

## when the time is right

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From: Nicholls, Diane R FLNR:EX  
: s.15  
To: Plecas, Bobbi JEDC:EX  
Sent: December 4, 2020 8:22:04 AM PST

Morning Bobbi,

I have been working with your new ministry prior to the shuffle (Susan Stanford ADM now moved to CITZ and Gerri Sinclair). We were exploring opportunities for the bio economy new products to get established in BC. When the time is right, I would like to give you and your team a briefing to get some feedback on what might be next steps.

Bioeconomy is using forest biomass (wood fibres) into manufacturing of bio-plastics (alternative to petroleum based plastics), biomaterials (for clothing, textiles, etc.), and biochemicals (used as emulsifiers in cosmetics, paints and other uses). I have been working with NRCAN CFS to focus on building opportunities for supply. We have completed the economic assessments and the social assessments and shortly will be completing the GHG emissions assessments and all point to higher value for these products when compared to forest biomass being used for fuels or for energy.....

If you think this is something you should be briefed on please let me know. As the Chief forester for the Province, my interest is in making sure the right fibre goes to the right manufacturing and gives BC the best return on that fibre....we do not want to have whole trees being used to support pellet plants, rather create a circular forest economy where different levels of manufacturing supports the next level. In BC we typically burn in slash piles 1/3 of every tree....tops, branches....we can use this unused fibre to create more value that will not compete with current dimensional lumber products.

I look forward to hearing from you.

**Diane Nicholls, RPF**

Assistant Deputy Minister, Chief Forester  
BC Provincial Government  
*"Caring for BC's Forests"*

## FW: Allo...just checking in

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From: Nicholls, Diane R FLNR:EX  
: s.15  
To: Messenger, Meggin A FLNR:EX  
Cc: Sit, Vera FLNR:EX, Begon, Stacey FLNR:EX  
Sent: December 11, 2020 12:41:41 PM PST

Yes – maybe Gerri or Susan’s replacement – can you make sure it happens? Or ask Stacey to please but give her the names

### **Diane Nicholls, RPF**

Assistant Deputy Minister, Chief Forester  
BC Provincial Government  
*“Caring for BC’s Forests”*

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**From:** Messenger, Meggin A FLNR:EX <Meggin.Messenger@gov.bc.ca>  
**Sent:** December 11, 2020 12:37 PM  
**To:** Nicholls, Diane R FLNR:EX <Diane.Nicholls@gov.bc.ca>  
**Subject:** FW: Allo...just checking in

?

Sent from my Samsung Galaxy smartphone.

----- Original message -----

From: "Mathey, Anne-Hélène (NRCan/RNCan)" <[anne-helene.mathey@canada.ca](mailto:anne-helene.mathey@canada.ca)>  
Date: 2020-12-11 12:24 p.m. (GMT-08:00)  
To: "Messenger, Meggin A FLNR:EX" <[Meggin.Messenger@gov.bc.ca](mailto:Meggin.Messenger@gov.bc.ca)>  
Subject: RE: Allo...just checking in

**[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.**

Hi Meggin quick but urgent question:

We were wondering if it would be a good for the meeting between Beth and Diane next week to also include someone from the Ministry of Jobs, Economic Recovery and Innovation (JERI) which has a number of mandates related to:

- Working across ministries to lead the development and coordinate implementation of an industrial and manufacturing strategy that generates cleaner, more innovative, value added economic activity across B.C.,
- Supporting reconciliation and CleanBC plan, and
- Supporting the development and investment in innovation clusters with a focus on emerging industries where B.C has been working on cleantech and engineered wood strategies.

As part of the discussions with BC on scaling up advance bioproducts manufacturing and more clearly articulating end-user demand, it might be useful to have a representative from JERI attend the upcoming meeting.

If you think it could be a constructive idea, Beth would write to Diane with a quick note to ask her to invite an appropriate person. Let me know so we can draft something for Beth today.

Thank you! (again)

## **Re: Supply Chain Resiliency Grant Program; Webinar Deck; FINAL (1).pptx**

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From: Nicholls, Diane R FLNR:EX <Diane.Nicholls@gov.bc.ca>  
To: Basi, Selena JERI:EX  
Cc: Sanderson, Melissa FLNR:EX  
Sent: February 27, 2021 9:24:34 AM PST

Sounds great- I will make the time  
Diane

Sent from my iPhone

On Feb 27, 2021, at 6:48 AM, Basi, Selena JERI:EX <Selena.Basi@gov.bc.ca> wrote:

Good morning!

This coming week we have some time to set up which I requested not only as a general catch up for the three of us but also since I had committed a briefing on our StrongerBC program for supply chain resiliency and value added manufacturing. This program is running in two phases with an internal and external delivery portion. The internal phase has just closed and as you can imagine - being open to industry associations and groups of business (everyone's favourite phrase consortia) - it is quite oversubscribed. We received over 90 applications and have around \$4M s.13  
s.13 Of these many are from your sector.

So this is a quick heads up - Dianne that - James Sandland has been contacted by my staff to provide some technical review support s.13  
s.13

s.13  
mandate letter item s.13  
more about this as well. . a  
Happy to chat

s.13  
s.13 . Please let me know if this sounds ok - I know there is lots on  
the go but I really think your lens on these will be important.

These are reasonably sized funding contributions -up to \$400k s.13  
s.13

Let me know if any questions in advance of Thursday. Also I don't know if the two of your are regularly in at CP2 but if so I am comfortable coming down to see you (or we can stick to teams).

Hope all is well. I apologize that I am delayed in getting this briefing to you both but think we are at a good time for a robust and visionary conversation s.13 . I am also keenly interested in what you both have been up to and how this might fit in with any ongoing or upcoming initiatives.

Selena

Sent from my iPhone  
<Supply Chain Resiliency Grant Program; Webinar Deck; FINAL (1).pptx>



Ministry of  
Forests, Lands, Natural  
Resource Operations  
and Rural Development



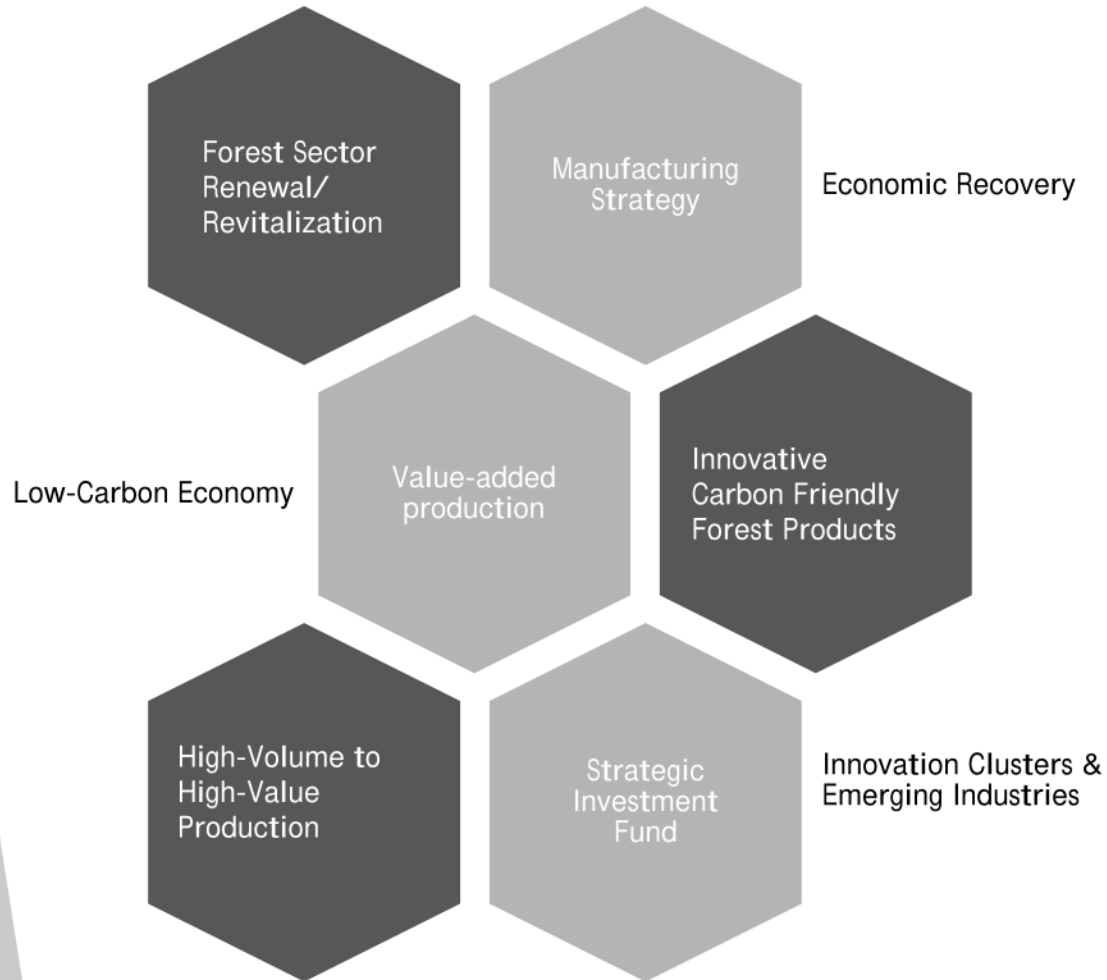
## Innovation, Bioeconomy & Indigenous Opportunities Branch

*Office of the Chief Forester Division*

# Presentation Overview

- I. Ministry Mandates & Economic Development Linkages
- II. Bioeconomy Background
- III. Bioeconomy Value = Economic + Social + Environmental
- IV. Bioproduct Market Analysis
- V. Bioeconomy ROIs for Economic Recovery
- VI. Bioeconomy foundation for Value-added Manufacturing

# I. Mandates & Economic Development Linkages

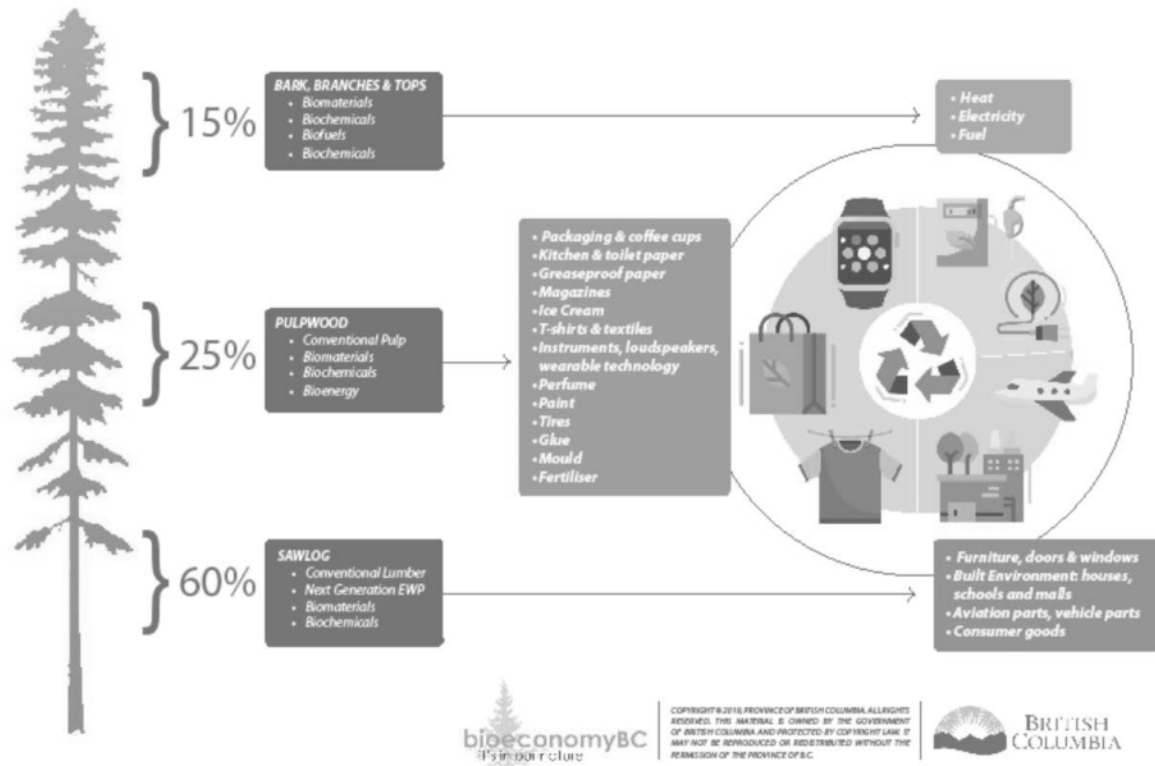





Near term opportunities in the emerging forest bioeconomy can create pathways that will maximize the returns to British Columbia and create competitive advantages for BC in the forest sector and other less obvious industries:

- Shipbuilding
- Aerospace
- Automotive
- Consumer Products
- Sustainable replacements for plastics

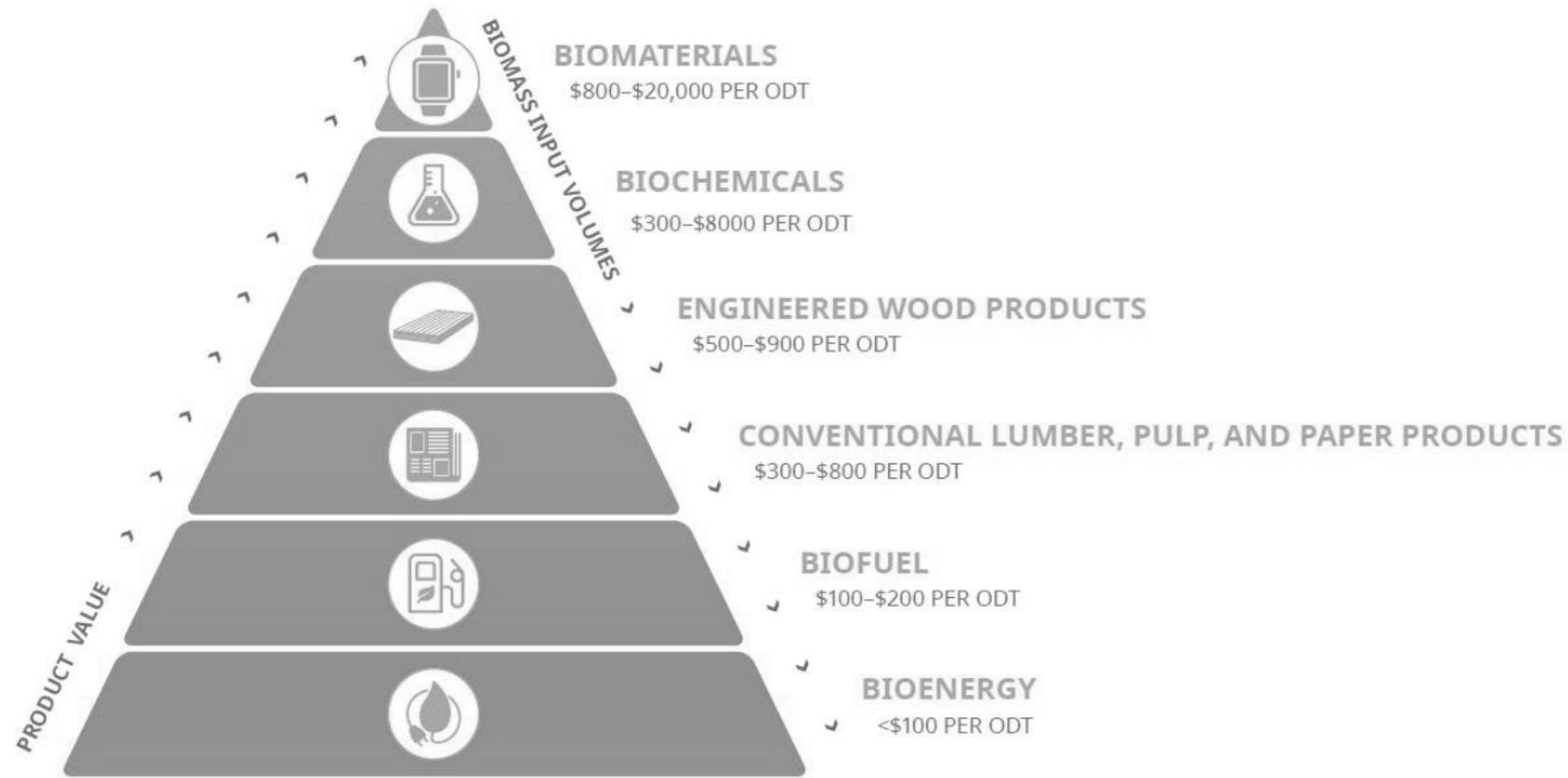
# II. Background: Innovation Driving Transformation

**Forest Bioeconomy**  
Value Chain of Bioproducts from Forest Biomass



|   | Conventional Bio-products                                  | Advanced Bio-products  |   |
|---|--|--|---|
| Paper Mills   | → Packaging, Newsprint, Publishing, Substrate, tissue      | <b>Composites &amp; Textiles:</b> Cellulose nanocrystals, Cellulose filaments, Micro-fibrillated cellulose, Composites using cellulose fibres, Bioplastics | <br>Advanced Bio-materials                                       |
| Chemical Pulp Mills   | → Market kraft pulpt Tall oil, Turpentine, Dissolving pulp | <b>Chemicals &amp; Additives:</b> Methanol, Ethanol, Acetate, Lignin, Lubricates, Surfactants and rheology, Pharmaceuticals                                | <br>Bio-chemicals  |
| Mechanical Pulp Mills   | → Market high-yield pulp                                   | <b>Liquid Fuels:</b> Pyrolysis oil, Bio crude, Gas, Bio diesel aviation fuel, Dimethyl ether, Natural Gas (Nexterra Syn-Gas, Gas Technology Institute)     | <br>Biofuel  |
| Forests and Process Residues                                    | → Pellets, Boilers   | <b>Solid Biomass:</b> Bio-energy intermediates, Torrefied pellets, Bio-coal, Heat and Power  | <br>Bioenergy  |
| Plywood Engineered Wood Products<br>Oriented strand board Mills | → Panels   | <b>Next-gen Engineered Wood:</b> Cross-laminated timber (CLT), Multi-attribute panels, Wood fibre insulation, Hybrid/tall building solutions, etc.         | <br>Conventional Bio-product System with Innovative Technology |
| Sawmills  | → Lumber   |  |   |
| Harvesting  | → Log  |  |   |

# II. Bioproduct Economic Value

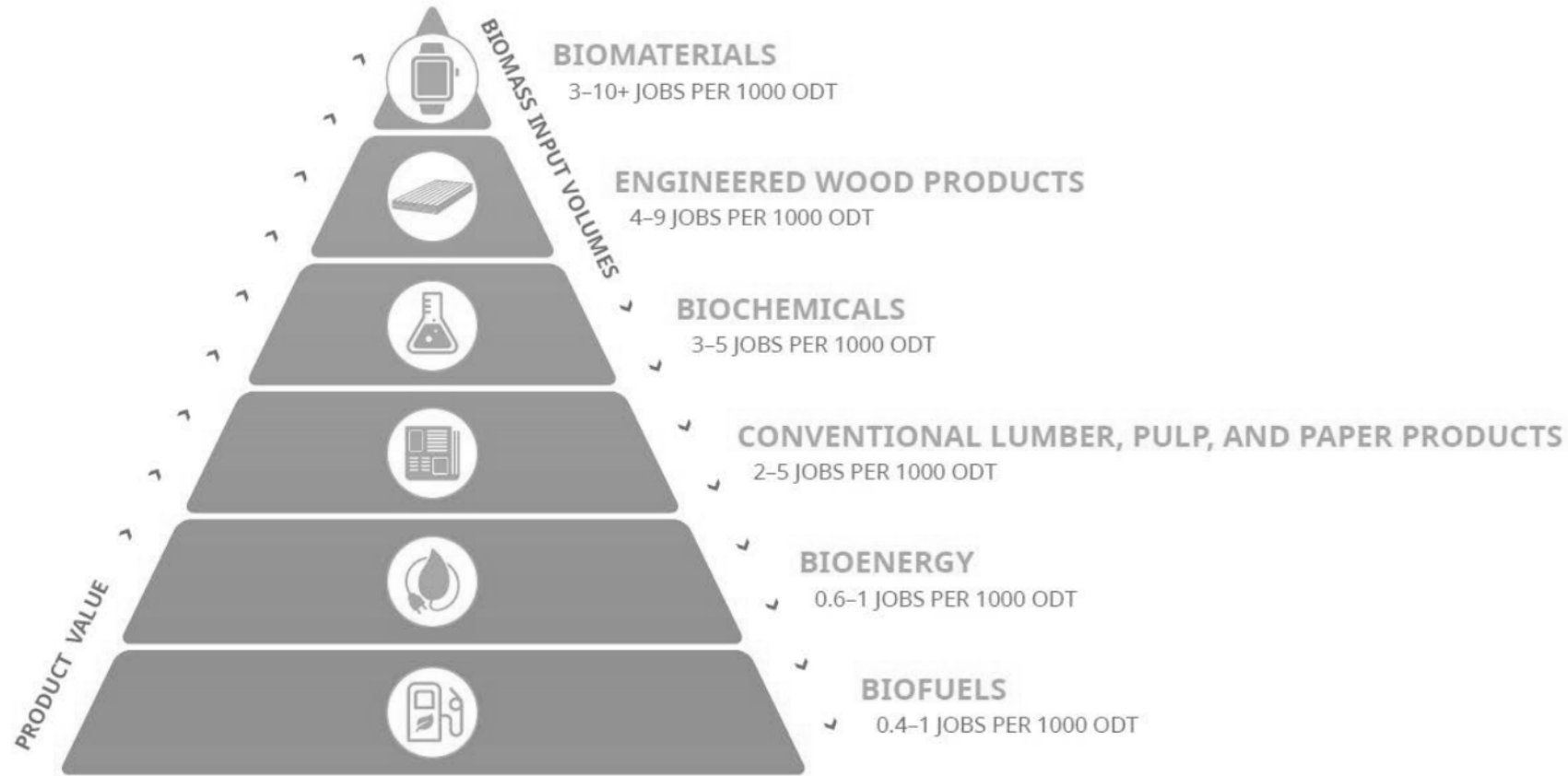


Different Bioproducts provide different economic value and require different amounts of biomass feedstock to be viable.

- Bioproducts on top can be economically viable and highly profitable with 10,000-50,000 oven dried tonnes (odt) of biomass/ year (high value; low volume)
- Bioproducts on the bottom require ~800,000 – 1M+ odt/ year to be economically viable (low value; high volume)
- Bioproducts on the top are not limited to comparatively small biomass needs; significant growth opportunities as per market analysis



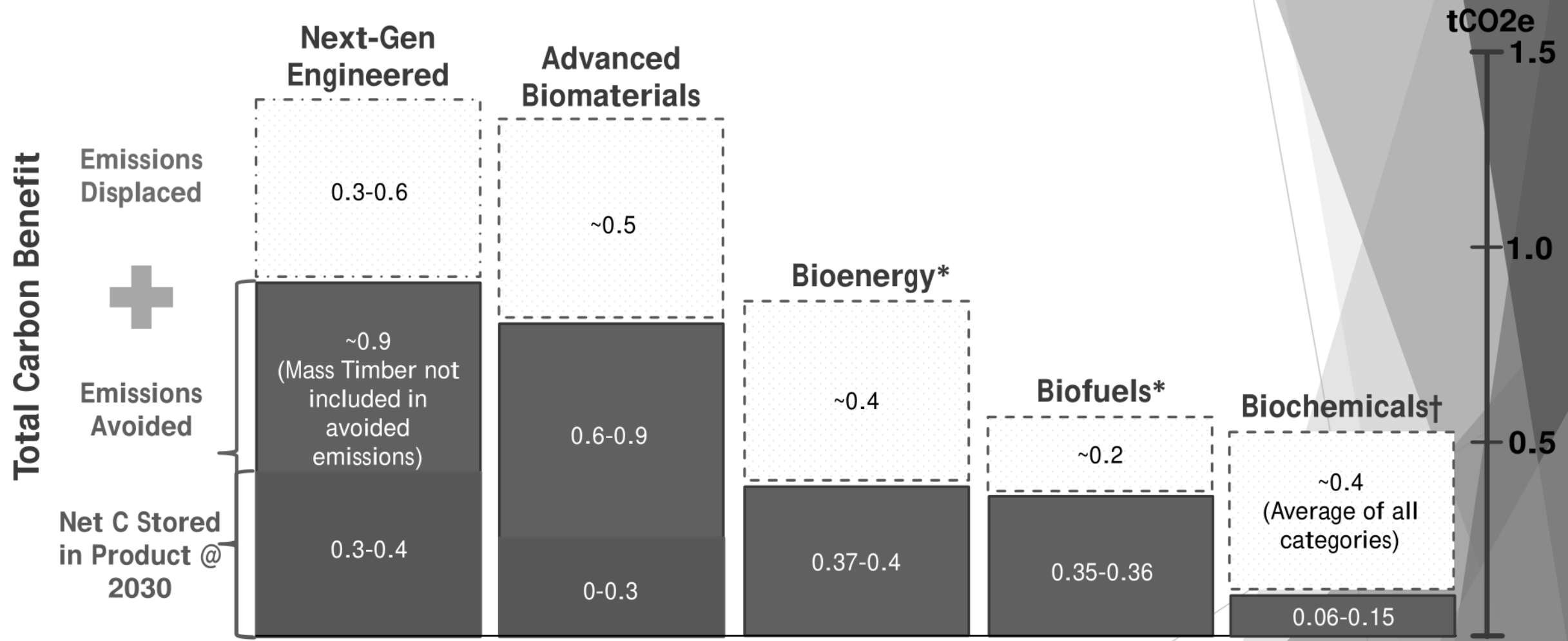
## II. Bioproduct Social Value



Different Bioproducts provide different social value.

- The top 4 categories of bioproducts provide high-paying manufacturing jobs and forestry jobs (sourcing biomass)
- The bottom two bioproduct categories provide forestry jobs (sourcing biomass)

# II. Bioproduct Environmental Value (carbon)



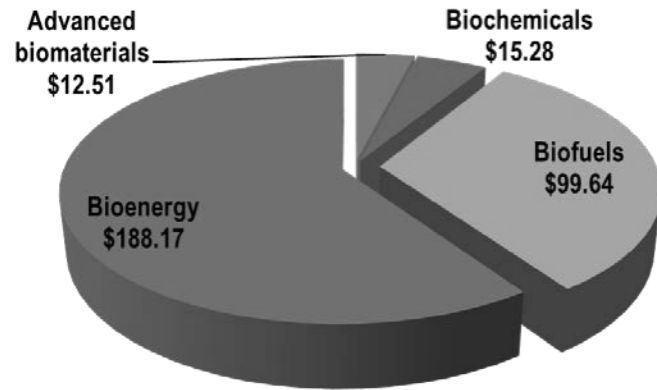
**Avoidance:** using residual biomass and avoiding slash burning

**Carbon Storage:** carbon stored in product for product lifetime

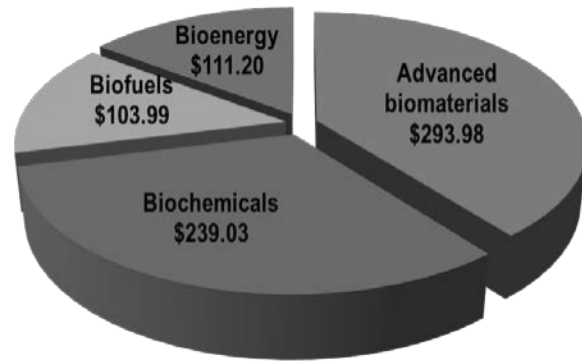
**Displacement:** using a carbon friendly bioproduct in place of a product with higher embodied emissions

# III. Forest Sector Transformation

## *Bioproduct Market Analysis Summary*



**2019 Global Market Value (Billion USD)**



**2030 Global Market Value (Billion USD)**

***Global market represents all sources of biomass.***

- Less than 1% of **biofuels** production comes from wood (high-cost feedstock + slow growing = uncompetitive)
- ~40% of **bioenergy** in Europe comes from wood-based sources due to significant subsidies, but share is decreasing due to lower cost alternatives, technology advancements and ending subsidies
- +50% of **biomaterials** market comes from wood biomass; BC softwood fibres provide inherent competitive advantages (strength, light-weighting, flexibility, compressibility)

***Global biomaterials market is the fastest growing market for bioproducts and will be the largest market segment by 2030 (by value)***

# V. BIOPRODUCT COMPARISON

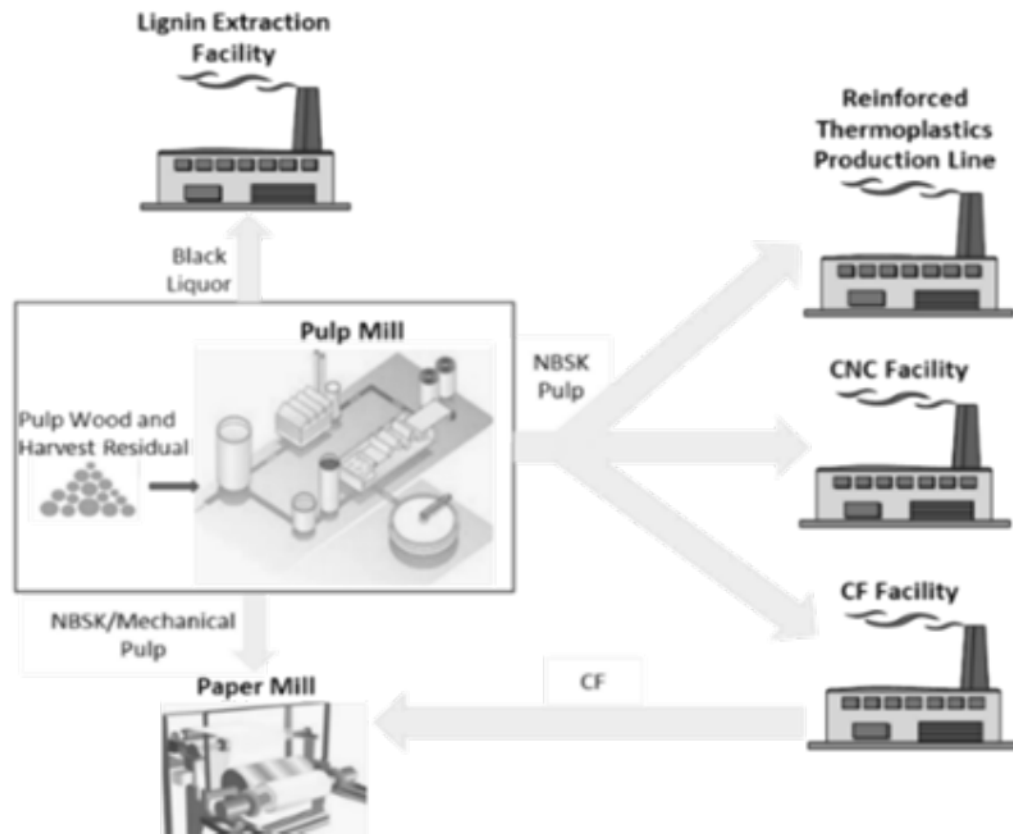
## Scenario A: Demonstration Plants

| Product                                  | Capital Cost<br>(million CAD) | Production<br>(tonnes/ year) | Feedstock<br>(oven-dried tonnes/year) | Net Revenue<br>(million CAD/year) | Government Revenue<br>(million CAD/year) | Per-unit Selling Price of Products<br>(CAD/tonne) | Direct Jobs<br>(fulltime) | Payback Period<br>(Years) | 2025 Expected Market Size<br>(\$Billion) |
|--|-------------------------------|------------------------------|---------------------------------------|-----------------------------------|--|---|---------------------------|---------------------------|--|
| Microfibrillated Cellulose (MFC)         | 14                            | 300                          | 700                                   | 8.6                               | 0.2                                      | 30000   | 5                         | 1.6                       | 1.2                                      |
| Cellulose Nanocrystals (CNC)             | 35                            | 300                          | 1300                                  | 18.2                              | 0.4                                      | 65000   | 10                        | 1.9                       | 1.2                                      |
| Cellulose Filaments (CF)                 | 37                            | 5200                         | 11000                                 | 25.7                              | 0.6                                      | 6000  | 20                        | 1.4                       | 2.4                                      |
| Pulp Reinforced Thermoplastic Composites | 30                            | 12700                        | 23000                                 | 23.7                              | 0.8                                      | 3000  | 15                        | 1.3                       | 12.3                                     |
| Integrated Production                    | 116                           | 18500                        | 36000                                 | 76.1                              | 2.0                                      | -   | 50                        | 1.5                       | -  |
| RNG Demo                                 | 200                           | 750000 GJ/year               | 54750                                 | 9.5                               | 0.4                                      | 30 CAD/GJ   | 40                        | 20.9                      | 0.03                                     |

# IV. Comparative Returns on Investment

| Product                                  | Capital Cost (million CAD) | Production (tonnes/year) | Upscaled Plants in BC (#) | Total Capital Cost (million CAD) | Total Feedstock (ODT/year) | Total Net Revenue (million CAD/year) | Government Revenue (million CAD/year) | Per-unit Selling Price of Products (CAD/tonne) | Total Direct Jobs (fulltime) | Payback Period (Years) | 2025 Expected Market Size (\$Billion) |
|--|----------------------------|--------------------------|---------------------------|----------------------------------|----------------------------|--------------------------------------|---------------------------------------|--|------------------------------|------------------------|---------------------------------------|
| Microfibrillated Cellulose (MFC)         | 224                        | 17250                    | 1                         | 224                              | 36800                      | 122.5                                | 2.9                                   | 8400   | 65                           | 1.8                    | 1.2                                   |
| Cellulose Nanocrystals (CNC)             | 284                        | 17250                    | 2                         | 568                              | 147000                     | 296.4                                | 9.0                                   | 13000  | 160                          | 1.9                    | 1.2                                   |
| Cellulose Filaments (CF)                 | 129                        | 34500                    | 3                         | 388                              | 220500                     | 138.6                                | 5.0                                   | 2400   | 300                          | 2.8                    | 2.4                                   |
| Pulp Reinforced Thermoplastic Composites | 107                        | 68000                    | 2                         | 214                              | 246000                     | 117.3                                | 5.4                                   | 2000   | 160                          | 1.8                    | 12.3                                  |
| Integrated Production                    | -                          | -                        | -                         | 1394                             | 650300                     | 674.9                                | 22.3                                  | -  | 620                          | 2.1                    | -                                     |
| Renewable Diesel                         | 1000                       | 200 million lit/year     | 1                         | 1000                             | 660000                     | 69.8                                 | 5.2                                   | 1.3 CAD/lit                                    | 120                          | 14.3                   | 0.3                                   |

# V. Value-added Manufacturing: Bioeconomy supporting BC's Manufacturing Base



- Carbon friendly, sustainable materials
- Better performing materials (strength, light-weighting etc.)
- Materials made in BC to support further value-added manufacturing in BC
- Forest-bioprocess manufacturing clusters supporting industrial manufacturing clusters
- Scalable to communities across BC