR

on providing a scientific foundation for Finland's energy and climate strategy and creating a roadmap for the digitalisation of bioeconomy, solutions for sustainable forest use and climate policy.

RESERCH PROGRAMME 2/4

Blue Bioeconomy

provides comprehensive support for businesses based around waterways and water, such as fish and algae farming, fishing and the use of new technologies and by-products.

We promote the use of waterways as an environment that can support wellbeing and recreation and develop new products and services based on the use of water.

KEY PROJECTS

Freshabit

EU-funded, 30 partners

AIM

To improve the conservation and ecological status, management, and sustainable use of freshwater habitats.

IMPACT

We examined e.g. the state of freshwater pearl mussel populations in built freshwater habitats.

FISHBOOST

EU-funded, 26 partners

AIM

To improve the main components of breeding programmes for the main six fish species produced in Europe.

IMPACT

We looked at replacing fish powder with insect powder in animal feed in order to increase competitiveness and decrease the pollution load.

SmartSea

funded by the Strategic Research Council of Academy of Finland, 7 partner organisations in Finland and Sweden

AIM

To provide a science-based guidance and new innovations for sustainable use of Finland's marine resources.

IMPACT

We started developing an open-source decision-making tool for sea area planning.

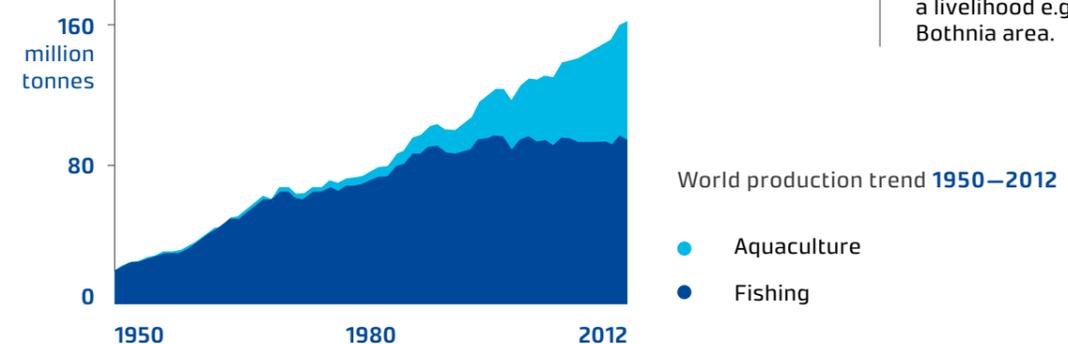
The tool will enable the growth of fishing industry as a livelihood e.g. in the Gulf of Bothnia area.

KEY FIGURES

Funding 10 million euros, 120 projects.

IN 2016 WE FOCUSED IN PARTICULAR

on preparing a roadmap for boreal blue bioeconomy for the Nordic Council of Ministers and a national plan for the development of blue bioeconomy. We worked on finding commercial applications for algae, creating added value products from blue biomasses, and utilising side streams of forest industry and blue bioeconomy.



RESERCH PROGRAMME 3/4

Innovative food system

supports a sustainable, profitable and innovative food chain at every stage.

Our objective is to produce healthy and sustainably produced food, support a circular economy in the food system and use digital and smart technologies at different stages of the chain. We aim to achieve an internationally competitive and responsible food chain and wellbeing of consumers.

KEY PROJECTS

Prominent

EU-funded, 9 partners

AIM

To develop technologies for concentration of proteins from solid and liquid side streams of wheat and rice processing.

To improve protein ingredient functionality for new sustainable high-protein food concepts with added consumer value.

IMPACT

We created solutions for the global need to increase dietary intake of plant protein.

SOLID

EU-funded, 25 partners

AIM

To identify obstacles to organic and low-input dairy farming systems, which deliver multifunctional benefits to the agricultural industry and society

IMPACT

We delivered an innovative toolbox of novel methodologies that will contribute to the competitiveness of the dairy industry.

FUSIONS

EU-funded, 21 partners

AIM

To decrease food waste by 50 percent by 2020 with social innovations

IMPACT

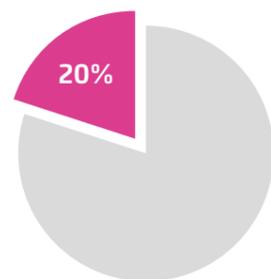
So far we have analysed policies related to food waste in different EU countries and developed instructions for defining and assessing food waste.

KEY FIGURES

Funding 19 million euros, 200 projects.

IN 2016 WE FOCUSED IN PARTICULAR

on promoting sustainable primary animal and plant production, more sustainable diets, smart use of food raw materials, development of end-product driven primary production concepts e.g. in novel plant-based food products, and urban food production by soil-free technologies. We researched gluten-free production systems, processing and commercialisation options project includes primary production, food processing and economic analyses.



Around 20 percent of food is wasted annually in the EU.

RESERCH PROGRAMME 4/4

Biosociety

studies and advances bioeconomy and the societal changes it requires.

We influence the formation of policies for the sustainable and acceptable use of renewable natural resources, the functioning of the markets, the spreading of new technologies, business models, and practices that will ensure balanced societal and regional development.

KEY PROJECTS

KILPA Competitiveness of the Finnish Food Supply Chain

funded by the Finnish government, 1 partner

AIM

To analyse the elements of success in food supply chain, its international competitiveness and factors that influence it in the Baltic region

IMPACT

A range of suggestions for businesses, decision-makers and stakeholders

BALANCE

funded by the Academy of Finland, 2 partners

AIM

To produce new ways of intermediation for local politics in the new detached housing areas in rural-urban interaction zones

IMPACT

Identifying and strengthening policies, governance systems and practices that contribute effectively to smart, sustainable and inclusive growth

KEY FIGURES

Funding 13 million euros, 155 projects.

IN 2016 WE FOCUSED IN PARTICULAR

on alternatives for the Transatlantic Trade and Investment Partnership agreement (TTIP) and the impacts on the agrifood sector to help stakeholders in preparations for the trade talks between the US and the EU. Our simulation models worked as the basis for the development scenarios that are used for decision-making in climate and energy policy.

Adaptation actions for the changing Arctic (AACAA)

funded by the Prime Minister's Office, 3 partners

AIM

The research project looked into environmental and socio-economic changes in Arctic region.

IMPACT

We provided decision-makers and other actors in the Arctic region with information on changes, their impact, adaptation and actions required by adaptation.



The time trans-Atlantic trade in agriculture and food products has been profitable for the EU.

Customer-funded activities

The academic efforts and technological research and development of the Natural Resources Institute Finland result in new services and added value for sustainable business activities based on renewable natural resources.

Highlights from customer activities:



FOREST

Kesla Inc. and Luke studying wood-chipping technology and comparing a new hybrid chipper to traditional chippers.

Luke helped in research to determine the productivity and fuel consumption of the hybrid chipper, as well as the quality of the chips from different raw materials.



FOOD AND RETAIL

Ecological, economical and healthy - rapeseed oil keeps rainbow trouts going.

Luke managed to replace fish oil with rapeseed oil without compromising the quality of the rainbow trout. In collaboration with the value chain, Raisioagro made plans on how to apply the results and launched a Finnish consumer fish brand, Benella Kirjolohi, which the Finnish fish farming industry is already making extensive use of to improve its competitiveness.



ENERGY AND CHEMISTRY

Rec Alkaline Oy and Luke have examined the possibilities of using the manganese and zinc separated from alkaline batteries as a source of nutrients for field crops. The collaboration has resulted in the development of a nutrient solution used for fertilisation.



AGRICULTURE AND AQUACULTURE

The study by Luke was used to create a set of competitiveness indicators, with approximately 15 key figures. These key figures were then compared between the eight countries located around the Baltic Sea.

Statutory and expert services & statistics services

produces expert services, information, data resources and statistics for the sustainable use of natural resources and decision-making in bioeconomies.

IN 2016 WE FOCUSED IN PARTICULAR on supporting knowledge driven governmental decision-making and related international processes in the field of sustainable use of natural resources. The expert services and information also supported business activities and piqued interest from both the media and the public. We provided information and expertise on greenhouse gas reporting to support actions in LULUCF-sectors based on the Paris climate agreement and gave international scientific advice to support sustainable use of Baltic Sea fish resources.

KEY PROJECTS

DIGITALIZATION OF MOOSE DATA production and web service in collaboration with Finnish Wildlife Agency. The service reached utilization rate higher than 90 % in first year of operation.

APPLYING GENETIC METHODS to produce more accurate estimation of wolf population size.

SCENARIO ANALYSIS about the ecological sustainability (biodiversity) of the Finnish forestry with increased use of forests.

TESTING OF PLANT PROTECTION products and chemicals was developed and negotiated with the industry in such a way that a part of the results is available for the public.

53

statistics, statistical studies and follow-ups, of which

36

belong to the Official Statistics of Finland

142

statistical releases

Additionally, information on agricultural price comparison in the EU was published.

2

online publications on bioeconomy in cooperation with the Ministry of Agriculture and Forestry's bioeconomy strategy project



In the beginning of 2016, the Natural Resources Institute Finland published its first E-yearbook of food and natural resource statistics. The statistics were for the year 2015.

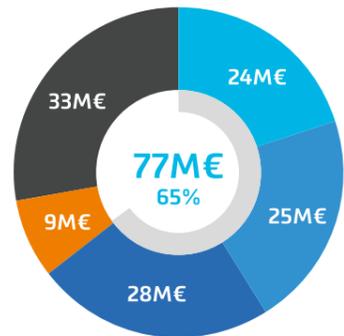
Financial highlights

FINANCIAL STRUCTURE 2016

	%	M€
Budget funding	65 %	77,1
Co-financing and collaborations	26 %	30,3
Revenue services	7 %	7,9
Other profits	3 %	3,5
TOTAL EXTERNAL FUNDING	35 %	41,7

EXPENCE STRUCTURE 2016

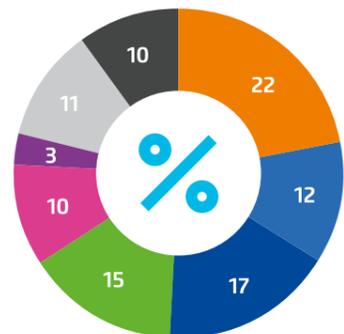
	%	M€
Human resources	65 %	76,8
Services purchases	14 %	16,5
Premises rent	9 %	11,1
Supplies and goods	5 %	6,1
Other expenses	6 %	7,0
Investments	1 %	1,3
TOTAL	100 %	118,8



- Statutory services
- Self-financed share of public pre-competitive research
- Strategic research
- Customer funding
- Public pre-competitive funding

77 MILLION € BUDGET FUNDING FUNDING, TOTAL 119 MILLION €

FUNDING SOURCES



- Natural Resources Institute Finland (Luke)
- Academy of Finland, Tekes – the Finnish Funding Agency for Innovation, Strategic Research Council
- Ministries
- Funds, foundations and organizations
- Companies
- EU and Nordic
- Other foreign
- Regional and structural fund

Scientific activity

715

On-going research projects

2 094

articles and reviews published between 2012-2016 on the Web of Science database

66

EU-funded international projects

570

Scientific peer-reviewed articles published in 2016

40

Applications for the EU H2020 funding

13 881

References to articles and reviews by Luke's researchers

13%

success rate

GET IN TOUCH AND JOIN US!



www.luke.fi



www.facebook.com/Luonnonvarakeskus



twitter.com/LukeFinland



[www.linkedin.com/Natural Resources Institute Finland \(Luke\)](https://www.linkedin.com/Natural Resources Institute Finland (Luke))



www.youtube.com/lukefinland

Blogs

www.luke.fi/blogi/

Customer magazine Leia

www.luke.fi/leia/

Newsletter

www.luke.fi/uutiskirje/

Publication series: Natural Resources and Bioeconomy

www.luke.fi/en/publications/

Events

www.luke.fi/tapahtumat/

