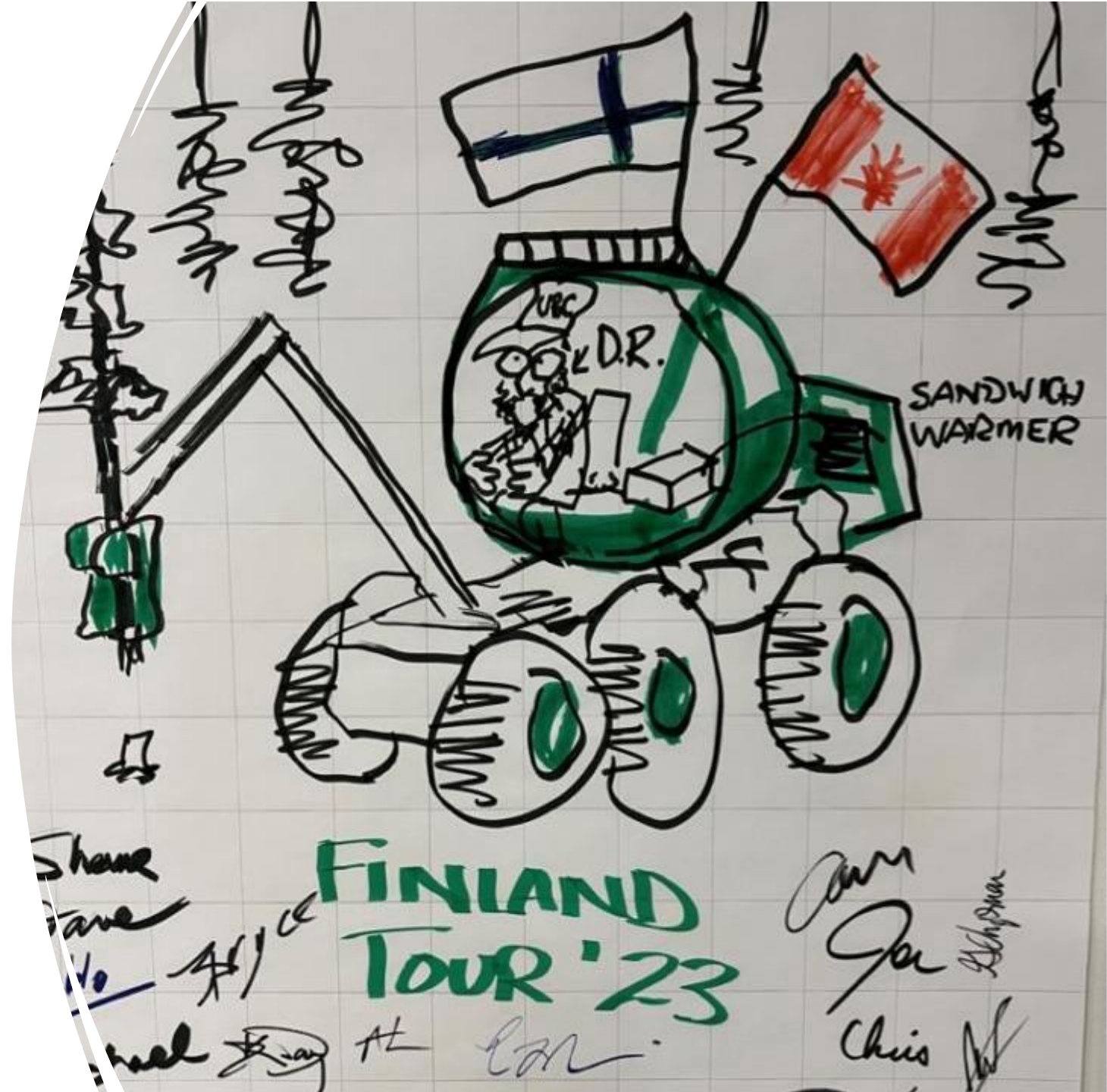


Finland Forest Management Tour

Highlights & Key Takeaways





31 People from BC had a tour of the Forests in Finland

Thirty-One BC Tour Participants Representing

- Office of The Chief Forester
- Four Education and Research Institutes
- Two Cities
- Federation of BC Woodlot Assoc.
- Six Forestry Consultants

- BC Timber Sales
- Six Forest Companies
- Council of Forest Industries
- Pulp and Paper Coalition
- Three Community Forests
- Four Woodlot Licensees
- One Private Forest Landowner

Michael Armstrong	Vice President and Chief Forester	COFI	Chris Elden	Inventory Forester	West Fraser Mills	Jorma Neuvonen	Assistant Dean	UBC Faculty of Forestry
Bryce Bancroft	Consulting Forester	Symmetree Consulting Group Ltd	Stephanie Ewen	Manager	UBC Alex Fraser Research Forest	Allan Powelson	Executive Director	BC Timber Sales, Ministry of Forests
Shane Berg	Assistant Deputy Minister, Chief Forester	BC Ministry of Forests	Curtis Fenton	Chief Forester	Dunkley Lumber Ltd.	Erin Robinson	Forestry Initiatives Manager	The City of Quesnel
Cam Brown	Manager, Resource Mgmt and Tech.	Forsite Consultants	Chris Gruenwald	Director of Forestry	City of Mission	Dominik Roeser	Associate Professor	UBC Faculty of Forestry
Gord Chipman	General Manager	Federation of BC Woodlot Associations	David Haley	Forester Private landowner	Haley Agro-Forestry	Christoph Schilling	Manager Business Development	FPInnovations
Jeremy Cover	Planning Manager	Dunkley Lumber Ltd.	Robert Kozak	Dean	UBC Faculty of Forestry	Mike Simpson	Forester Facilitator	M.F. Simpson Ltd.
Pablo Crespell-Montero	Research Fellow	College of New Caledonia	Coleen MacLean-Marlow	Program Coordinator	North Island College	Brenden Tostenson	RPF	Gorman Bros Lumber
Kenneth Day	Consulting Forester	KDay Forestry Ltd.	John Marlow	Consulting Forester	Rockview Resources Limited	Kalin Uhrich	Chief Forester	Canfor
Kenneth Dodd	Registered Professional Forester	Hummingbird Lake Holdings	Jeff Mycock	Chief Forester BC Operations	West Fraser Mills	Frank Varga	General Manager RPF	Burns Lake Community Forest
Joe Dolling	Chief Forester	Tolko Industries Ltd.	Joseph Nemeth	General Manager	BC Pulp and Paper Coalition	Alex Wagstaff	Cedar Supply Manager	Western Forest Products Inc.
			Jorma Neuvonen	Assistant Dean	UBC Faculty of Forestry			

Learning objectives of the tour

1. Finnish history, development of forestry
 - a. What were some more recent challenges and do they relate to our current state in any way? What can we learn from their history?
 - b. Structure of the forest sector – Is it all private? What are the metrics on the size of forest estates?
 - c. Are there potential pitfalls folks from Finland could advise BC to avoid?
2. Clearly understand Finnish Stand Management Regimes
 - a. Harvest Stats – total thinnings vs clear felling, continuous cover forest management, other. Also a breakdown products – sawlog, pulp, bio log, veneer...
 - b. Metrics that drive treatment decisions –
 1. Stocking standard regimes?
 2. Site quality
 3. Planting – single or multiple spp (mixed or stratified?), deciduous management?
 4. Pre-commercial Thinning - stand diameter, stand value, revenue distribution (cash flow), financial incentives?
 5. Commercial Thinning
 6. Continuous cover forestry (shelterwood management) vs clear felling
 - c. Modeling metrics – Hannu Salminen (LUKE) CT Calculation Model – it would be good to walk through this with the group and even better if we had the model outcomes that we could relate to some field sites.
 - d. Decisions driven by piece size instead of CAI?
 - e. Economic analysis considerations – NPV calculations in the Finnish regimes
 - f. What discount rates are being used, and if higher than BC standard 2%, then why?
 - g. Total yield vs total value considerations – which has the greater influence and why
3. State of biodiversity values
 - a. How Finnish Forest Management affects biodiversity
 - b. Changing practices to protect biodiversity, water, wildlife habitat
4. State of biodiversity values
 - a. How Finnish Forest Management affects biodiversity
 - b. Changing practices to protect biodiversity, water, wildlife habitat
5. Effects of climate change on Finnish Forests
 - a. Anything on adaptation of forest management or practices?
 - b. Carbon management story – where are they relative to net 0?
 - c. How Forest Management affects the carbon balance
6. Forest management planning
 - a. Who makes forest management plans
 - b. How are values determined? Role of First Nations
 - c. How do management plans link to harvest planning
7. Inventory Data and Technology
 - a. Inventory quality and attributes
 - b. Technological innovation from inventory data
 - c. Other Finland tech that supports operational excellence across multiple forestry phases from planning through forest operations
 - d. Productivity data for various harvest regimes
8. Forest Products Manufacturing Sector
 - a. How much export or import of logs occurs?
 - b. Modernization and capitalization in the sector – is investment healthy across both greenfield and brownfield projects
 - c. What is the relationship structure between manufacturers and suppliers? – numerous short- and long-term procurement agreements?
 - d. Is timber auctioned competitively?
 - e. How do manufacturers ensure a consistent supply across market cycles?
9. Finland Forest Strategy
 - a. How does this influence all of the above in the country?
 - b. What can we learn in terms of the value of having a forest strategy?
10. Lastly, perhaps a summary of key challenges going forward and how Finland plans to address them?

Finland a country with a forestry strategy and vision

Finland has a National Forest Strategy that provides updated guidance and clarity in decisions made regarding Forestry and its role as a world class asset.

[National Forest Strategy 2035 –Growing Wellbeing from Forests and for Forests](#)

*Besides the wellbeing forests produce for the Finns, the vision **emphasises the wellbeing of forests themselves. The vision and all strategic objectives include the economic, ecological, social and cultural dimensions of sustainability. The strategy promotes a responsible and comprehensive economy of wellbeing.***

Strategic objective 1

*Finland is a **competitive operating environment for a responsible forest sector that is capable of renewing itself.** This dimension includes taking care of the investment conditions and security of supply, availability of raw materials as well as diversification of the forestry sector. In addition, the dimension includes well-functioning governance structures, encouraging operating environment and influencing in international contexts.*

Goals

1. Forest-based business is increasingly diverse and continues to grow
2. Proactive and effective cooperation and influencing the EU and international processes improve the operating environment of the forest sector
3. Smooth administration and well-functioning infrastructure create a predictable and encouraging operating environment
4. Well-functioning markets ensure access to raw materials and services

Note the Vision begins with the forest sector – this may be the single largest difference from BC where the forest sector, while recognized as an important element, is not stressed on how it fits with the other goals and objectives for management moving forward as it is clearly stated here.

Strategic objective 2

Forests are in active, sustainable and diverse use

This dimension concerning the use of forests comprises ecosystem services and perspectives of profitable forestry. This objective also includes ensuring the vitality of regions.

Goals

1. Use of forests is target-oriented and based on knowledge and active decisions by forest owner
2. Active and increasingly diverse forest management increases forest growth and supports climate change mitigation
3. Services and incentives to forest owners and operators support active, sustainable and diverse use of forests in a way that takes the special characteristics of regions into account
4. Ecosystem services offered by forests enhance people's wellbeing and create new earning opportunities

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Strategic objective 3

We strengthen the vitality, diversity and adaptability of forests

This ecological dimension includes safeguarding the biological and other kinds of diversity of forests. This objective also comprises measures to ensure the health and resilience of forests. Climate change adaptation and mitigation and risk management in general are also included

Goals

1. Biodiversity trend in commercial forests is directed onto a path to recovery
2. Climate change resilience of forests is strengthened, and risks of damages are in control
3. Environmental risks caused by forestry are managed and in control

Strategic objective 4

We strengthen knowledge-based management and competence in the forest sector

This objective is based on scientific research and promoting this in an interdisciplinary manner, good knowledge base and constantly improving competence. This objective includes the attractiveness of the forest sector as a field of study and work.

Goals

1. High-quality research, advancing spatial data and usability of data create a strong knowledge base for decision-making and foresight work
2. Forest expertise is diverse, responds to changing needs and attracts more people to seek employment in the forest sector
3. Communication and interaction enhance understanding of the use of forests and of forest environment and culture in society, especially among the young

Ministry of Forests

Key Messages

- A National Forest Strategy linked to legislation that includes: reforestation, bioeconomy, climate and energy, and policy coherence is key!
- Each of the goals laid out in the strategy document was observed during the tour – Finland is providing guidance through their vision and acting upon it.
- High-quality research, advancing spatial data and usability of data create a strong knowledge base for decision-making and foresight work
- Cultural difference – There is trust AND collaboration between land-owners and government and scientists. Scientists and academics are seen as “interpreters” of knowledge and best forest practices and work together with willing landowners
- The national identity is tied to forestry; city and country people alike identify deeply with the forests
- Adequate funding/support for different initiatives

ACTIONS:

- Create a Vision – learn from the Finnish example
- Finland perspective can provide valuable input in the ongoing strategy discussion
 - Michael to follow-up – reached out to Leena to provide webinar to us
- The Ministry is assisting Mexico with a national strategy and has offered to



Metsähallitus

State enterprise that governs about one third of Finnish for forests and waters

- Foster natural values across generations
- Metsähallitus is a state-owned enterprise that produces environmental services for diverse customer base ranging from private individuals to major companies.
- They sustainably use, manage, and protect state owned land and water areas and reconcile the different goals of owners, customers and other stakeholders.
- Committed to promoting the UN sustainable development goals agenda of 2030 and UN guiding principles of Human Rights
- They manage approximately 1/3 of inland surface area 9.168 million hectares of land and manage 3,414,000 ha of water with a total amount of 12.582 million ha.

Mesahallitus Vision

- They will build trust through open interaction and pledge develop more customer oriented in digital forms of cooperation we will expand responsible and ethical practices throughout our value chain so that's part of the responsibility and cooperation within climate change we will
- Triple renewable energy production by 2030
- They will achieve a 10% increase in the carbon sinks of state-owned multiple use forests by 2035 and
- They will increase carbon storage on state owned land by 10% by the year 2035
- They will step up our efforts to actively halt threats to species and habitats
- Maintain deterring habitats across 17,000 has in protected areas and 4700 ha in commercial used areas by 2032
- They will strive for world class management of the conservation area network, for example to improve its ecological status
- They will improve the sustainability of natural resource use in the minimizing it biodiversity loss
- Will create opportunities for recreation and nature and wilderness experiences that promote health and well-being for everyone.
- Business operations will generate 114 million euros in government revenue by 2024
- Will create jobs boost regional economies especially in sparsely populated areas and improve partners opportunities developed safe and sustainable future and nature and wilderness tourism
- We'll develop and produce sustainable solutions for new products and services in the future that will help us transition from a fossil economy to a bio economy and we are pioneer in sustainable forestry

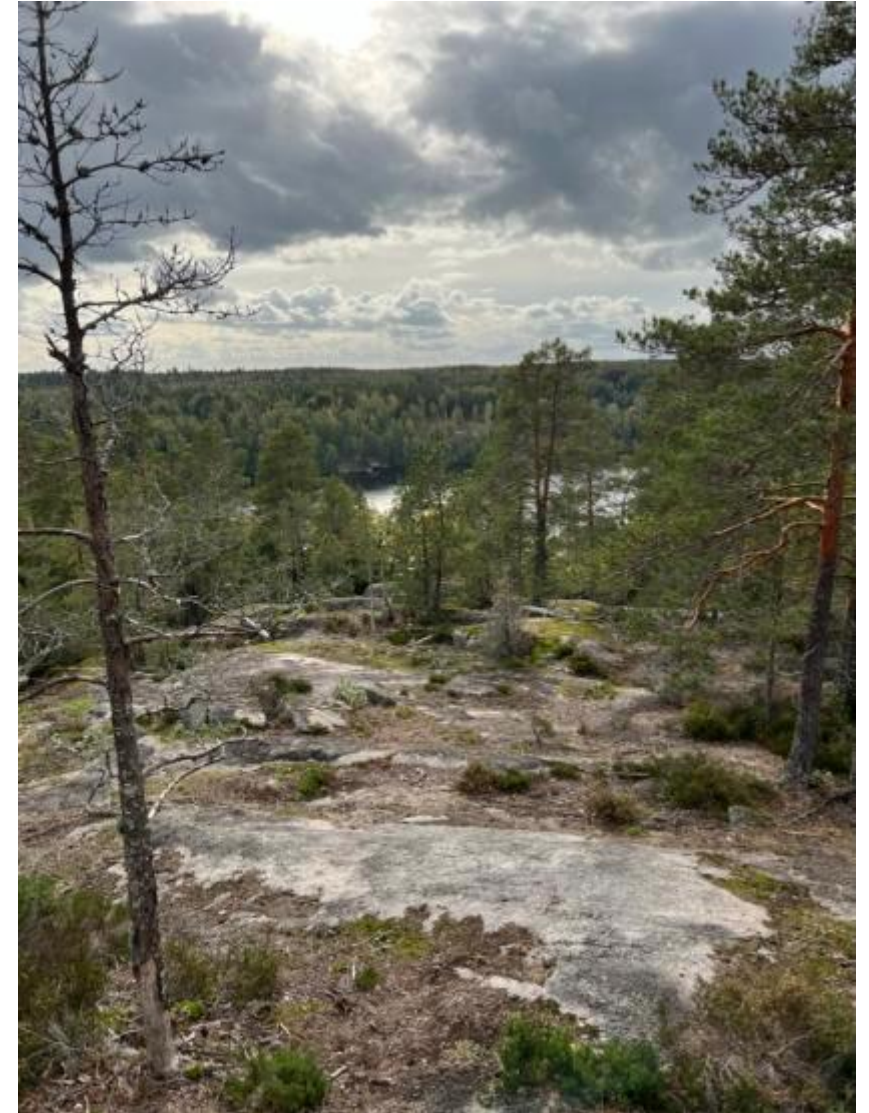
Metsahallitus

Key Messages:

- The Metsahallitus vision builds upon the National Strategies Vision goals and objectives – i.e., policy coherence.
- Research and innovation are the foundation for decision making and future planning
 - E.g., Continuous Cover Forestry – demand from society is directing new approaches research
- Heavy reliance on advanced digitalization across all segments within forest sector

Actions:

- Willingness to try and error
- BC Roadmap 2030 with inclusion of FN and communities in its development



Metsa Group

Metsagroup's parent company Metsaliito is a cooperative owned by more than 90,000 Finnish Forest Owners

- Their strategy for profitable growth is values reliability corporate corporation change and responsible profitability
- Strategy is sustainable customer oriented and growing with supply which is based on comprehensive for services in the utilization of data
- Strategic projects a forerunner in sustainable forestry superior customer experience most efficient operations and resources and reliable partnership based on values
- *Some of the mega trends are population growth urbanization digitalization biodiversity loss and climate change that help define their direction.*
- **They are diversified (vertically integrated) and add value wherever possible**
<https://www.metsagroup.com/products-and-services/other-bioproducts/>

Metsa Group Vision

To be the most sought-after partner in responsible business operations and increasing the value of forest assets, our strategy for profitable growth is based on that ***vision with the purpose to promote bio and circular economy by converting northern wood into first rate products sustainably and efficiently.***

Key takeaways:

- **The last part of the *Vision* could be used in BC as part of the BC Vision.**
- 19% women 81% men the average age is 44 years. The average time that they work for them is 14 years. Most have a forest sector university degree. They have no problem getting new people except for machine operators.
- The issue of finding machine operators is being addressed through the training center to some extent – BC is looking into coordination with the training center to create an employment stream for BC operators
- They use AI in estimating growing stock data the along with measurement data from harvesters and data collected from the log measuring devices at sawmills all providing reliable estimates of growing stock
- Committed to regenerated forestry - our goal is to ensure Finnish forest assets are transferred in a more vibrant diverse and climate resilient condition from one generation owner to the next.
- Added value is provided to forest owners by diversifying forest income while safeguarding the role of world trade.
- The group provides products with verified positive impacts on nature and ecosystem services.

Metsa Group

Key Messages

- Willingness to take risks – solid data as the foundation
 - Implement - Monitor – Modify – Repeat
- A solid foundation is needed to advance the bioeconomy – the core business is built on pulp and paper (80%) which has created new opportunities (20%) for Metsa
- Competitiveness of the forest industry is a key part of the national forest policy: employment, infrastructure development, attracting new investment

Actions:

- Explore how the value-add strategy by the MOF can be informed by what we have seen in Finland – link into the Value Added Accelerator initiative (BCFNFC, MOF, COFI and VAC) - Rachael Pollard, MOF and Michael Armstrong, COFI contacts



Key observation after DAY 1: A clear link between the Vision and how they go about managing the resource, from the State to the large Cooperative. They have embraced the need to change to address climate change with tangible actions. They have also made a strong linkage between the economy and the state of the resource.

John Deere

- The Joensuu factory was purchased by JD in the early 2000s – instilled LEAN – have 100-minute stations – flow is monitored and presented on screens showing Green on time, Yellow minor issues, Red indicating an issue – needs a supervisor or someone to address the issue. [Issues are triaged with effective support get back to “green”](#).
- All part deliveries are ‘Just in time’. Very impressive factory. Organized with bins with all the component parts delivered to the stations as needed. The entire machine takes 9 days to complete, and they create 8 per day. The only questioned thing noticed was they spray paint portions by hand and did not wear masks? Otherwise, we were wearing high vis vests, safety glasses and headsets that were linked to a microphone. They have a quality control where all units are tested for a period of about three days to ensure there are no glitches.
- They create custom single grip harvesters and forwarders at this factory. Size ranges with a plethora of options. A key element is the linkage to a GPS based mapping system that is linked to the cloud. All relevant data are transferred from the harvester to the cloud and used by the forwarder – with links from the mills on what is desired.
- These machines are not cheap – approx. \$1 million Canadian for the harvester and approximately \$700,000 for a forwarder.



Arbonaut

- Arbonaut staff provided us with a range of tools and applications, some of which are available in BC, and some are aspirational for BC – such as a LiDAR-based inventory available to all
- We had a presentation on the use of LiDAR layers and what they can provide for an inventory. They use approximately 800 9 m radius plots for 200,000 ha to train the data. BC is using 20 m by 20 m fixed area plots at much lower density
- Species are color coded. The government provides all 1 pulse per m² LiDAR to the public at no charge. The most recent 5 pulse per m² is not available publicly due to national security issues. They re-fly their LiDAR about every 6 to 7 years. Flying is seen as more cost effective rather than drones as they have limited range.
- Building comprehensive value on to LiDAR data with strategic/tactical/operational products to inform optimum sustainable forest management of multiple values (social, environmental, economic, cultural) in a digitalized platform.



Day 2

Key messages:

- The forest sector plays a large role in Finland and most people have a connection to the forest since a lot of people are employed in forest sector related businesses.
- Once LiDAR is available it creates opportunities for businesses to innovate
- It becomes more evident that a coherent voice and strategy is leading to new innovative businesses and largely contributes to the success of the forest sector

Actions:

- Recommendation for BC – Provide LiDAR and forest inventory - ensure the current BC LiDAR program collects required data for forest / ecosystem requirements not just critical infrastructure
- Need to start to frame a coherent approach to forestry in BC including all partners and stakeholder
 - First Nations engagement is critical



Joensuu Bioproduct facility

Background:

- 180MW CHP plant, 30MW heat plant, Biooil facility, Biochar facility under construction
- The plant is relatively large but quite simple, few workers.
- What seemed like a lot of feed stock surrounded the facility but was said to be only one weeks' worth. The stock looked to be partly sawlog ([BC Spec](#)) and pulp, but they were using it for biofuel. The intent is to wean off peat and move to slash and small wood to create a net zero solution.
- 100% local ownership, 11 heat plants 3 power plants across Joensuu.
- 270 km of piping, 230 m per customer.
- Heat from the mill is between 70 and 100 C and returns at about 40 C.
- There company is the 8th largest supplier of district heat in the country.
- Heating the majority of people living in Joensuu
- They have a roadmap for Carbon Neutrality – something that we should likely have for each facility – timelines on what to do when.
- Plant was originally built in the 1980s – i.e., they have been using this form of heating here for 40 plus years. The infrastructure piping has been in place or part of the planning.
- Buildings have radiators in the rooms.
- This power plant uses on average 40 truckloads per day up to 100.

Learn and adapt:

- Ash was used for fertilizer but was found to have too high levels of heavy metals. Now used for berms.
- They found that Bio oil was corrosive. One mill still producing it. Now exploring biochar to add value



Joensuu Bioproduct facility

Their plans:

- By 2030 to be carbon neutral. Stop using Peat, create green H, carbon capture, create biochar plant.
- The facility produces both heat and electricity and switch based on price. Their feedstock is supposed to be of poor quality, but economics determines end use.

Also interesting:

- Some figures Sawlogs are worth about 70 € at the stump, approx. 90 € at the mill gate, Pulp 40-50 € at the mill gate (standing 15 to 25 €). Transportation costs are a concern. They use 800,000 m³ yearly with a radius of 100 to 120 km. It was pointed out it may be closer to 20 km in BC for an economic source.
- Biomass is part of their supply chain, thus managed from the field to the mill as part of the total package. In the field we saw tops and limbs that in a normal situation would have been sent as biomass. The harvester would create separate sorts, sawlogs, pulp logs and biomass. The forwarder would move each independently. The biomass is left on roadside and covered by a locally invented paper covering to allow drying over the summer. Chipped ([not a pulp chip – coarse grind](#)) on site and delivered to the mill after that.
- This is a very typical setup in Finland and a major user of forest biomass across the country
- Provides a solid backbone of the biomass market in Finland
- Based on proven and existing technology



Joensuu Bioproduct facility

Key messages:

- A Finnish biochar company (4.5 billion € company) is looking for investment in Canada – actively seeking partners
- CHP provides a solid basis for exploration of other bioeconomy opportunities bio-oil/bio-char

Recommendation for BC:

- Support bioeconomy opportunities such as heat and power that provide a strong foundation for further advanced future technologies and learn the basics before moving to advanced bioproducts



Tornator

Background:

- They own 675,000 ha in Finland, 66,000 ha in Estonia, and 12,000 ha in Romania
- They procure more land each year (approx. 22,000 ha).
- Their stands cover the age range, with 40% at 30 to 60 years. 4% are 100 plus (no real old forests).
- Run by pension funds. **Annual ROI in the 5-7% range.**

Also interesting:

- They do strategic plans every 5 to 7 years and tactical plans every 3 to 5 years.
- Suggested small operators get 1 € more per m³ with FSC certification. FSC certification varies by country.
- They fertilize about 2% of their area - \$500 € per ha.
- There are government rules for reforestation. No rules for seed use, but the foresters want the best. They have BMPs.
- **Their planning tools provide for the full range of outputs based on accurate mapping. They have small compartments (stands) in the order of 2 to 5 ha. That are managed a specific way.**
- Cost averages – clearing 300 € per ha. One forester is responsible to manage 55,000 ha using regimes that are based on the data provided for each compartment.
- They stress timing of treatments is key to getting the optimum returns.



<https://www.tornator.fi/> choose English

Innovation in the forest sector:

Tornator has a leasing program where the owner receives monthly payments based on the potential cut. The interest in this program is increasing.

Recommendations for BC:

- For regimes to be successful in BC requires zoning for areas suited to thinning.



Fostering conversation and innovation the Finnish way



Metsa-Karelia thinning operation visit

Background:

- Site visit to a second thinning
- Trails are about 4 m wide, RBA at 16 m².
- The final harvest is planned for 15 years later.
- Value to the owner seemed to be significant.
- SI based on ecological factors.
- Spray stumps to limit root rot. Urea or some other material.
- No CWD objectives per se but they have dead wood direction from certification.
- These sites they fertilize and get 10% more volume. Heli or by machine, not by hand. 500 € per ha. Covered by the owner.

Harvesting costs:

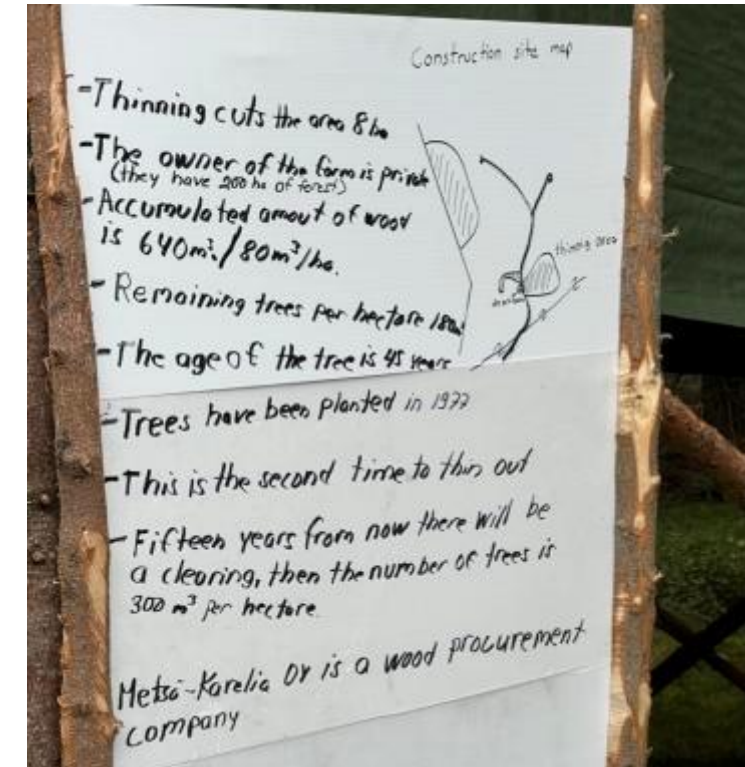
- 15 € /m³ meter in thinning
- 10 € /m³ in regeneration cuts
- 20 € /m³ in first thinnings

Stumpage:

- 20 € /m³ in first thinnings for biomass
- 25 € /m³ for pulp in thinnings
- 50 € /m³ for sawlogs in thinnings
- 30 € /m³ in thinnings
- 70 € /m³ in regenerative cuts

Machine costing:

- Harvester 100 € / hour including operator
- Forwarder 75 € / hour including operator
- Machines run for 4,000-5,000 hours per year – contractors sell machines after 5 years



Note: Stumpage in a Finnish context is what the land owner receives following the sale of logs. Silviculture costs are typically not accounted for in stumpage.

Note: The stumpage accumulates over time from 2-3 commercial activities on the same ha. This is key to the value vs volume model in Finland that maximizes economic returns to the landowner.

Day 3

Key Messages:

- Finnish people treat their forest operations responsibly
- Operator training is critical for success.
- Machines need to run efficiently in order to be successful
 - This contractor runs machines 5,000 hrs/yr
 - Replaces machines after 5 years (25,000 hr)
- Good inventory data is essential for private companies and leads to innovation and solid decision making
- Coherent messaging and strategy visible at all stages

Actions:

- Need for machine operators that understand forestry and high utilization – proper workflow is critical
- Provide LiDAR and inventory data to support forest managers and innovation in the forest sector



Kesla thinning operation visit

Background:

- 2nd thinning in a birch stand
- “Kesla 21” mounted on a “Pro-Silva machine” is a smaller harvester than on day 3
- Multitree felling head with chainsaw and shear head
- Tractor based forwarder
- Forwarder distance – max about 250 m. An interesting factoid provided was anywhere you go in Finland you are likely not greater than 800 m from a road.

Machine costing:

- 85 € / hour including operator
- 380,000 Euro including head
- Used 2,000 hours per year
- Forwarder trailer is about 80,000 Euro
- Tractor approximately 120,000 Euro – can be used for multiple purposes – high utilization
- **Significantly lower investment and operating costs compared to a traditional setup – this provides opportunities and flexibility for a range of stand pre-treatment conditions**

Recommendation for BC

- Explore this equipment set-up for area based tenures and fuel treatment programs.



Kesla thinning operation visit

Firewood facts:

- Finns use 6 million m³ of firewood per year.
- The cost of it now is high - 250 €/ m³ cut and dried (3.5 m³ per cord = almost \$1,000 E per cord – or \$1,500 Canadian).
- The cost at the site is about 20 €/m³.
- Finns almost all have wood as a backup – they treat it like the French treat red wine. It is obligatory to have a backup to electricity so many use wood. There is a need for people to follow BMPs to reduce emission issues. E.g., Birch takes two years to dry once split.
- While wood is being used for biomass there is a shift to other sources such as wind and solar.



Eno Energy Cooperative

Background:

- Established in 1990 for members sell their wood directly to the coop.
- The key is to have the entire supply chain worked out.
- We saw all parts from the log storage to chipping, to dumping to the actual boiler factory where the chips are moved out of the truck by an internal conveyor system.
- The boiler provides heat – too small for electrical generation.
- All small towns have these in Finland.
- Wood is left at roadside with paper tarps for drying over a period of **one to** two summers. The tarps are a local invention and help with snow as well as rain. They are 6 m wide. The machine is used to pull over the stacks of wood.
- Chipping (**not pulp chip**) is used, not grinding. The machinery is sensitive to rocks so professional piling is recommended – minimizing the area touching the ground.
- Chipper is approximately 700,000 Euros, with the truck with moving bed approximately 2 to 3 hundred thousand euros. The truck hauls 16 tonnes of dried material.
- Boiler site – small scale. Limit on the distance the heat can be transported. Most efficient use is in larger buildings, e.g., schools, hospitals, seniors' homes. Dispersed houses are not efficiently served.



Small scale operations

Key Messages:

- Wildfire is the main hot button issue to gather support
- Use of smaller equipment is very successful and has its place alongside high efficient operations
- Significantly lower investment and operating costs compared to a traditional setup – this provides opportunities and flexibility – to be explored for community, First Nations forests and fuel treatments
- Bioenergy is part of the success story in Finland and provides the backbone of the bioeconomy
- Operator training is critical for success. Machines need to run efficiently in order to be successful

Actions:

- Need to develop small scale supply chains to deal with fuel treatment and provide opportunities in communities across BC
- Need for machine operators that understand forestry and high utilization – proper workflow is critical





Riveria Training School

Day 5



Riveria Training School

Background:

- State of the art training facility for forest machine operators
- The training center is a three-year program for young workers fully funded by the Government.
- The students learn some forestry but predominantly how to work the various machine types.
- The simulators show how complex it is to begin with.
- They get hands on experience from simulator, to actual machine simulators to working in the bush.
- Success rate is 98% or so.
- Government pays for the tuition and room and board.

Key observation: Training of operators is critical and leads to success



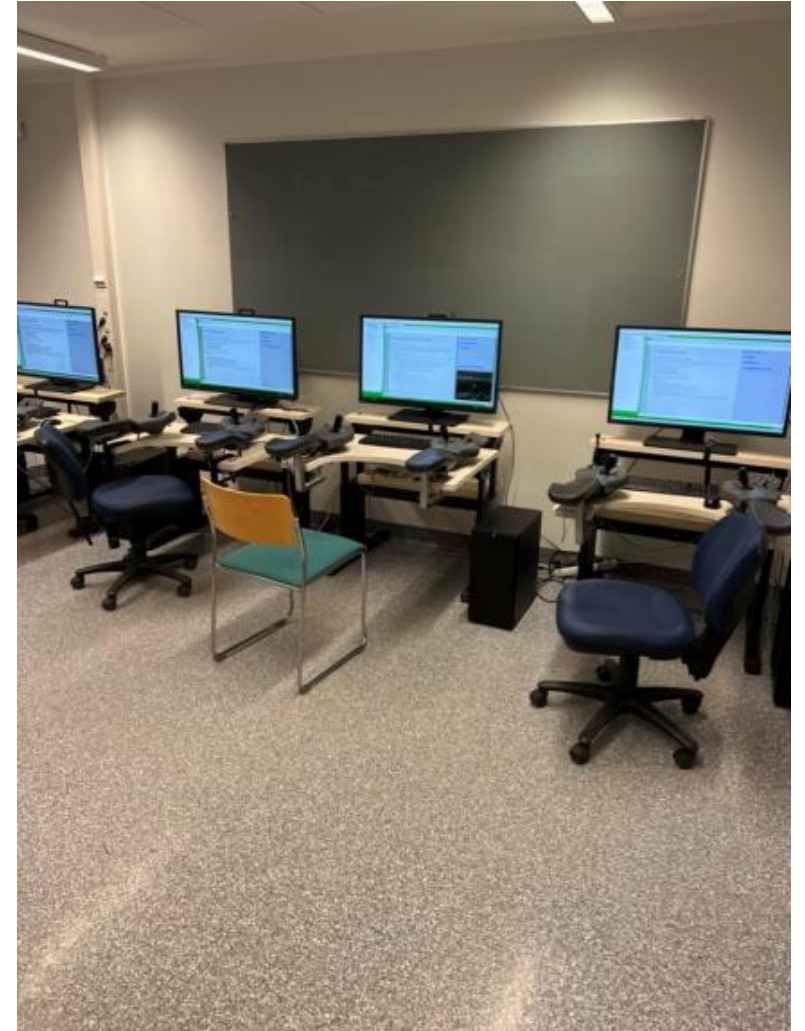
Riveria Training School

Key Messages:

- Training of operators is critical and leads to success of an entire sector
- Focus of the training on the entire system (planning, silviculture, operations, maintenance)
- The training school is a great example of the coherent strategy in Finland. By spending money on proper education of operators a solid foundation is provided that supports the entire sector and builds trust

Recommendations for BC:

- Need to develop these kind of training opportunities in BC



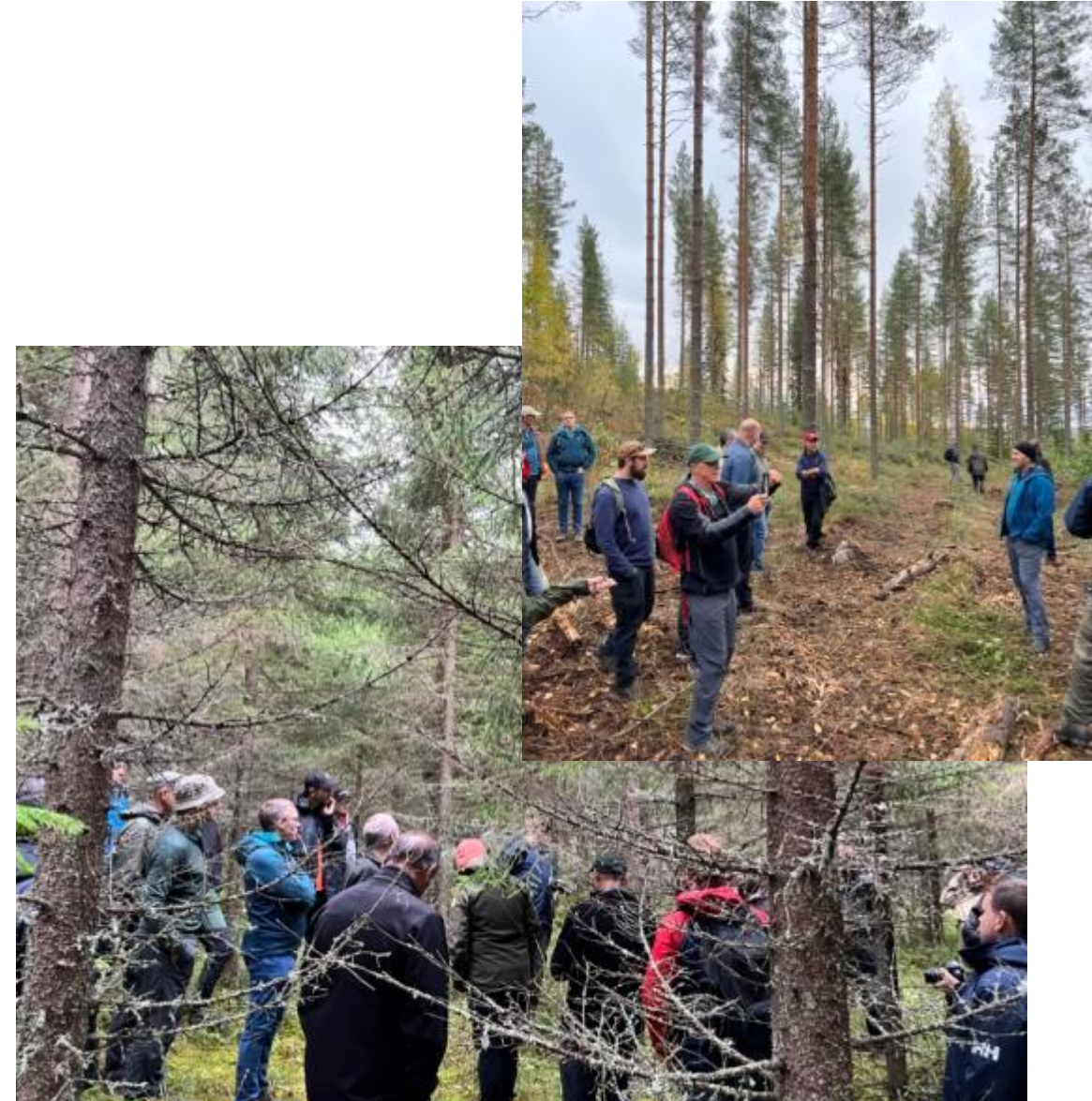
Forest management field visit

Key messages:

- Good data leads to good decisions
- Good data enables forest management and builds trust
- Thinning models are a critical component to manage forests under a thinning regime

Recommendations for BC:

- Need for an enhanced forest inventory in BC
- Development of tools and services that focus on improving forest management and decision making



Metsä Group

Background:

- 1.2 billion Euro state-of-the art facility
- Fully committed to the new bioeconomy
- Using wood elements to create bio products to replace plastics and the use of fossil fuels
- A commendable objective with tangible outcomes.
- The company is privately owned by 90,000 landowners.
- It uses over 6 million m³ per year
- Building a demo plant to produce clothing fibres from wood
- Build on a solid foundation producing pulp – adding on other high value bioeconomy product streams
- Unique visitor center demonstrates the positive image that forestry has in the society



Key observation: The bioeconomy is real and value add is possible – build on the traditional industry foundation (sawmilling, pulp & paper)
 Recommendation for BC – support the existing industry to diversify through enhancing fibre supply confidence and certainty.

Key needs to move forward

A coherent vision/forest strategy that formulates and enables:

- A clear commitment to manage our forests with adaptive management throughout the rotation according to clear objectives
- A commitment to implement, review and adapt (innovative) practices based on solid data and science
- Risk tolerance to do things differently
- Leadership
- Knowledge and knowledge exchange
- For this to be driven by the forest sector as a whole
- Improved social license
- A coherent voice to make change happen
- That fully embraces the emerging bioeconomy



Kesla thinning operation visit

Background:

- 2nd thinning in a birch stand
- Smaller harvester than on day 3
- Multitree felling head with chainsaw and shear head
- Tractor based forwarder
- Forwarder distance – max about 250 m. An interesting factoid provided was anywhere you go in Finland you are likely not greater than 800 m from a road.

Machine costing:

- 85 € /hour including operator
- 380,000 Euro including head
- Used 2,000 hours per year
- Forwarder trailer is about 80,000 Euro
- Tractor approximately 120,000 Euro – can be used for multiple purposes – high utilization

