

# Oregon Board of Forestry's unrestrained vision for Oregon forests

## Summary

At the Oregon Board of Forestry meeting on April 6, 2022, former Governor John Kitzhaber encouraged us to envision Oregon forestry unrestrained from the realities of today, as perhaps it could and should be. It is hard to connect the dots between that approach and what department staff and board members will face - the realities of the present day - as we begin work on the Forestry Plan for Oregon. How do we square the two?

Governor Kitzhaber claims that different forest ownership structures and our forest governing systems are not serving Oregonians very well. I envisioned Oregon forestry as it would be if every management and ownership structure we have today magically disappeared, but the big picture challenges we have today are the same. No federal lands, no state-owned lands, no tribal lands, just forested lands that we manage for the best possible outcomes. No complete and coordinated firefighting structure.

In such a world how would we regulate forestry? How would we fight fires? How do we deal with geography and different climates? How would we manage how forestry affects species and water? How would the industry be successful? How would we approach carbon? How would we approach climate change?

I kept it really simple and high level and limited myself to one page. I am sure it is woefully incomplete, but don't think that is the point.

This is my ask of you Board members: write your own thoughts on this issue. Keep it simple and high level and try to limit to one page. The results will be combined and then become a tool in the toolbox. If we have a vision for a more perfect "unrestrained" world of Oregon forestry, it will give us something to help us frame our real world vision and goals. It will provide a filter. Does this take us towards a smarter and better world of managing Oregon's forest, or does it take us the other way?

*Chair Jim Kelly  
Oregon Board of Forestry*

[Link to watch the Board of Forestry discussion on this topic.](#)

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## Response 1

### Management

All forests in the state are managed by one agency that deals with all natural resources issues with similar rules for all lands, modified to reflect climactic regional differences.

### Planning areas

Focus forest management and planning on a watershed basis with a goal of maintaining healthy and resilient working forests, clean drinking water, and species protection.

### Preservation

Preserve x% of forests as unmanaged old growth forests (protect existing old growth). Focus on preserving rainforests that are unlikely to burn in wildfires.

### Carbon

Active management of forestlands throughout the state that are designed so that carbon stores are additive over time, while accounting for carbon loss due to fire and disease.

### Economic success

Oregon's forests and forest products are at the forefront of world standards:

- State of the art use of technology in logging and milling.
- All Oregon forests certified as climate smart.
- Focus on technologies that create high-value products from thinning.
- Focus on local use of Oregon timber and wood products for commercial and residential use in Oregon.
- Investments in mills located where needed for resiliency projects, with certainty of supply a priority. High-tech mini mills located close sources of fiber to serve resiliency needs.

### Fire and firefighting

Oregon's forests are returned within a generation to a healthy less-fire prone condition.

- Aggressive commitment to thinning and prescribed fire investment in drier forests.
- Programs to adapt forest and tree species to climate change.
- Fire breaks and other methods employed to impede large fire growth.
- Public policy changes to stop large fires (highway closures, power shut down protocols).
- Single agency managing all firefighting in the state.
- Widespread public health investments to protect vulnerable citizens from smoke (filters, etc.).

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## Response 2

### **We should strive for the forests of Oregon to be healthy, robust and resilient.**

*Healthy* means that they are not in peril due to any particular disturbance, but are growing vigorously. Disturbance events are an important ingredient in a forest, but should appear at an appropriate scale. When a fire, bug infestation, wind storm, drought, etc., starts to affect a large area, that is a problem, and we should work to avoid large-scale disturbances.

*Robust* means that there is a full complement of plant, animal and tree species present at both the landscape scale as well as the stand level. There is a wide range of ages present on the landscape.

*Resilient* means that the forest has the ability to persist as healthy and robust over time and long into the future. This will require a certain level of complexity and adaptability in the forest in order to persist despite disturbance events.

### **A forested landscape in Oregon that is healthy, robust and resilient should be able to provide a wide range of benefits to the people of Oregon, the U.S. and the world.**

This includes (but is not limited to):

- A supply of valuable timber and wood products delivered to local mills.
- Abundant local mills that will manufacture long lived durable wood products for the world.
- Watersheds that provide enough clean drinking water for the people who live in those watersheds.
- An ever-increasing store of carbon in the forest.
- Abundant and well-managed recreation that is accessible to all Oregonians.
- An ever-increasing store of carbon held in the built environment.

This healthy, robust and resilient landscape that is providing all of these benefits will serve to both support the towns and communities that live in or near these forested areas, and will also exist for the enrichment of all Oregonians.

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## Response 3

Consistent with what I think the direction is, this is very high level and assumes no land ownership distinction nor a trust land county concept. It also assumes we have significantly more information on a range of topics (species distribution, perennially indices, old growth inventories, water basin studies, etc.) than we do. It also assumes a consistent multi-faceted goal for management of forest lands that is not dependent on agency jurisdiction etc.

I envision an approach that takes inspiration from the State Forest HCP but without the use of legal standards to set our metrics (for instance avoiding "take" under ESA is not a sufficient standard for species...instead we want to see healthy population numbers that are sustainable over time and resilient to large- and small-scale disturbances). In summary, the approach takes a landscape level view and seeks to promote healthy, resilient forests that can provide a range of values to present and future Oregonians by managing certain areas primarily for non-timber related values while providing reliable harvest opportunities in other areas. To ensure that non-timber values are adequately protected, action must be taken to identify and preserve the forest habitats that are most important for species habitat and connectivity (especially STE species), biodiversity, carbon sequestration, water quantity and quality (headwaters and riparian areas for example) and cultural needs (in consultation with Tribes). Generally, these areas would not be managed or would be passively/minimally managed to achieve identified goals. In considering the placement of these areas, climate change impacts must be considered. For instance, unoccupied habitat that is projected to become occupied due to climate change conditions should be considered for inclusion as a species protected area. Climate change adaptation will be addressed by promoting resilient landscapes and species designed to withstand disturbance. Additionally, will be addressed by promoting reduction of emissions in forest operations. Climate change mitigation will be addressed by preserving key old-growth areas and/or promoting practices that increase sequestration in soils. Perhaps use of markets.

Areas not set aside for other value protections could be open to harvest with consideration given to areas that can assist with restoration of early successional habitat, reduction of fuel loads or management of disturbances (pests, etc.) or avoiding areas that would present safety concerns or other negative landscape outcomes (landslides, etc.). The key should be finding opportunities for sustainable, reliable harvest (with predictable yield) that can give industry the ability to plan and invest in infrastructure and workforce. Replanting and BMPs would be required. Diversification of products should also be considered that take into account changing markets and consumer preferences. Incentives and/or private/public partnerships could help reduce the risk of diversification. Support measures to reduce potential for land conversion (although may not be as much of an issue in this scenario). Some level of harvest should be directed toward WUI areas or other medium- and high-risk fire areas to also help improve fire resiliency. May be helpful to have one entity be responsible for forest fire prevention and response in close coordination with local fire districts. This entity will also be responsible for identifying and utilizing available tools to mitigate fire risk including prescribed fire.

A key accepted practice would be adaptive management that is informed by the best available science. A standing independent scientific advisory committee that conducts and/or stays abreast of new relevant science and recommends adjustments to the management framework if necessary to achieve goals/objectives would be ideal. Additionally, offering opportunities for diverse public feedback on initial management designations and potential changes would be key.

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## Response 4

Envision Oregon forestry as it would be if every management and ownership structure we have today magically disappeared...

### 1. How do we deal with geography and different climates?

Forest management in Oregon needs to be set within the context of [forested ecoregions](#) as they exist today and as they will likely exist in 80+ years (one full rotation). Forested regions need to be defined ecologically as influenced by climate change but will likely generally fall within the following geographic regions: Coast Range, West Cascades, Southwest Oregon, East Cascades, Eastern Oregon.

### 2. How would we approach climate change? How would we approach carbon?

There is a moral responsibility of all Oregonians, all US citizens and the global community to do whatever we can to sequester and store carbon and prepare for dramatic changes to [our future forests](#) in most regions of the world. We need federal and state policies to achieve this goal and to encourage afforestation of potential forest land so that all management decisions, policies and practices maximize carbon storage while minimizing greenhouse gas emissions in forests now and over >80 years.

### 3. How would we regulate forestry?

There would be one set of regulations across each forested region of Oregon regardless of ownership. The most ludicrous current policy framework involves streamside protection where streamside management areas change as the stream passes from federal to private to state to ag lands. The stream is a system that has been chopped into pieces by a legacy of artificial boundaries imposed over the past 150-200 years. One set of regulations across all ownerships supported by science, aligned with federal policy and enacted by the Board is needed. This applies to water, air, state- and federally-protected species and to a carbon storage policy which needs to be developed and included within this regulatory framework. A Science Advisory Committee, independent research scientists from universities, should inform policy development in each of Oregon's forested regions. If Tribal Nations agree, an international tribal advisory committee could provide traditional ecological knowledge to guide policy decisions. Metrics for success in each region should be identified and monitored. Policies should be reviewed, and if needed, changed regularly through a [structured decision-making process](#).

### 4. How would we fight fires?

We would only fight fires within control lines established within [Potential Operational Delineations \(PODs\)](#) in each region with control lines established to protect people and infrastructure. The idea of putting out all fires within 24 hours should be abandoned EXCEPT within PODS control lines. Forests should be managed to interrupt the spread of crown fires by establishment of fire-resistant species (e.g., hardwoods, old thick-barked trees) to form regularly spaced fuel breaks as well as a source of wood products and habitat. Rotations should be long (80+ years) with large trees of species able to withstand fires. Approaches will vary by forested region. Repeated fires (prescribed and wildfires) will eventually reduce fine fuels in some of the drier regions.

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### **5. How would we manage how forestry affects species and water?**

See response to 3, above. In addition, stands should be mixed-tree species each adapted to withstand different types of intense weather events, as an insurance measure. As some species die out from climate change and extreme weather, other species present in the mixed species stands can replace them. Species and genotypes from other areas will need to be matched to likely future site and climatic conditions.

### **6. How would the industry be successful?**

Each forested region will control timber harvest sufficient to allow regularly spaced mills to continue to operate so that economically viable management options remain in each region. Industry must adapt to an unpredictable future. Mills will need to adapt to a variety of species and piece sizes from mixed species stands grown on long rotations. Wood products should be long-lived and distributed in a manner that minimizes greenhouse gas emissions.

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## Response 5

We live in a world where different owners have different objectives for the management of their lands. Economic, environmental and social forces push and pull on these goals and objectives and often result in unexpected second and third order consequences. This, combined with an unrealistic idea that every acre of forest land can do everything at once (economic, environmental, social) with the average Oregonian not appreciating how forests change through time.

### Areas of exceptional value

While there are special places that are unique because of their environmental or social value (e.g., wilderness areas, parks) these places should be carefully selected regardless of ownership because of their uniqueness. Any forestland that is selected to be “unmanaged” or managed only for the benefit of one use should be extremely limited. The reduced economic benefits should be accounted for to the local community financially. Increased risks (e.g., wildfires) that may occur because of managing for one value should also be accounted for in assessment rates.

### Control of fire

All lands would be evaluated for risk under the same criteria. Fuel loading, stand conditions, topography, would drive prevention and suppression techniques across entire landscapes. Landscapes at higher risk would be assessed at higher rates, thus creating more money for prevention, control, and incentives for mitigation.

### Forest regulations

Science and best practices would be used across all forested landscapes with no limit on available tools to achieve stand management goals. Use of herbicide, road construction, logging practices, burning, etc., would be available on all lands if the use of these tools were appropriate. The protection of threatened and endangered species would be considered across all lands together, recognizing that forests change through time and benefits will change as forests change. The goal would always be to have enough of the forest in different conditions to sustain species.

### Carbon and climate change

All lands would have the same access to carbon markets and the impact of any management activity, offset, or harvest would be evaluated completely to the net effect on carbon in the atmosphere. Consideration of carbon stored in forest products along with the leakage associated with Oregon Forests not producing forest products would be measured when evaluating the net effect of harvesting to atmospheric carbon. Additionally, CO<sub>2</sub> emitted from fires along with the loss of carbon storage resulting from stand replacement fires would be considered. The change of forests from being sinks of carbon to emitting carbon from insect, disease or fire would be considered when evaluating forest treatments.

### Vibrant forest industry

It would be recognized that a vibrant forest industry across all forested areas in the state needs to be maintained and reestablished in those areas of the state it has been lost. Consistent and predictable volume would be available in enough quantity to allow each region of the state to compete nationally and globally.

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## Response 6

### 1. How do we approach climate change?

- Incorporate a "Natural Life Cycle" perspective, based on knowledge that "Forests are dynamic systems that naturally undergo fluctuations in carbon storage and emissions, as they establish and grow, die through natural aging, competition processes or disturbances (e.g., fire and insects), and re-establish and regrow." (Sustainability and Climate office USDA)
- Scale up strategic approaches. Work across larger EcoRegions, not just admin boundaries, to accurately frame problems and expand possible opportunities.
- Literally, think/go "up stream" to identify watershed health issues that have immediate consequences to downstream WUI. Addressing interface (WUI) alone is like investing solely in emergency room care vs. long-term preventative health care (entire watersheds).
- The catastrophic wildfires we experience today in Oregon are density driven.
- -The historic outbreaks of insects and disease we see across the west are density driven.
- Identify those watersheds across EcoRegions that are have "missed" multiple natural wildfire disturbance cycles. Those at highest risk due to fuel loading and out of sync with fire regimes, prioritize for coordinated thinning and prescribed burning.
- Gather the top leaders of all the acronym natural resources governments within Oregon (and possibly beyond) for "action-biased" work on this one issue, including DOD. Leverage their diverse tools for identifying issues and innovations, working at all scales.

### 2. How do we approach carbon?

- Understand that carbon is naturally in every part of our forested landscape, and carbon will increase and decline as part of the natural cycle/ system. Carbon issues may not be resolved in the same way that our other natural resources problems were solved before.
- Governments setting statewide carbon reduction deadlines may not work for forested systems?
- Already, Cop 26 carbon neutral goals are being missed due to unanticipated war in Ukraine and global COVID consequences. Some economists believe the focus only on forests globally will not meet that goal (to make up the 10% needed). "Nature-based" solutions will not be enough, a private/public approach will need to close that gap, including existing and new green technology. (Anne Finucane)
- Forests across U.S. remove the equivalent of about 12 % of annual U.S. fossil fuel emissions. Forests in Oregon may offer twice this contribution, providing additional time for Oregon to try innovative problem-solving options and time. Oregon forests currently contribute carbon benefits to a higher degree. On the downside, if we lose that capability, due to out-pacing of catastrophic wildfire and insect and disease; Oregon forests will not only fall behind, but may become an overall emitter of carbon, similar to Montana forests.
- Plan time for robust Board conversations on assets Oregon forests bring to the climate change and carbon table. Discuss not only benefits of carbon sequestration and carbon storage rates, but forest contribution to working landscapes and healthy communities, socially and economically.
- Differentiate, between our vision and tools. First, describe our vision for forested lands and communities (e.g., health, resiliency, productivity, diversity) in a changing climate

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environment; then address carbon markets and perhaps credits, as a means (tools) to achieve vision.

- Expand biomass utilization as an essential carbon-cycle solution for density driven fuels issues. Remove arbitrary policies that limit the ability to create innovative paths for biomass removal and use.
- Upscale reforestation capacity. New growth from seedlings is foundational for carbon sequestration cycle. Shift from natural seeding (due to leave tree prescriptions) to realities of replanting/reforestation due to increasing catastrophic wildfire stand-replacement events.
- Consider before completely discarding idea of carbon credits (consider all tools). With global interest/focus, carbon options will continue to evolve rapidly. The pandemic, war in Ukraine, etc., continue to create volatile global issues and Pacific Rim Oregon is connected to all.

### **3. How do we consider geography and different climates?**

- Geographically different ecosystems all have natural patterns of disturbances (wildfire regimes intervals). These natural wildfire return intervals vary according to a landscape's geography and climate. Implement management tools that will return the natural disturbance patterns according to the specific landscape.
- Lean into communities that support innovative /adaptive actions. Leverage community strengths and diversity.

### **4. How do we manage forestry and affected species?**

- Forest landscapes and ecosystems are habitat for wildlife terrestrial, avian and aquatic species. If forest health is declining and at risk due to wildfire/insect/disease events, then too, is the risk for the habitat that forests provide.
- Past options to set-aside more habitat may not be a long-term solution? Evaluate recent wildfire impacts and patterns on habitat set-asides and determine if now is the time for a paradigm shift. It may be time to consider a level of active management to reduce catastrophic wildfire threat to important habitat.
- Thoughtfully design and implement "demonstration" prescriptions and projects around the most "at-risk" habitats. How can forest stands maintain diverse structure and also be resilient to intensive wildfire events?
- Is current interpretation of ESA still logical in this climate change environment? Retired USFWS Director of SE, Cindy Dohner, recently testified to Congress stating there is room in ESA for management of species. NEPA and Oregon wildfire recovery activities determine why recent CEs were not upheld - science or social? Should lawmakers update these policies to reflect the expansive and intensive impacts of wildfires in the west? Does Oregon have a dog in this fight?

### **5. How can forest industry be successful? Or another way to ask this question - how can forest industry be successful and be an important part of climate change and carbon options and solutions?**

- In June of the 2020 pandemic, when hundreds of thousands of lives were being lost across the globe, World Health Organization officials reevaluated their strict "shut down" of human

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movement and business. They recognized that “lives and livelihoods” were both important. Stating, we should not choose between either, we must have both.

- President Biden, during his final push for passage of the bipartisan stimulus package in March 2021, stated that 400,000 businesses were lost during the pandemic and made the case that businesses are part of a healthy environment and economy.
- Forest industry is key for the restoration of our forest lands. They can implement fuels reduction through mechanical treatments and biomass utilization; and ensure a continued healthy life cycle of carbon, through reforestation and creation of hardwood products.
- To be successful in forest health and restoration efforts, Oregon needs a network of industry infrastructure to meet this challenge. Some western states painfully lost infrastructure that is now sorely needed and key to restoration of healthy forests, in the face historic levels of wildfires and insects/disease.

### **6. How to fight wildfires (how to fight wildfires successfully in increasingly severe weather patterns and fuels loading?)**

- Multiple local, state and federal agencies are part of the nationwide firefighting structure and organizations. However, wildfire fighting resources become limited later in the wildfire season and particularly when the nation reaches Level 5. What are adaptive strategies for Level 5 resources?

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## Response 7

Chair Kelly,

You asked us to envision what Oregon's forests could be. I will provide some specific elements below but before doing so, I wanted to offer that Oregon should aspire to be a leader – within a peer group of comparable forest regions across the globe. This peer group would naturally possess forests but, more importantly, cultural values that prioritize forests and wild landscapes. California and Washington are often mentioned as peers, and I would add to the list British Columbia, given its similar landscapes and politics. I would also add Finland, Sweden and New Zealand, three progressive countries I have toured over the past few years with the OSU College of Forestry. In fact, I just returned from Finland and Sweden and have attached notes from my travels for your review. In short, I believe Oregon has a lot to learn from this peer group. These are cultures where urban centers not only value forests, but also forest management, forest products and the forestry profession. Indeed, local forest products are showcased in the urban centers of in these peer regions. See as examples: Vancouver Olympic Pavilion, Stockholm mass timber district. We are seeing some progress here in the Northwest – both PDX and the Seattle airport are investing heavily in wood-based architecture for this specific purpose – and I believe the BOF must lead the conversation in Oregon that builds upon this momentum. This is a tremendous opportunity for both the BOF and for Oregon. As my travel notes suggest, Oregon has a great deal of catching up to do, relative to our peers. There is no reason Oregon should be in this position. We are the natural leaders in this peer group. The BOF must lead the way.

That is the opportunity. Here is the threat. The USFS, in their “Confronting the Wildfire Crisis” report (April 2022), provides some alarming data we must heed. Page 18 states, “Smoke from wildfires now causes about 25% of all harmful human exposure to fine particulate matter (a form of air pollution) in the United States. Economic losses from wildfires have grown into the hundreds of billions of dollars each year.” Extrapolating these figures forward, several trillion dollars are at-risk over the next decade. Oregon will incur a significant share of these costs, as the USFS lists Oregon among the states at highest risk of wildfire. As noted, the USFS particularly highlights the health ramifications from the growing wildfire crisis. I believe the health issue is only now garnering the attention it deserves, and will grow to dominate aspects of the BOF agenda in the coming years. At present, Oregon and the west simply are not prepared for what is coming.

The same USFS report (page 38) states, “Hispanic populations in the west are twice as likely as other demographic groups to live in areas most threatened by wildfires.” This begins to add the social justice dimensions of wildfire and climate change. As we discussed at our April 6 kickoff meeting, the BOF will increasingly be tasked with addressing wildfire due to its threats to vulnerable communities. This conversation has only just begun. We must lead.

As it is, in Oregon we remain on a very *UNSUSTAINABLE forest management pathway*. As we think about the next 30-50 years, we need to focus on:

1. Forest resiliency, genetics and forest health that can tolerate changing weather and climate conditions. As we are seeing now in the wake of the 2020 fires, a very pragmatic need is

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additional nursery capacity. We need to anticipate greater demand for seedlings following catastrophic fire.

2. A wood products industry that is thriving and profitable with innovation that meets society's needs.
3. Forest practices that move us from a fossil fuels-based society to a "renewable, sustainable fuels-based" industry, that support renewable biofuels and sustainable products.
4. Forests that support rural communities and make them economically viable and healthy. Forestry is a key to Oregon's economy and this high multiplier, value added innovation is key to our rural economies and counties.
5. The backlog of forests needing fuel reductions must be completed. The USFS and BLM need to increase harvest and downsize burnable fuels so normal fire activity can resume.
6. Forest systems that provide for widest diversity of species and wildlife. A system based on rewarding land owners who maintain and increase habitat health. A system based on metric, measurement, outcomes and rewards.
7. Forestry is already a net CARBON sink. Increasing wood buildings and structures throughout Oregon, adds to the long-term stable carbon. Improved systems with technology that measures carbon.
8. Forest sustainability. Continue to plant more trees annually than we use; fossil free mills by 2040; forest waste streams that are 100% utilized and generating renewable energy and bio-products.
9. Housing affordability. Oregon can help solve our "affordable housing" crisis with sustainable harvest and thinning from the USFS and BLM public lands.
10. Oregon's government can move from a "plastic-based and fossil fuel-based economy" to "wood-based renewables" in our packaging, water bottles, pallets, food containers, etc.
11. Forest recreation and human health. Recognize the studies that correlate human health to wood, be it in nature, churches or wooden structures.
12. Public safety. Utilize CLT and new wood innovations for proven earthquake resiliency. CLT is essential in new schools, government buildings, etc.
13. Rewrite the endangered species act and move away from a control/command "taking" that is not protecting species, to an incentive-based "reward" system that benefits forest managers for actual increased results, using third party verification.
14. "Thinking LOCAL" – Oregon should be "clean and green." Our forests are key in getting back to this image.
15. Purchasing by 2040.....mills are fossil free; water used in mill processing is down 40%; 100% of the forest waste stream is utilized; we have moved our system from fossil based to a renewable, sustainable wood based system; Oregon's public purchasing, supplies and buildings are wood based; Oregon increases harvest and thinning on public lands and drives down affordable housing issues; and the state provides incentives for this conversion.
16. State forests also become a resource to every Oregonian, not a liability.

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17. Oregon must move off this UNSUSTAINABLE forest pathway that demands over 50% of the ODF budget to fight fire; burns 4 million+ acres in 5 years; has burned 7 rural communities and lives lost; generates billion dollar lawsuits with endless conflicts; and dangerous USFS and BLM lands due to unmanaged forests with record burnable fuels. Oregon needs to step OFF this pathway onto a much more sustainable pathway that includes forests as a key part of our solution.
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1. Sweden and Finland are moving from a **FOSSIL FUELS based economy to a RENEWABLE, sustainable fuels based economy** and 2030 is their goal. Wood products and the forest waste stream are CORE to this change. Below are many of the products they are focused on. Big investors are now buying agricultural land and planting forests.

wood/fibre/CLT/lumber/pulp

wood chips/bark/sawdust/biopellets

bioenergy/biogas/oil/fertilizer/gases/electricity/steam

fiber/clothing/food packaging/packaging/cosmetics/paper/cardboard

2. **METSA Group** was a most impressive stop. They have 100,000 owner-members to this cooperative that supply wood; 80% of their wood comes from Finland and the other 20% from other Northern European countries; their wood is entirely traceable and 88% of the wood is certified; each part of the wood is used efficiently and for the most valuable purpose. METSA has 35 production facilities in 8 countries. Their owner/members have about 5.2 million hectares. One of the most impressive products they make is a **fibre made from sawdust**. *This fiber looked identical to wool, and is being designed for clothing.* Kuura is the brand name for this fiber and Itochu, a Japanese trading company, is Metsa's partner in this new wool like material. They said this is expected to be a 100 million tonne market. The waste stream in both Finland and Sweden is important, as it is essential to heat, energy, and core to their new products. Metsa's focus is to be "sustainable" every day. Their new Rauma Sawmill will be fossil free from day 1. Their goal is to reduce water usage by 25%, and to utilize 100% waste stream from their sawmills by 2030. Bark and sawdust go to bioenergy; chips to pulp; ash to fertilizer and earthwork materials; and green liquor waste to geopolymers. Bioenergy creates steam and electricity. New products from their mills include fiber, fertilizer, sawdust, bioenergy, geopolymers, biogas, wood chips, oil, turpentine, bioethanol, biopellets, bark, pulp (for further processing), new bark, gases and lumber. The government is guaranteeing investments, subsidizing interest rates and very focused on moving away from fossil fuels.

3. **Optimization and traceability** is starting at the forest level, in addition to the mill. Mills want different wood quality and characteristics in addition to log size and length. Using the same technology as we do in U.S. mills, they are optimizing logs prior to harvest and determining which mill these logs will go to. It was common for us to see 10 or more sorts in the fields and multiple log sorts at the front end of the mills. We saw **Ponsse harvesters** which collect extensive data at harvest. (Lee Miller, Miller Forest Services, utilizes these harvesters. He harvests, thins and provides services in 6 U.S. Western states). The mills dictate what logs they want, where we are more of a log "taker." However, we can optimize on our private ground.

4. **Trimble Forestry** and **Collective Crunch** are two groups leading Forest technology. Stahlbush has worked with Trimble Ag as this is where we obtained our GPS Satellite technology for our tractors and farm equipment. In agriculture, Germany is always 10 years ahead of the states, and it appears they are also leading in the forest technology. Lidar and big data is moving quickly and Trimble

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and Collective Crunch are forefront companies. I believe this technology could help in many directions ~harvest optimization and data; planting population counts; genetic selection for seeding zones; appraisal and inventory valuations; ongoing inventory counts; forest health and silviculture; optimization; and carbon valuations. This technology could also help with documentation associated with HCP requirements and harvest mapping. These groups appear to be moving this big data into very usable management information and plans. At the Mellanskog plant we saw where they are effectively creating forest management plans utilizing this technology. While early, this technology is moving quickly.

5. Finland **sets aside** about 25% of their forested acres for conservation and the EU announced last week they want to go to 30%. This compares to Oregon's almost 70% (USFS, State HCP, Private Forest Accord, etc.). **Genetics** and plant selection play a key role. While there are thousands of land owners there are three associations (Sodra, Mellanskog and Norraskog) that provide grower services in Finland. Straight logs, flat angle on branches, climate tolerance, growth, disease and insect tolerance are their breeding goals. Putting the right seedling, and the right species in the correct zone has increased their productivity 18.9 percent. Norway Spruce and Scotch Pine are their predominant types. There are 1.3% more forests in Finland vs. Oregon, and they produce 2.5x more wood.
6. The predominant mill metric is **yield**. We toured a Mellanskog plant in Finland and their log to lumber yield was 51-53% (with bark removed). They want to get this to 54-55%. For every 1% increase this is \$3 million in net to their bottom line. Our mills seem far more efficient by speed but I'm not sure by recovery. It appears we use the same equipment and technology. USNR, Soderhamas, Hewsaw, Finscan, Laserstraiar and Microtech were equipment names I observed. Microtech is Xray made by an Italian company. They believe that data will be their biggest productivity driver.
7. Both Sweden and Finland announced last week, while we were in their countries, that they would join NATO. We listened to a speech by the President of Finland. With **trade being cut off between Russia** and these European countries, forest waste/branches are essential for biofuel plants that produce heat for the cities. While there is more regulation on biofuel plants, energy independence is essential. Energy costs are so high that Sweden is importing garbage and burning it for energy. They pile their forest waste and branches in the forests and then chip it for more efficient transportation. In the U.S. we are less than 3% electric cars and already talking about electricity shortages and blackouts. We too will need alternative energy sources that bring much greater capacity online.

Finally, I had the opportunity to sit with Tuula Packalen, the Director General for the **Ministry of Agriculture and Forestry** for Finland at dinner on our final evening. Her greatest concern was the EU asking for more set aside, at the same time that energy independence and moving away from fossil fuels is of greatest priority. This was a great trip.