The Finnish forest bioeconomy objectives challenge science-business interaction

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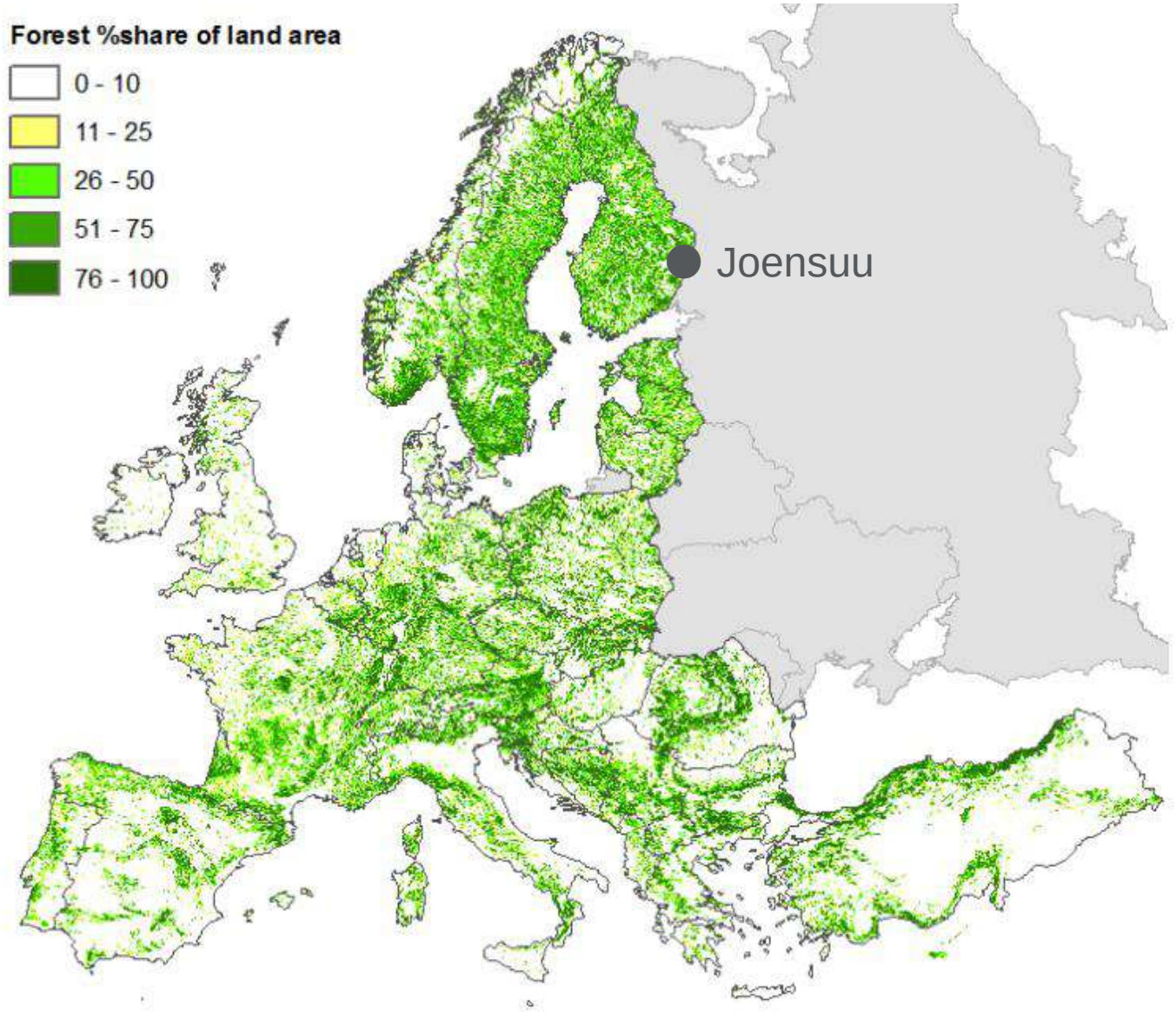
Contents of the presentation

- My background
- Finnish forest bioeconomy - development, structure and future goals
- Activities to increase science-business interaction

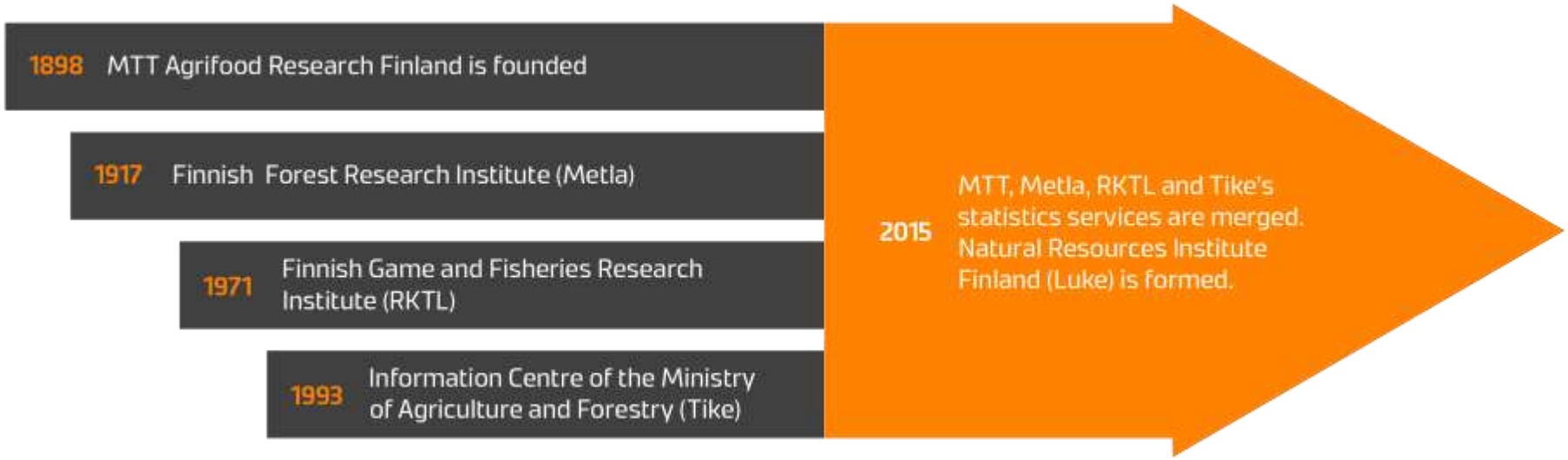
Finland’s forest cover in European context



Joensuu – Center for forest bioeconomy

Forest capital of Europe

Luke – based over 100 years of research excellence



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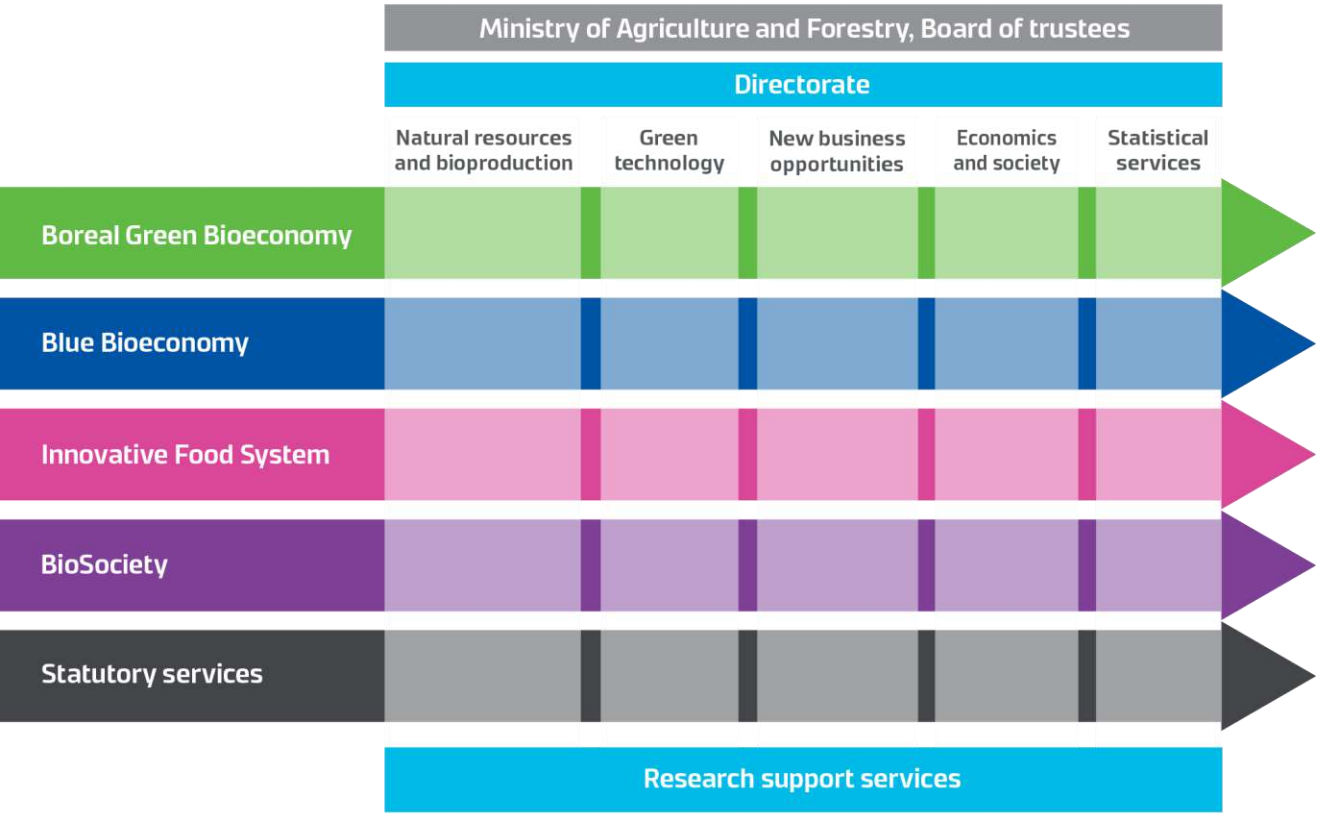
Growth and well-being from sustainable bioeconomy



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

120 M€
Turnover

100 M€
Research & customer portfolio

20 M€
Statutory services

25
Locations in Finland

HQ in Helsinki

Present in 11 campuses with universities, research institutes and polytechnics

1300
Employees

50 research professors
650 researchers

We are one of the four Statistical Authorities in Finland.

We contribute for the European Statistical System and for the international statistical framework for the UNECE and OECD statistics.

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forest.fi

FINLAND AND HER FORESTS IN A NUTSHELL

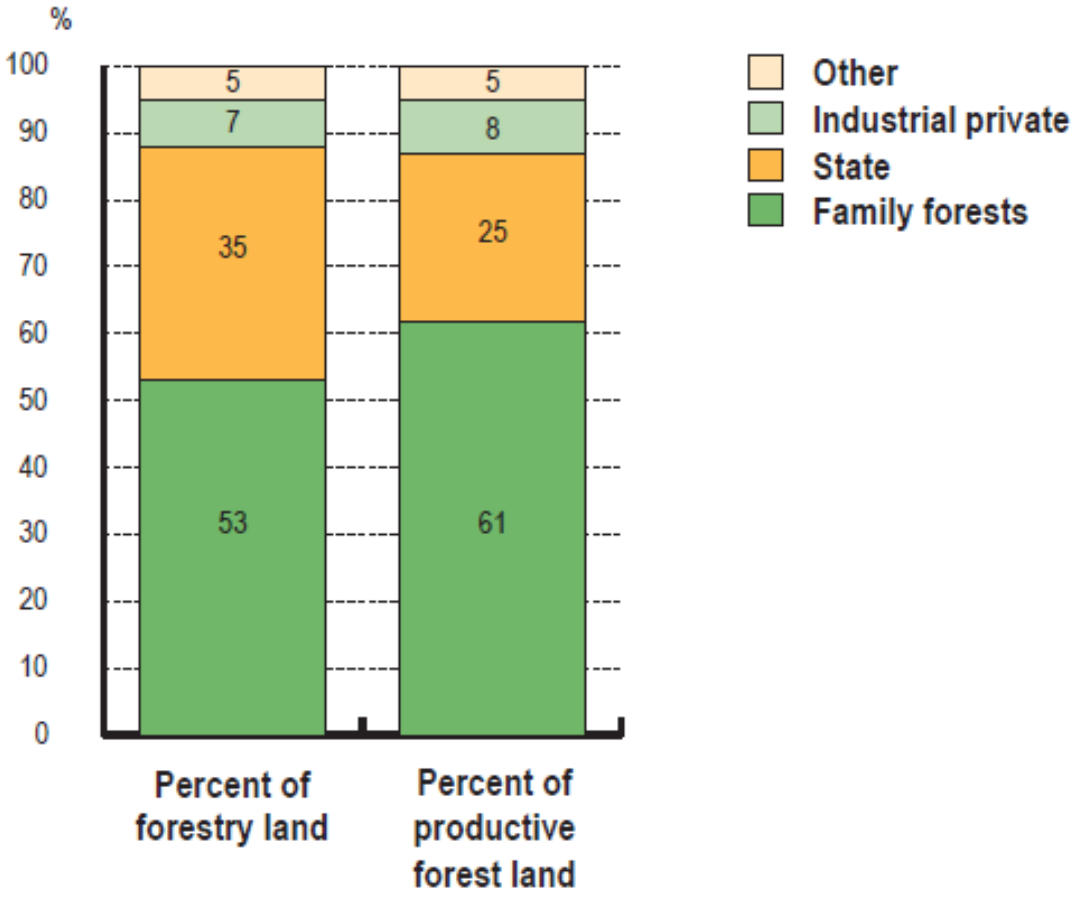
TOTAL AREA	33.8 mill. ha
Water	3.5 mill. ha
TOTAL FOREST AREA	26.2 mill. ha
Share of land area	86 %
Productive forest land	20.3 mill ha
Low productive forest land	2.5 mill. ha
Other forestry land	3.2 mill. ha
Logging roads etc.	0.2 mill. ha
Family forests	53 %
State-owned	35 %
Industry-owned	12 %
POPULATION	5.5 mill
FOREST PER PERSON (productive and low productive forest land)	4.1 ha
PROTECTED FORESTS	2.7 mill. ha
Share of productive and low productive forest land	12 %

STANDING TIMBER STOCK	2,356 mill. m^3
FOREST GROWTH PER YEAR	105.5 mill. m^3
LOGGINGS PER YEAR	70 mill. m^3
HARVESTED FOREST AREA	3.0 %
Fellings for regeneration	0.7 %
Thinnings 2.2 %	
CERTIFIED FOREST (PEFC & FSC)	19,1 mill. ha
FOREST SECTOR'S SHARE OF GDP	4.1 %
Value of exports	11,7 bill. €
Share of exports	21.7 %
Employees	65 000
Share of total employment	2.6 %

• The Finnish classification of forestry land is based on the annual forest increment. On productive forest land the annual increment per hectare is over one cubic metre. On low productive forest land the increment is 0.1–1 cubic metre, and on other land area for forestry less than 0.1 cubic metre per hectare per year. In addition to this, forestry land is taken to include protected forest and also logging roads, intermediate timber storage areas by the roadside and other similar areas.

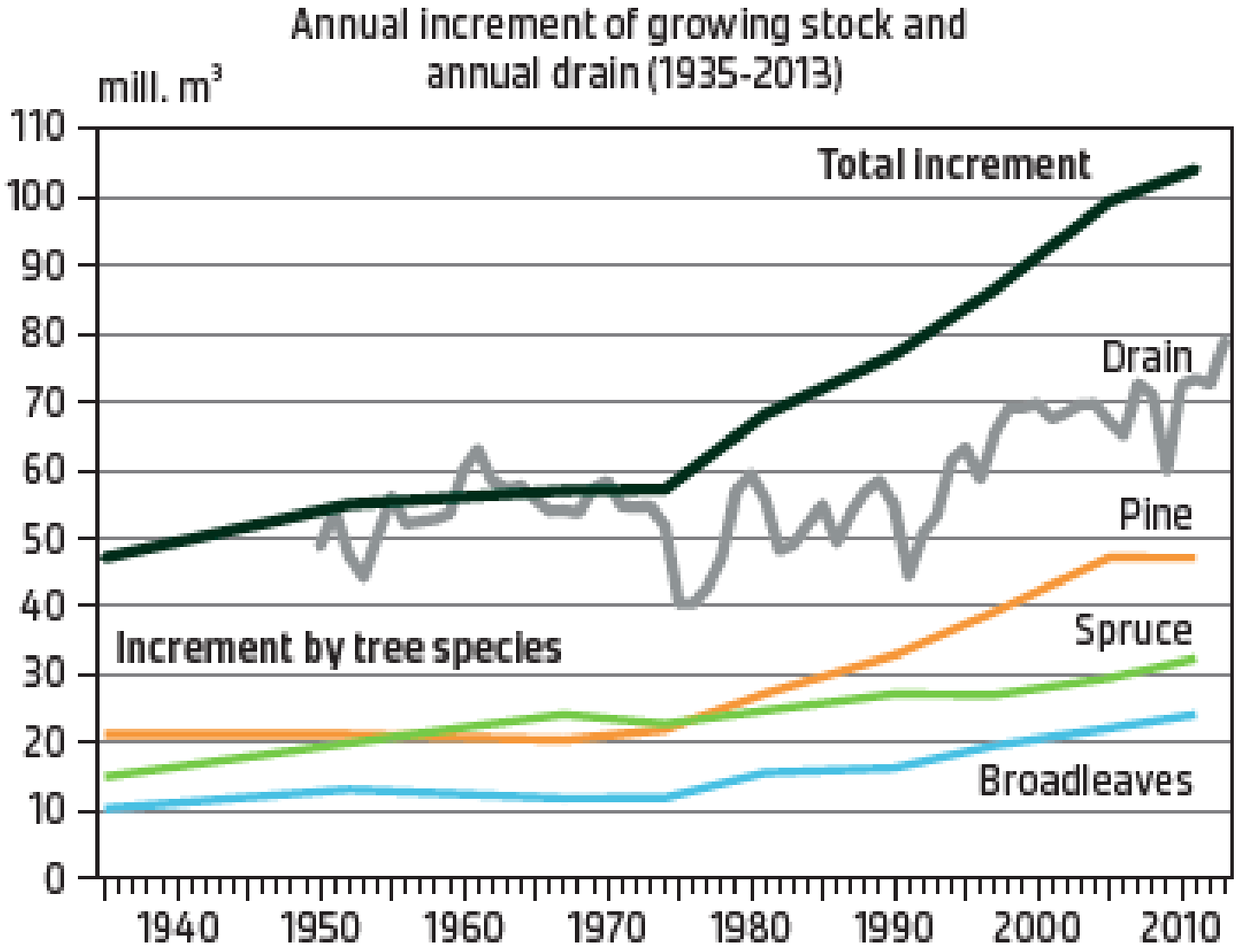
• Source: Natural Resources Institute Finland (stat.luke.fi); Statistics Finland; Customs; PEFC Finland. Graph updated 01.08.2017.

Forest ownership



• The Finnish classification of forestry land is based on the annual forest increment. On productive forest land the annual increment per hectare is at least one cubic metre. On low productive forest land the increment is 0.1–1 cubic metres, and on other land area for forestry less than 0.1 cubic metres per hectare per year. In addition to this, forestry land is taken to include logging roads, intermediate timber storage areas by the roadside and other similar areas.

• Source: Natural Resources Institute Finland, National Forest Inventories. Graph updated 01.07.2016.


Annual increment of growing stock and annual drain (1935-2013)
mill. m³
110
100
90
80
70
60
50
40
30
20
10
0
1940
1950
1960
1970
1980
1990
2000
2010
Total increment
Drain
Pine
Spruce
Broadleaves
Increment by tree species

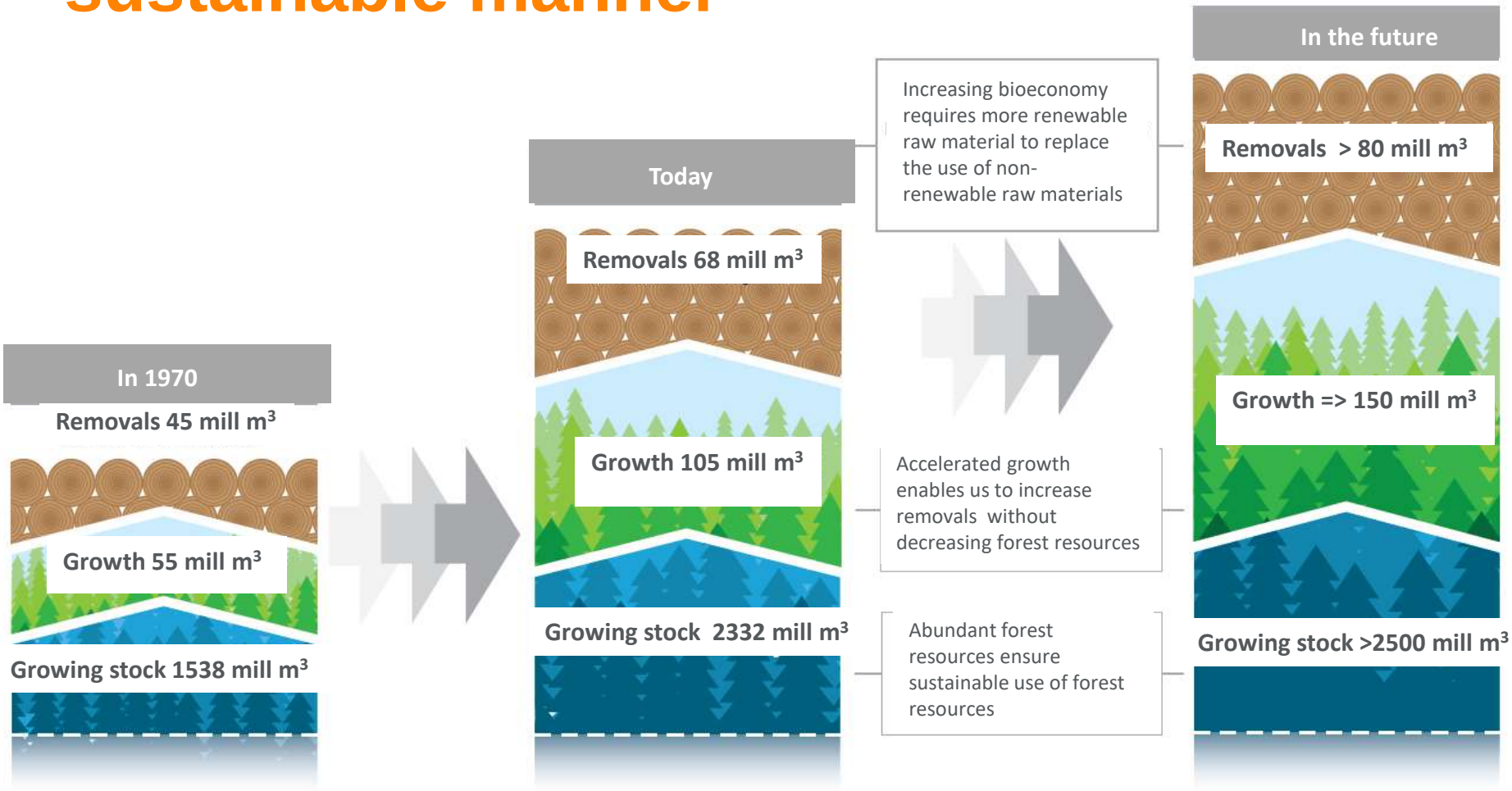
Reasons for increased growth rate of Finnish forests from 1971 to 2010

- Observed growth increase during the last 40 years has been **47** mill. m^3, i.e. **81 %**

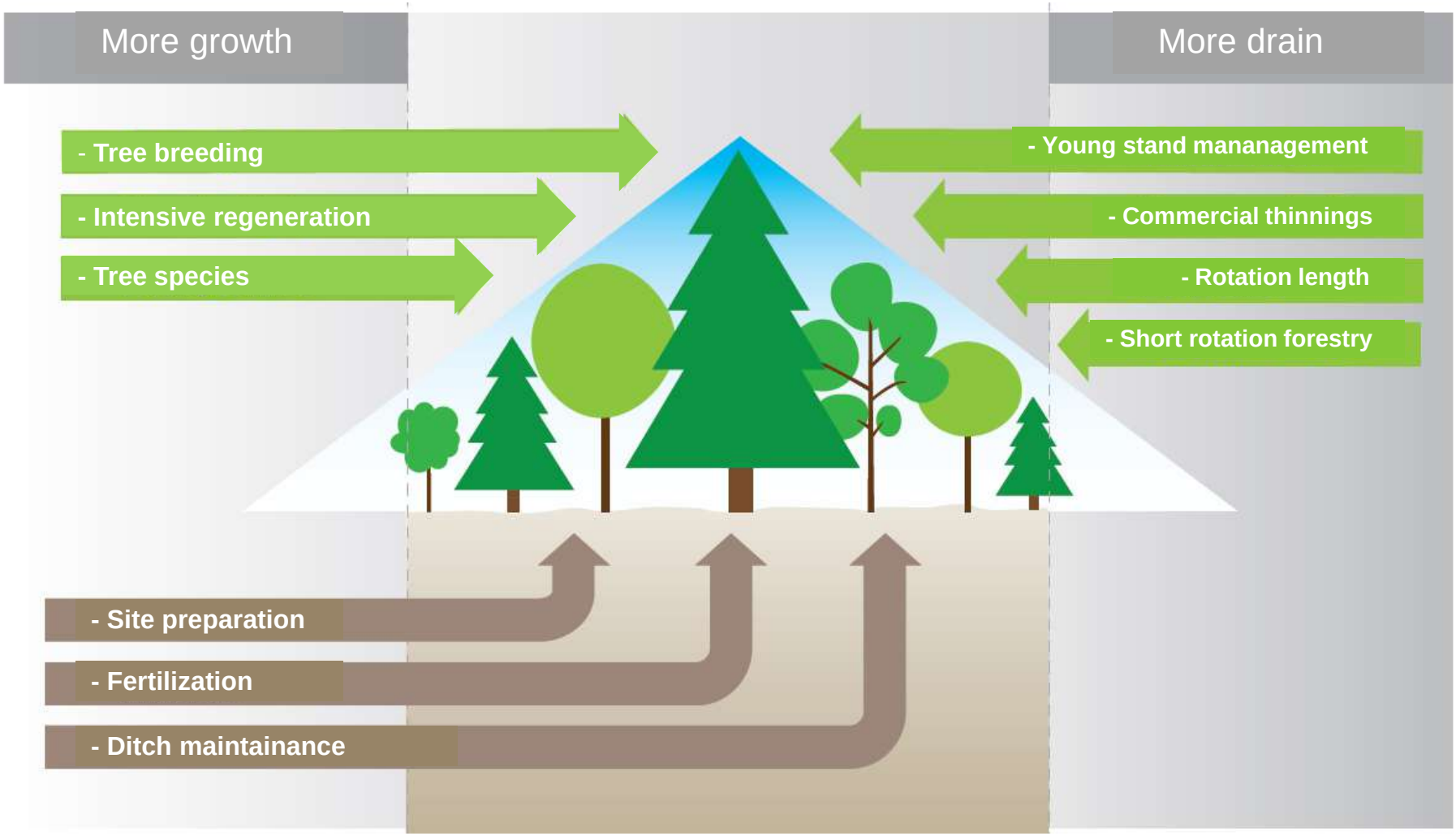
- **63 %** of increased growth **is due to forest management**
- **37 %** of growth increase **is environment-induced**

Source: Henttonen, H.H., Nöjd, P. & Mäkinen, H. 2017. Environment-induced growth changes in the Finnish forests during 1971 – 2010 – an analysis based on National Forest Inventory. Forest Ecology and Management 386:22–36

Increase of forest growth is prerequisite for increasing cutting removals in a sustainable manner



Intensive forest management practices to further increase forest biomass production in a sustainable manner



IN OTHER WORDS:

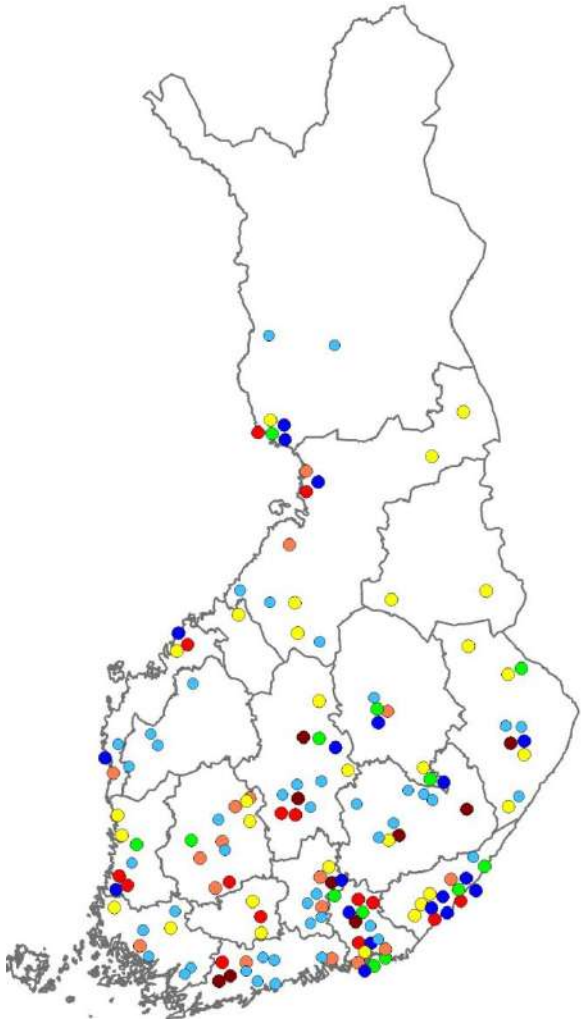
THERE IS INCREASING SUPPLY OF FOREST BIOMASS FOR DIFFERENT NEEDS

IN ADDITION:

THERE ARE INCREASING DEMANDS FOR IT!

Sustainable and multifunctional use of forest

Forest industry production plants in Finland (2016)

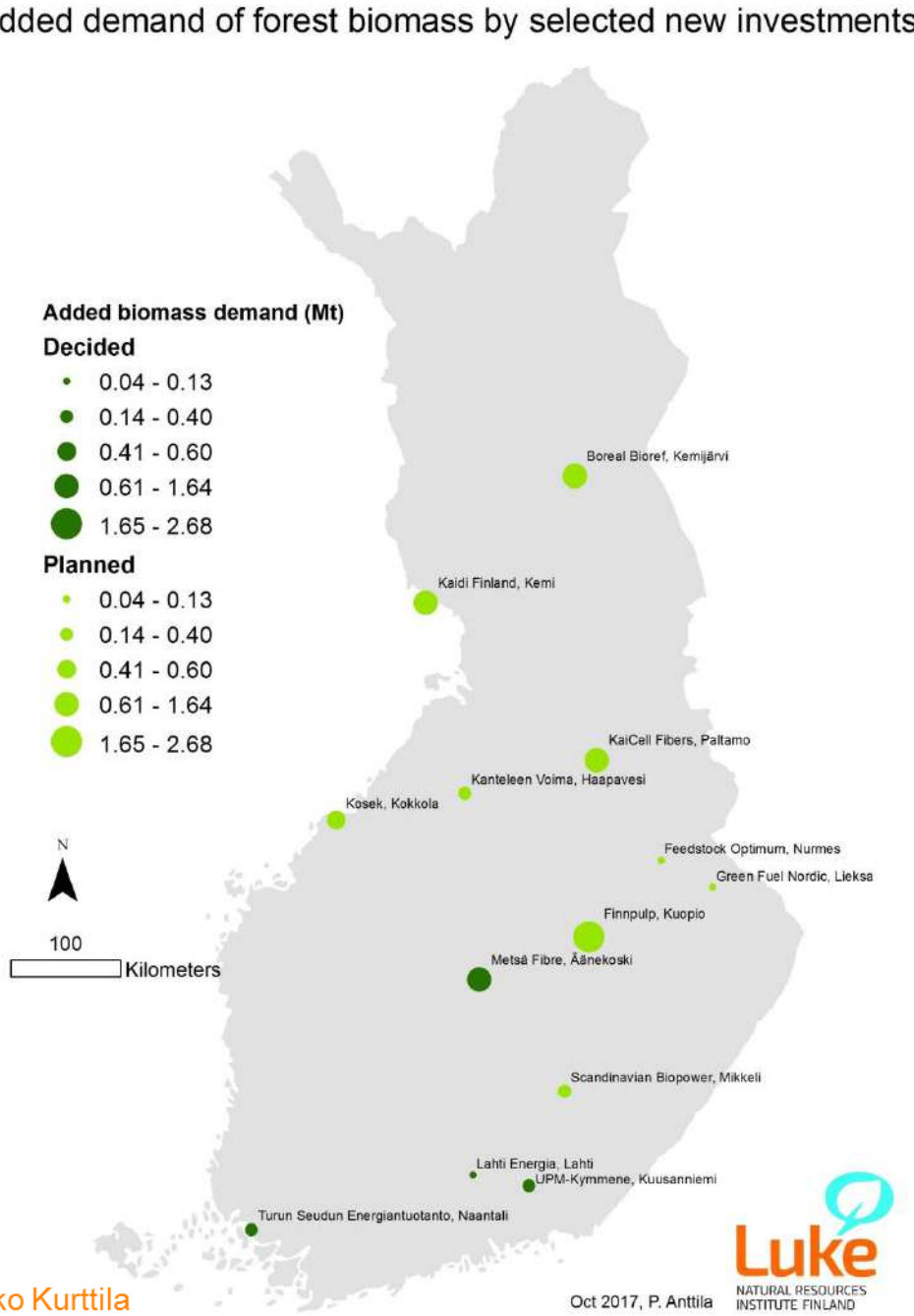


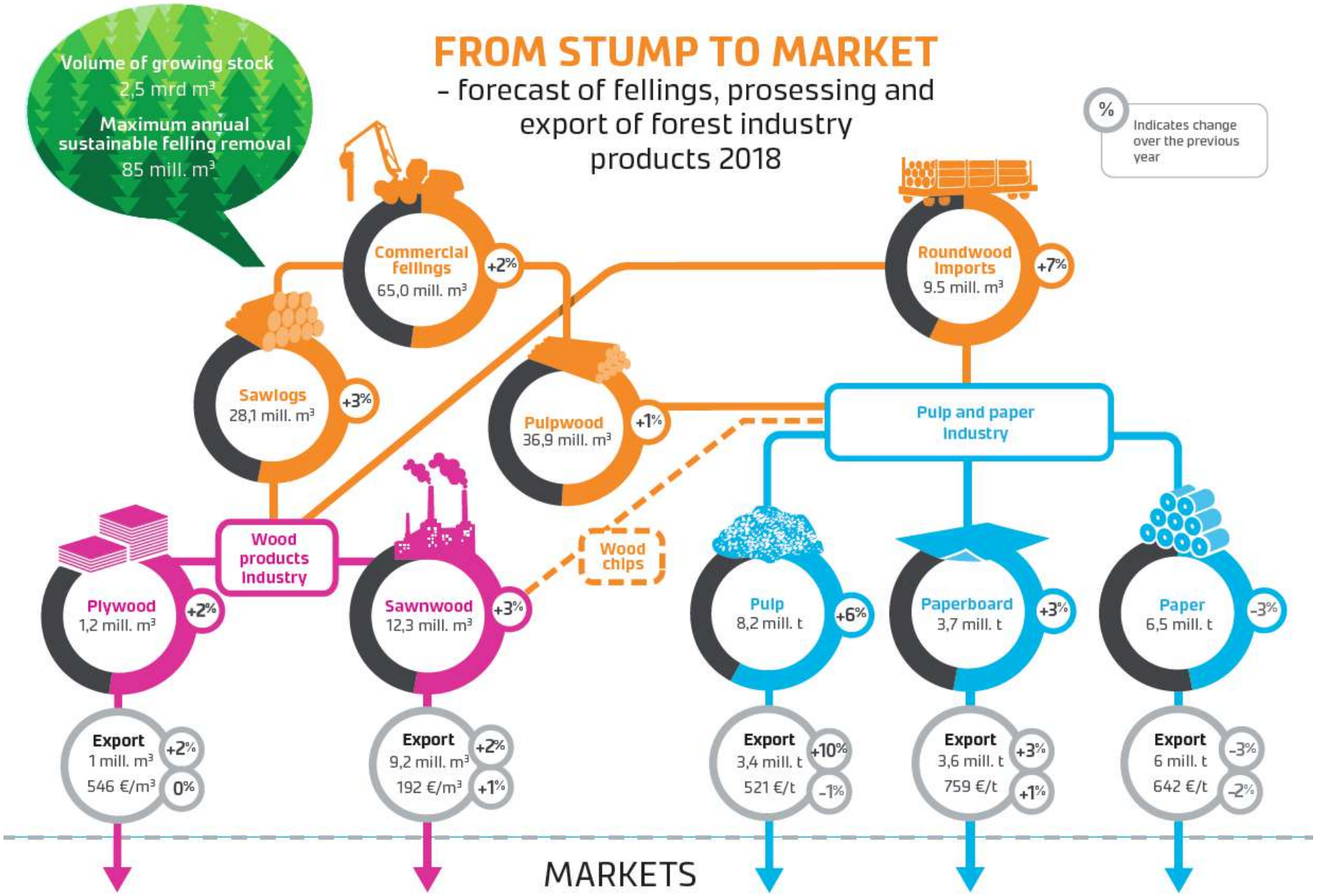
- Paper mills (17)
- Paperboard mills (14)
- Pulp mills (19)
- Paper and paperboard converting mills (18)
- Sawmills* (30)
- Plywood, particle board, fibreboard and veneer mills (10)
- Furniture and joinery industry (47)

SOURCE: Finnish Forest Industries Federation; *FFIF members' sawmills, **Member companies of the Association of Finnish Joinery and Furniture Industries

Investments: Planned and under implementation

- Biorefineries and pulpmills
- Biocoal
- Bioethanol
- Bio-oil, biodiesel and biogasoline




FROM STUMP TO MARKET
– forecast of fellings, prosessing and export of forest industry products 2018
Volume of growing stock
2,5 mrd m³
Maximum annual sustainable felling removal
85 mill. m³
%
Indicates change over the previous year
Commercial fellings
65,0 mill. m³
+2%
Roundwood imports
9.5 mill. m³
+7%
Sawlogs
28,1 mill. m³
+3%
Pulpwood
36,9 mill. m³
+1%
Pulp and paper industry
Wood products industry
Wood chips
Plywood
1,2 mill. m³
+2%
Sawnwood
12,3 mill. m³
+3%
Pulp
8,2 mill. t
+6%
Paperboard
3,7 mill. t
+3%
Paper
6,5 mill. t
-3%
Export
1 mill. m³
546 €/m³
+2%
0%
Export
9,2 mill. m³
192 €/m³
+2%
+1%
Export
3,4 mill. t
521 €/t
+10%
-1%
Export
3,6 mill. t
759 €/t
+3%
+1%
Export
6 mill. t
642 €/t
-3%
-2%
MARKETS

Finland's top export products

1. Paper and paperboard 6,8 bill. EUR

4. Wood pulp 1,8 bill. EUR

5. Softwood sawnwood 1,7 bill. EUR

2. Diesel fuel 3,7 bill. EUR

3. Stainless steel 2,3 bill. EUR

Photo Valmet Automotive

5. Motor vehicles for personal transport 1,1 bill. EUR

Photo ABB

7. Electric generators and motors 1.1 bill. EUR

8. Special machinery 1,1 bill. EUR

9. Earth movers and excavators and other similar machinery 1,0 bill. EUR

Photo Planmeca

10. Medical instruments 1,0 bill. EUR

SOURCE: Finnish Customs

Bioeconomy's significance in Finland

Turnover €60bn

Share of employment 13%

Share of exports 26%

Finland seeks to increase its bioeconomy output to 100bn euros by 2025 and to create 100,000 new jobs in the process.

Bioeconomy combines wood processing, chemistry, energy, construction, technology food and health.

About half of Finland's bioeconomy consists of forest bioeconomy.

Strategies and programmes promoting Bioeconomy

In addition to green bioeconomy, blue, yellow and red have emerged!

Finnish Bioeconomy Strategy 2014
http://www.bioeconomy.fi/

Government programme 29.5.2015
http://valtioneuvosto.fi/en/sipila/government-programme

National Forest Strategy 2025 (2015)
http://mmm.fi/en/nfs
+ Regional Forest Programmes including regionally specified goals

Government report on the National Energy and Climate Strategy for 2030
http://julkaisut.valtioneuvosto.fi/handle/10024/79247

Finland's bioeconomy strategy

Strategic goals

1. COMPETITIVE ENVIRONMENT FOR BIOECONOMY
2. NEW BUSINESS FROM BIOECONOMY
3. STRONG KNOW-HOW BASE FOR BIOECONOMY
4. USABILITY AND SUSTAINABILITY OF BIOMASS

Implementation and monitoring

Sustainable bioeconomy solutions are the basis of Finland's welfare and competitiveness.

How to achieve the bioeconomy goals?

- New business from bioeconomy,
- New biobased products, renewal of value chains, added value to biobased materials…
- Servitization of society
- New business ecosystems

Versus:

- Poor dissemination of research results to practice (traditional ways prevailing)
- Forest researchers (in Finland) are often ”non-entrepreneurial” in their attitudes
- Not active discussion with companies regarding the demand and offering

→ NEED FOR NEW WAYS TO INCREASE SCI-BUSINESS INTERACTION

Developed practices and activities in Luke

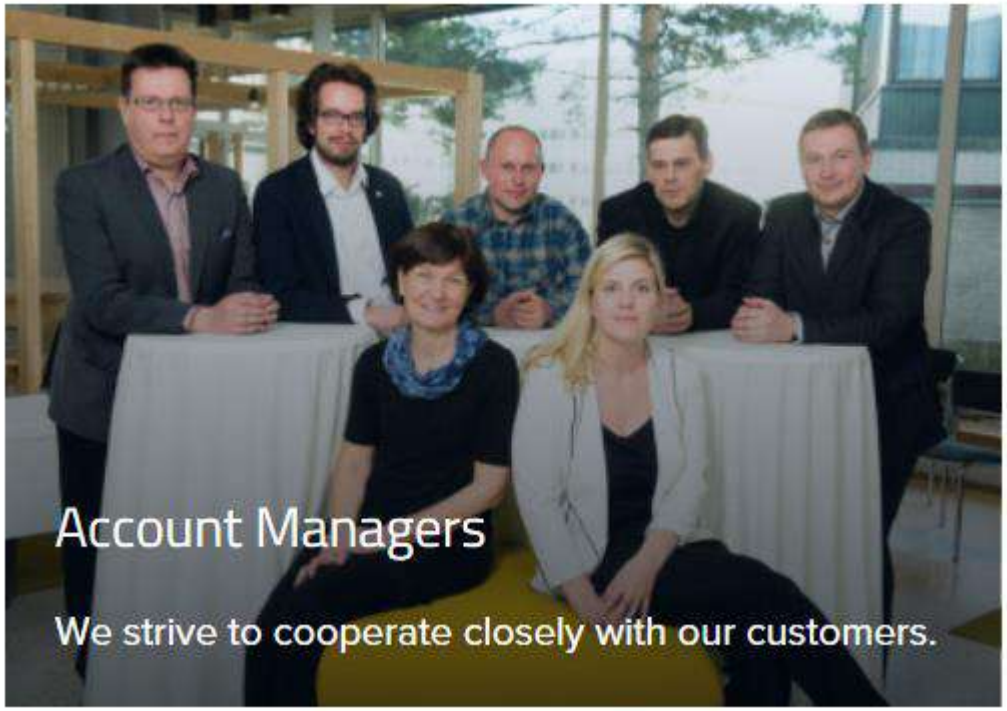
- Establishment of research programme ”New forest and forest biomass based products and services (NEW)” in 2014
- Programme opened a position for innovation expert in 2015 – cooperation with Joensuu science park
  - development of business oriented practices to Luke
- Project for supporting researchers’ visits in companies
- Platforms: offering research based solutions for the targeted needs of companies
- Targeted search of and funding for projects with high innovation and commercialization potential within Luke

In Metla, considerable efforts and funding to research and activities to projects that hold a promise towards new prodcut And service development

Annual budget

Ideas were adopted in Luke https://www.luke.fi/en/business-solutions/

- International key account manager
- Sectoral key account managers (forest, circular economy, food and trade,agriculture)
- Regional account managers



References

13.6.2017 Agriculture, Climate, Environment, Forestry

Qvidja Kraft purchases Luke's pending patents for the biomethane reactor – The development continues

22.12.2016 Climate, Food

Hesburger defined product carbon footprints with Luke

31.5.2016 Agriculture, Economy, Food

An eye-opening survey on the degree of domestic origin in the food sector

25.4.2016 Forestry

Luke's training prepares Helen Oy for the use of biomass as fuel

22.4.2016 Environment, Fish

Phosphorus load from fish farming reduced through the addition of an enzyme

”Invite researcher for a visit” is a campaign to increase activities and interaction between companies and Luke.

Aim is to

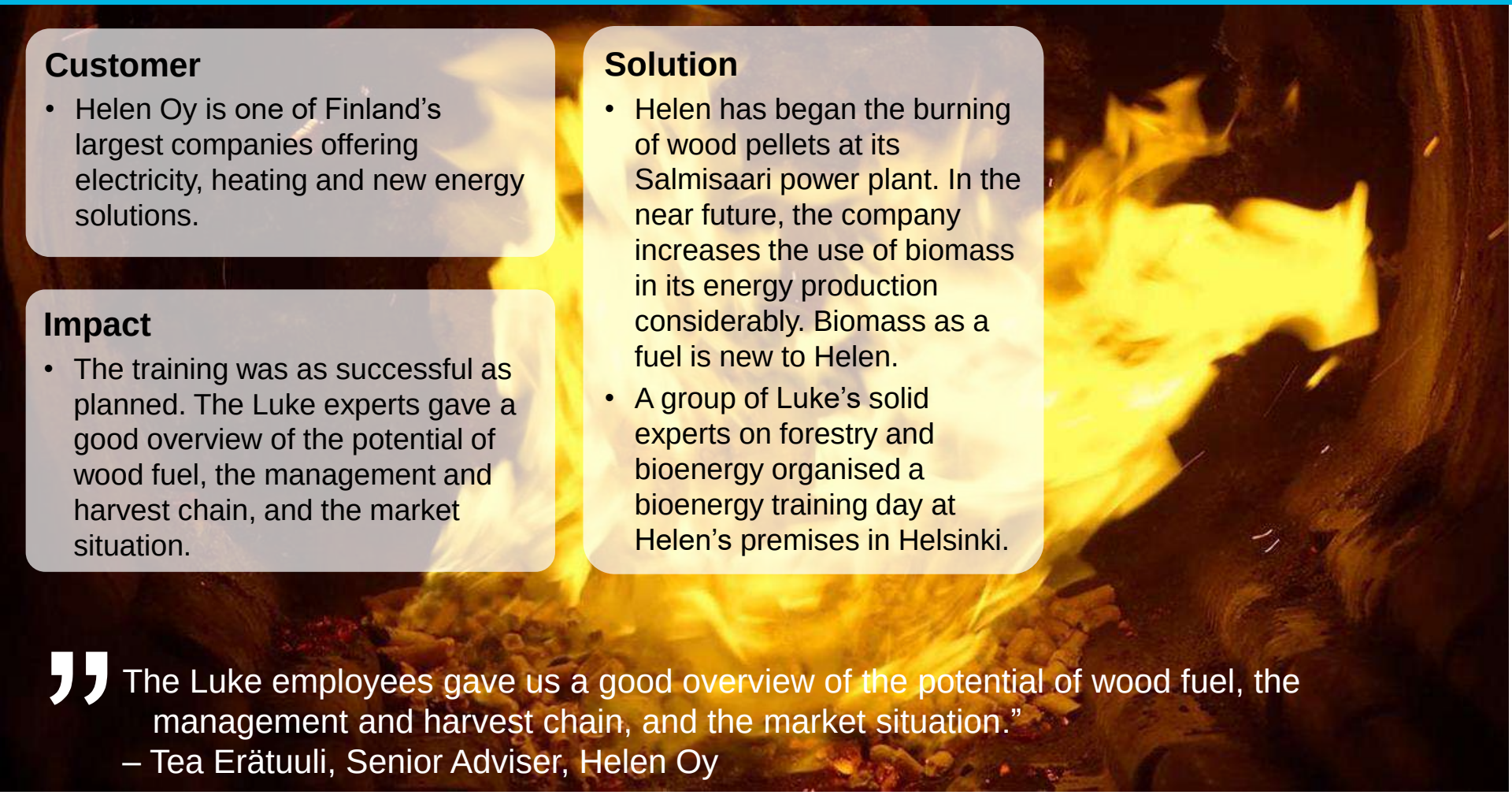
- Build networks between public and private sectors
- Transfer research results and innovations into practice
- Recognize companies’ challenges and offer Luke’s solutions
- Increase our activities towards private sector
- Support the growth of bioecenomy

How?

- Researcher contacts company (or vice versa)
- 1-2 days visits
- Free for companies, funding from Ministry of Economic Affairs and Employment, covers the salary and travel costs

Already more than 30 companies visited until Oct. 2017!

Luke's training prepares Helen Oy for the use of biomass as fuel



Customer

- Helen Oy is one of Finland's largest companies offering electricity, heating and new energy solutions.

Impact

- The training was as successful as planned. The Luke experts gave a good overview of the potential of wood fuel, the management and harvest chain, and the market situation.

Solution

- Helen has began the burning of wood pellets at its Salmisaari power plant. In the near future, the company increases the use of biomass in its energy production considerably. Biomass as a fuel is new to Helen.
- A group of Luke's solid experts on forestry and bioenergy organised a bioenergy training day at Helen's premises in Helsinki.

"The Luke employees gave us a good overview of the potential of wood fuel, the management and harvest chain, and the market situation."
– Tea Erätuuli, Senior Adviser, Helen Oy

Further information: Lauri Sikanen, Luke

HELEN

Luke
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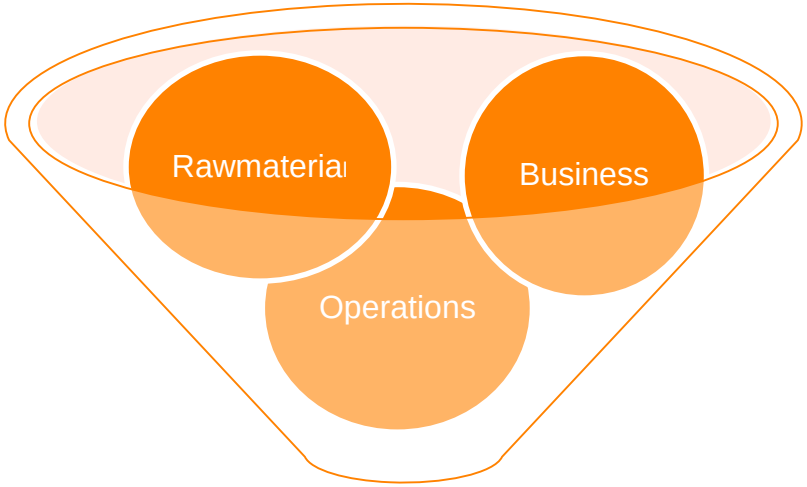
Approach of integration

BioHub – A business centre

Aim: To develop methods and business models for forest terminals



Right assortment

Right industry

Right time

Highest possible value gain

New business models to develop BioHubs

The aim is to develop a new business and operational model for terminals. Based on the model, terminals can serve as “BioHubs”, centres in which preliminary mechanical processing of raw materials and refining processes can take place based on end-user quality requirements. As a result, it is possible to increase the value of forest raw materials and create new supply chains that will better serve both traditional forest industries and emerging biorefining industries.

The project will

- Map out prevailing business models
- Provide terminal entrepreneurs and developers information on business dimensions (variables) that the management should consider when developing/ establishing a terminal
- Help to develop and share new, innovative business practices

Photo: SLU

FORLEAP- New products from side-streams of forest biomass (2016-2018)

European Union
European Regional Development Fund

Leverage from the EU 2014–2020

- Different side-streams of forest biomass, such as needles, bark and stumps, contain valuable compounds, which could be utilized to high-value added products such as cosmetics, preservatives and medicines
- We can test for example bioactive properties of side streams obtained from forestry to help companies to find new applications to utilize different forest derived raw materials
- We offer an easily accessible product development platform and services for SMEs to enhance application of research results to practice
- Funding for the project come from EU regional development funds

Chemical components of bark extracts are a huge resource for future products with antioxidative, hydrophopic or antimicrobial properties

For example:

- Suberin from birch bark is a potential compound in development of surfaces with hydrophobic properties. With the expertise in suberin extraction and purification we have supported companies to obtain the compound for testing protocols in product development.


Welcome to
LukeLEADS
Call for applications: 27.11.-8.12.2017
Announcement of the finalists 18.12.2017
Pitching training session for the finalists: 10.1.2018
LukeLEADS pitching event: 17.1.2018
Voting time for the audience 18.-19.1.2018
Announcement of the winners: 22.1.2018
Projects start: 1.2.2018

Conclusions

- Forest bioeconomy must be based on diverse use of raw materials and diverse end product portfolio
- Ideas for innovations can be found from many sources
  - EU-funding (e.g. H2020, BBI) also emphasizes more and more establishment of networks or expert/stakeholder groups, knowledge sharing etc.
- Funding available directly for business development based on research results (www.tekes.fi)
- Cooperation between research and industry truly needed
  - Forest industry often has their own rdi-departments
  - Change of mindsets demanded from researchers
  - Different roles of universities and research institutes?
  - Slow progress taking place


Thank You for Your Attention