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Bioenergy and Forest Roads are the Key Factors for Successful Forest Sector Development

- Shift from Forest Mining to Smart Forestry is a Fundament for Sustainable Business.

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Demand for Wood & Infrastructure

Sustainable and Progressive Forestry

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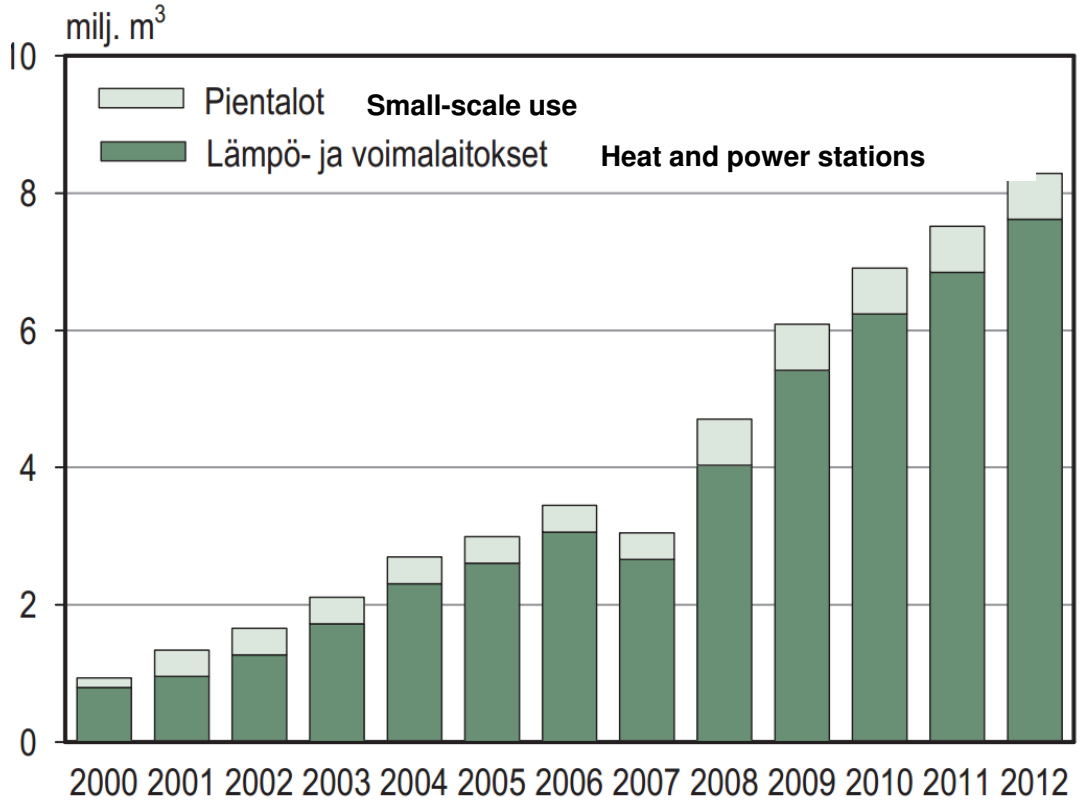
1 The Bioenergy Benefit: DEMAND FOR WOOD

The key development driver for forest sector & local economy

- Markets for low-quality wood: income instead of ”cleaning” costs
- **Thinnings → better silviculture, timber quality and more valuable forests!**
  + improved fire resistance
- Huge impact on local economy: new jobs, income for logging companies and forest industry → **money stays in the region!**
- **Modernization of energy infrastructure:** better efficiency, reliability and cost-competitiveness
- More oil, gas and coal available for export
- Less harmful environmental impacts:
  - CO2, SO2, oil leakages during transport and storage




Use of wood chips for energy grows fast in Finland



Origin of wood chips in 2012

Thinning wood	47,1 %
Logging resudues	33,8 %
Stumps	14,3 %
Large stemwood	4,9 %
	100,0 %

SOURCE: Finnish Forest Research Institute - Metla

OSKE
OSAAMISKESKUSOHJELMA

Technologies available for all scales

Industrial scale
50 - 500 MW (69%)

CHP, co-generation
Substituting coal
Cofiring with coal & peat
- **Fludized bed boilers**
- **Gasification**

Valmet, Andritz, Foster Wheeler

Municipal scale
3 - 50 MW (22%)

CHP or heat only
Substituting coal & oil
Cofiring with peat
- **Fludized bed boilers**
- **Fixed bed boilers**

KPA Unicon, Vamet, Renewa…

Heat entrepreneur scale
0,25 - 3 MW (9%)

Heat only (wood chips, pellets)
Substituting light fuel oil
- **Fixed bed boilers**
- **Small CHP coming**

Megakone, Ariterm, Ala-Talkkari…

Large building / micronet scale
25 - 250 kW (<1%)

Public/industrial buildings, farms,
row houses, micronets for one-family houses
Chips/pellets substituting oil & electricity

Domestic scale
5 - 25 kW

Firewood and pellets
Substituting light fuel oil
& electricity

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2 Road infrastructure: ACCESS TO FOREST RESOURCES

Logistic infrastructure is the key factor for new investments in wood-based industry!

- **All-year available forest roads**: secure raw material supply, full use for machine investments and access to silvicultural works
- **Logistic costs have a major impact on timber costs at the mill!**

➔ **All basic elements for investors!**

- **Enables efficient forests fire management**
- Multiple use: mushrooms, berries, hunting, fishing…

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2 Road infrastructure: ACCESS TO FOREST RESOURCES

Forest Road Statistics

In Russia:

- Average road density 1,5 m/ha (0,4 – 4 m/ha in NW Russia)
- Most of the roads available only in winter
- Haulage distance long, logistic costs high
- Need for new permanent forest roads 2200 km/y, others 9300 km/y

In Finland:

- Average road density 12-13 m/ha
- Most of the roads available around the year
- Haulage distance <250 m, logistic costs reasonable
- Forest road construction about 600 km/y, re-construction 3500 km/y
- Average costs: construction 15.-20.000 €/km (subsidy 20-40%), reconstruction 10.-15.000 €/km (subsidy 40-60%)

Forest Roads to Become a Success Factor for Russian Forest sector

MISSION IMPOSSIBLE?

The Russian Forest Road Reform?

Problem: Investments in long-term infrastructure do not benefit the companies having the logging rights

Basic principle 1: Road construction and maintanance must be attractive for forest leaser

- Compensation in rent, if job well done

Basic principle 2: Road network needs to be designed well to gain good cost-efficiency

Basic principle 3: Actual road construction and maintanance works must be cost-competitive

➔ Competition – contractors – technology - skills

Several models possible.

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3 From Forest Mining to Smart Forestry: SUSTAINABLE AND PROGRESSIVE FOREST SECTOR DEVELOPMENT

Sustainable, quality-based forest production:

- **Optimization of forest's production capacity = thinnings & final fellings in same operational area → mosaic structure of the forests**

  → Raw material does not "escape" further away from mills!

- **Every operation (thinning etc.) aims to improve the quality of remaining forest**

  → Cut-to-length (CTL) forest machinery

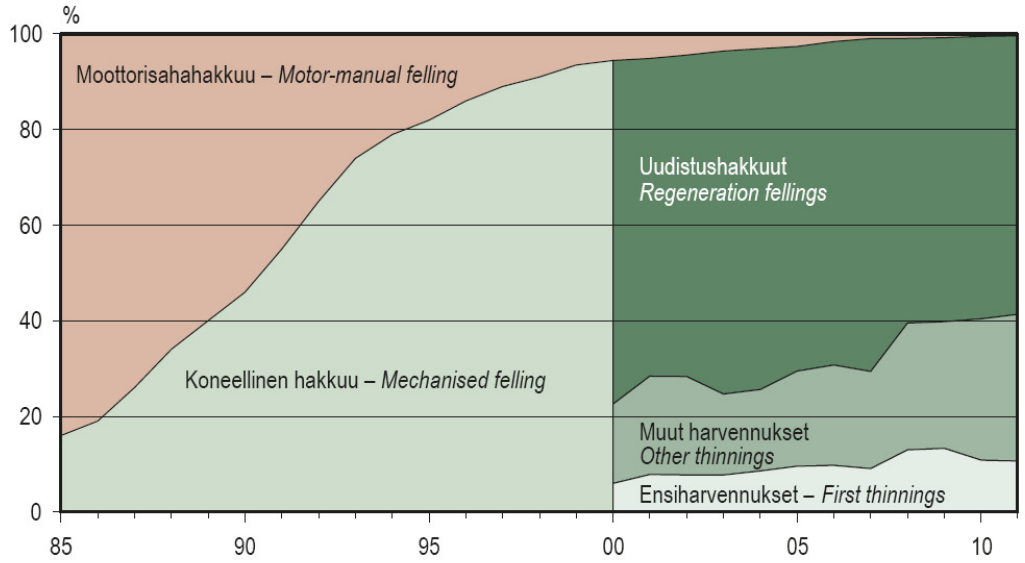
Utilization of economics of scale (one land owner):

- **Optimal road network**
- **Rational size of harvesting sites and other operational units**

ACURATE FOREST INVENTORY DATA IS A BASIS FOR OPTIMAL USE OF FORESTS

How to promote investments – Finnish example

Cost-efficienfy: Mechanization of forest operations



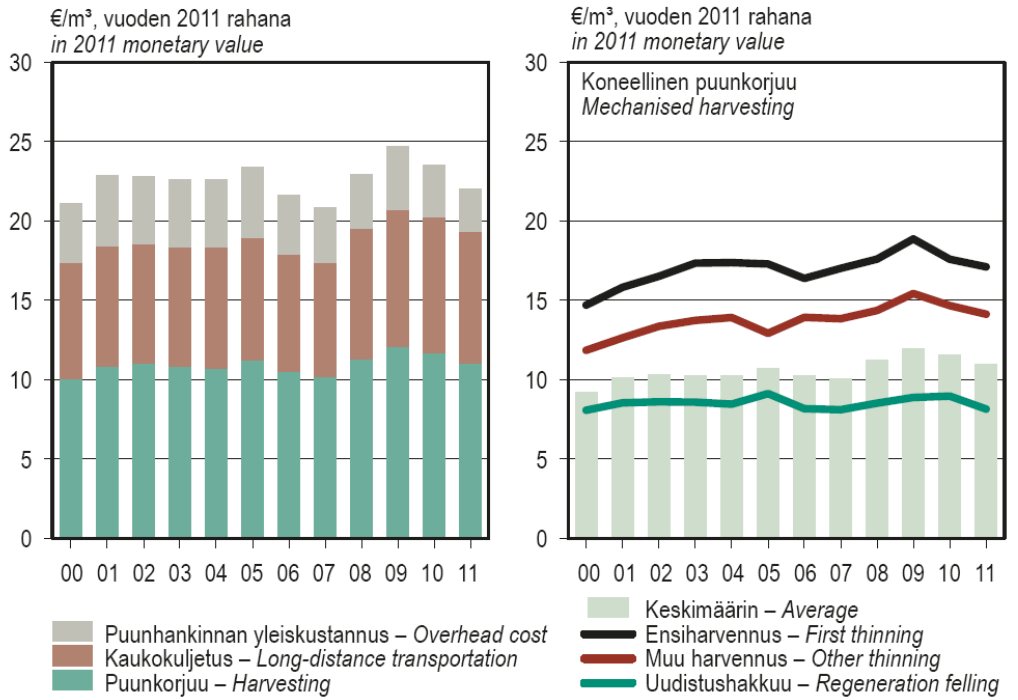
Metsäteho Oy:n osakkaiden (suurimpien metsäteollisuusyritysten ja Metsähallituksen) hakkuut.
Fellings by the forest industries and Metsähallitus, which is a state enterprise administrating all state-owned forests.

Lähde – *Source*: Metsäteho Oy

Kuva 5.4 Hakkuiden koneellistamisaste 1985–2011
Figure 5.4 Degree of mechanisation in fellings of commercial roundwood, 1985–2011

- Over 99% of timber harvested using harvesters
- Fast mechanization in 1980's and 1990's
- Machines owned by private contractors (not forest industry)

Cost-development in Finnish timber supply
- quite well in control



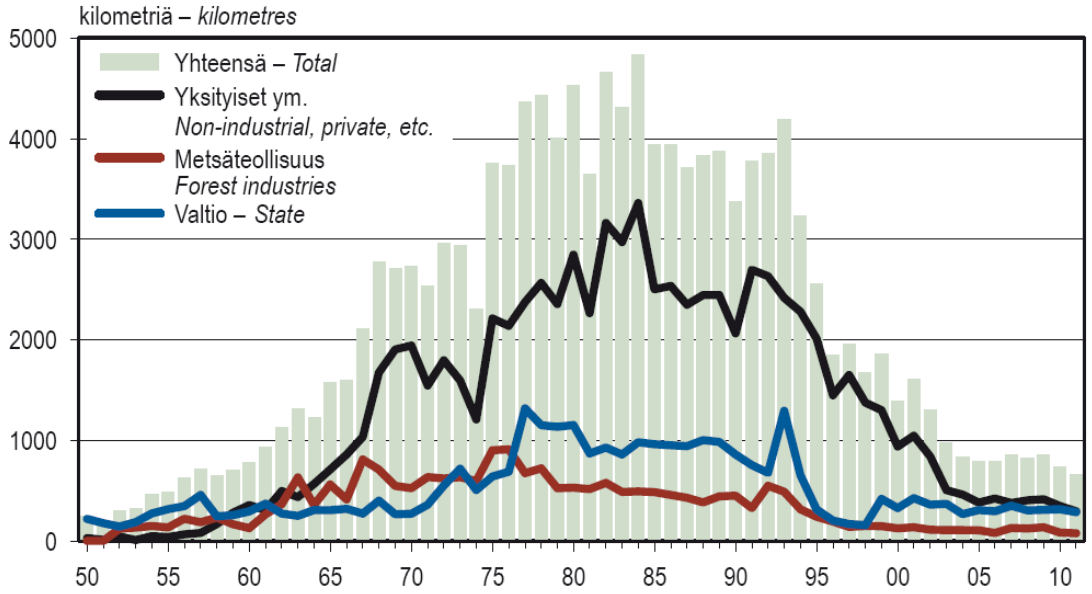
Luvut sisältävät Metsäteho Oy:n osakkaiden (suurimpien metsäteollisuusyritysten ja Metsähallituksen) korjaaman ja kuljettaman markkinahakkuiden puun.
The figures include domestic logs and pulpwood harvested and transported by the forest industries and Metsähallitus.

Rahanarvot on muunnettu tukkuhintaindeksillä (1949=100). – *Monetary values are deflated using wholesale price index (1949=100).*

Lähde – *Source*: Metsäteho Oy

How to promote investments – Finnish example

Infrastructure!



Lähde: SVT: Metsäntutkimuslaitos, metsätilastollinen tietopalvelu – *Source: OSF: Finnish Forest Research Institute*

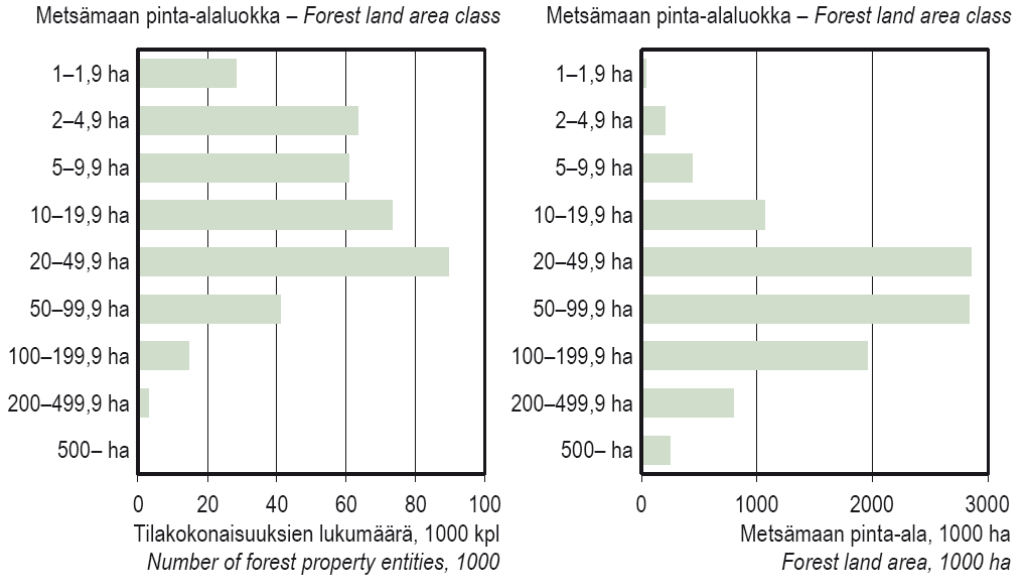
Kuva 3.7 Metsäteiden rakentaminen 1950–2011
Figure 3.7 Construction of forest roads, 1950–2011

- "By-products": Practically no problems with forest fires, extensive multiple use (mushrooms, berries)

SOURCE: Finnish Forest Research Institute (Metla)

How to promote investments?

Fragmented forest ownership structure is a problem everywhere in Europe - unlike in Russia



SOURCE: Finnish Forest Research Institute (Metla)

- Active long-term policy to avoid dispersed forest ownership
  - 60% of forest land owned by private forest owners
  - Average size of private forest property (those > 2 ha) = 30,1 ha
- Keep the forests in active hands!
- Develop services for urban forest owners!

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Cooperation – transfer of technology and know-how

- Finnish experiences and technology – trials and errors, research and hard development work – can be transferred and adapted into Russian conditions
- Power for modernization:
  - **Forest roads and other logistic infra:** design, construction, equipment/materials, maintanance
  - **District heat networks:** design, construction, modernization, maintenance…
  - **Biomass energy:** fuel availability, harvesting & logistics, energy production, business models
  - **Fibre production:** forest inventory and management, thinning forestry, mechanized silviculture
  - **Waste management:** waste collection, landfill management, landfill gas utilization, biogas production, manure handling and utilization…
  - Energy efficient wood construction



World class know-how in North Karelia
Forest machine technology and material handling solutions:

JohnDeere, Kesla, Waratah OM, Outokummun Metalli, Pentin Paja,
Mantsinen Group, Konepaja Antti Ranta, Konepaja Riikonen, PKP Flex…

Joensuu – the Forestry Capitol of Europe

Unique combination of forest research:

- European Forest Institute – EFI (headquarters)
- Finnish Forest Research Institute – Metla
- University of Eastern Finland – UEF
- Karelia University of Applied Sciences

…and wider bioeconomy scope:

- Finnish Environment Institute – SYKE
- The Energy and Resources Institute – TERI
- About 600 experts in bioeconomy sector

Joensuu Science Park:

- Facilitator between research and companies, national and international
- Coordinator of the Finnish Bioeconomy INKA Program 2014-2020

EFI METLA UNIVERSITY OF EASTERN FINLAND Karelia UNIVERSITY OF APPLIED SCIENCES SYKE teri

Joensuu – the Forestry Capitol of Europe

Complete package of forestry education

University of Eastern Finland (UEF)

- Bachelor
- Master
- Licentiate
- Doctor

Master programme in Wood materials science

of Science in Agriculture and Forestry

ICT, Optics, pedagogy – international programmes, CBU…

Karelia University of Applied Sciences

- Bachelor of Natural Resources
- Masters Degree of Environmental Technology

North Karelian Technical College in Valtimo

- Qualifications for forest machine drivers and fitters, loggers, timber truck drivers, forest road constructors, forest service enterpreneurs
- International trainer of teachers

Forestry-oriented high school in Eno and

ENO-Environment Online (http://www.enoprogramme.org/)

- Over 10,000 schools joined, over 12 million trees planted