Forest Products Opportunities

• Yellow Poplar CLT’s – down the road
• Hardwood Exports – now and future for medium and upper grade hardwood logs and lumber
• Housing – OSB, Truss systems, flooring, millwork – depends on housing market – medium to lower grade lumber
• Low grade hardwoods – Pallets, pulp, OSB, Pellets and fuel
• Logging and other residues – pellets and fuel
Forest Products Opportunities

- Phil Araman, SRS-Blacksburg, VA
Pittsylvania Power Station: Dominion’s Proven Experience with Biomass Fuel

- State of VA pushing for 15% of power from renewable sources
- Converting 3 coal plants to biomass plus this facility

- All Biomass Power
- Wood burning
- Mostly logging waste wood
- 150 trailers/day (20 tons each)
- Uses 2,500 tons/day (650,000 tons/year)
- 83 megawatt
- 2nd largest biomass power plant
- Power for about 20,000 homes
## Dominion’s Biomass Facilities:
### Operating & Under Construction

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Description</th>
<th>Status</th>
<th>Biomass MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altavista</td>
<td>Coal-to-Biomass Conversion</td>
<td>Operating</td>
<td>51</td>
</tr>
<tr>
<td>Southampton</td>
<td>Coal-to-Biomass Conversion</td>
<td>Under Construction</td>
<td>51</td>
</tr>
<tr>
<td>Hopewell</td>
<td>Coal-to-Biomass Conversion</td>
<td>Under Construction</td>
<td>51</td>
</tr>
<tr>
<td>Pittsylvania</td>
<td>Biomass Facility</td>
<td>Operating</td>
<td>83</td>
</tr>
<tr>
<td>VCHEC</td>
<td>Coal with Biomass Co-firing (~10%)</td>
<td>Operating</td>
<td>59</td>
</tr>
</tbody>
</table>

**TOTAL:** 295 MW
Coal-to-Biomass Conversions: Photos

Stacker / Reclaimer

Biomass Truck Tipper

Biomass Fuel Yard in Operation
Virginia City Hybrid Energy Center
Virginia City Hybrid Energy Center -- BIOMASS TIPPER AND YARD
Dominion’s Renewable Energy Facilities: Wind, Solar, Biomass and Hydro

- **Fowler Ridge I**: 150 MW
- **NedPower I & II**: 132 MW
- **VCHEC**: Up to 117 MW
- **VA Wind**: 248 MW
- **Gaston/Roanoke Rapids**: 315 MW
- **Hopewell**: 51 MW
- **Southampton**: 51 MW
- **Azalea Solar, LLC**: 7.7 MW
- **Indy Solar I, II, III**: 28.6 MW
- **Bath Pumped Hydro**: 2772 MW
- **Cushaw & North Anna**: 3 MW
- **Solar Partnership**: Up to 30 MW
- **Offshore Wind**: [TBD] MW

**Note:** Facilities in **RED** are In Development or Construction, Facilities in **BLACK** are in Operation

1 Megawatt capacity represents Dominion’s 50% capacity only

2 Pumped hydro does not qualify as renewable energy in the VA RPS
Are coal to pellet power plants next?
Potential next big wood product --
Cross-Laminated Timber (CLT) Panels –
a new engineered wood product
Factory built and assembled at the construction site

- Spruce/Pine/Fir
- Southern Pine
- Yellow Poplar?

- Active R&D at Virginia Tech
- Potential for massive amounts of wood needed
- Potential plant in Stuart, VA
CLT Benefits

**Strength**
- Allows wood to be used in never before seen buildings like 30 story high rises
- Cross lamination creates perfectly uniform strength properties like steel and concrete
- Creates new possibilities in cantilevers and load bearing

**Fire**
- Low surface area doesn’t sustain a flame so fires burn themselves out
- Airtight construction lowers the fires’ oxygen supply, gas does not travel through the panel
- Heat does not conduct from one side of the panel to the other

**Seismic**
- Combination of strength, ductility and light weight form the ideal earthquake-proof system
- Shake table tests up to 7 storeys prove that CLT buildings have excellent performance
- No loss of life or structural damage even against the strongest earthquakes

**Acoustic and Vibration**
- Solid wood panels give excellent acoustic insulation
- Vibration design can satisfy the strictest building codes
- Construction process is nearly soundless, perfect for urban projects

**Thermal Insulation**
- Ideal building system for Passive Homes - that don’t require heating systems
- Can trap 90% of the heated air that escapes from normal homes
- High thermal mass of timber keeps home warm in the winter and cool in the summer

**Durability**
- Has the best long-term stability of any wood building system
- CLT eliminates swelling, shrinkage, warp, and creep – main barriers to normal wood construction
- The stability allows for precision building and new higher wood towers

**Installation Efficiency**
- Manufacturing process minimizes on-site labour with off-site efficiency automation
- Panel connections are based on simplified self-tapping screws
- Can build a 9 storey building in 9 weeks instead of 27, even with a 4 person crew

**Sustainability**
- Building a CLT home can be a carbon positive project where more carbon is saved than emitted
- The only fully renewable heavy duty building material, requires a fraction of carbon to produce