Appendix G

Estimation of "Per Panel" and Industry-wide Cost Increases for Phase 1 and Phase 2

A. Hardwood Plywood (HWPW)

A.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases

- Wholesale cost of a panel made with UF resin = $20.00 (averaged from prices listed on the Pittsburgh Forest Products website)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 5% of the cost of the UF panel = $1.00
- Labor accounts for 19% of the cost of the UF panel = $3.80

A.1.a. Phase 1: How it Might Be Met for HWPW

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (< 1.0)

A.1.a.i. Projected Resin-related Cost Increase for Phase 1 HWPW

- Resin Cost ($/lbs): UF = $0.24; (UF + 4% Melamine) = $0.30; Low UF co-blend = $0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = $1.25
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = $1.15
- Increase in panel price for (UF + 4% Melamine) = $0.25
- Increase in panel price for Low UF co-blend = $0.15

A.1.a.ii. Projected Labor-related Cost Increase for Phase 1 HWPW

- None – assumes that use of the above resins constitutes "drop-in technology"

A.1.a.iii. Potential Wholesale Panel Price for Phase 1 HWPW

- (UF + 4% Melamine) = $20.25 (1% increase)
- Low UF = $20.15 (1% increase)

A.1.a.iv. Conclusion for Phase 1 HWPW

- Potential cost increase for producing a Phase 1 panel is about 1% -- used 5% to calculate industry-wide cost to bracket the upper-end cost

A.1.b. Phase 2: How it Might Be Met for HWPW

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either PVA or (UF + 15% Melamine)

A.1.b.i. Projected Resin-related Cost Increase for Phase 2 HWPW

- Resin Cost ($/lbs): UF = $0.24; (UF + 15% Melamine) = $0.465; PVA = $1.00
- % increase in cost for (UF + 15% Melamine) = 94%; ∴ (UF + 15% Melamine) resin cost = $1.94
- % increase in cost for PVA = 317%; ∴ PVA resin cost = $4.17
- Increase in panel price for (UF + 15% Melamine) = $0.94
- Increase in panel price for PVA = $3.17

A.1.b.ii. Projected Labor-related Cost Increase for Phase 2 HWPW

- (UF + 15% Melamine) and PVA: 15% increase in labor cost = ($3.80 x 1.15) = $4.37
- Change in panel price due to labor increase = $0.57

A.1.b.iii. Potential Wholesale Panel Price for Phase 2 HWPW

- (UF + 15% Melamine) = ($20.00 + $0.94 + $0.57) = $21.51 (8% increase)
- PVA = ($20.00 + $3.17 + $0.57) = $23.74 (19% increase)

A.1.b.iv. Conclusion for Phase 2 HWPW

- Potential cost increase for producing a Phase 1 panel is about 8 to 19% -- used 15% to calculate industry-wide cost to bracket the upper-end cost

A.2. Potential Industry-wide Cost Increase for HWPW

General Assumptions for Potential Cost Increases

- California HWPW consumption = 299-million ft^2 = 9.4-million 4’ x 8’ panels
- Cost increase for Phase 1 = 5% per panel (i.e., $1.00 per panel)
- Cost increase for Phase 2 = 15% per panel (i.e., $3.00 per panel)
- % of production affected in Phase 1 = 60% (40% of U.S. production already complies with the Phase 2 standard)
- % of production affected in Phase 2 = 60% (40% of U.S. production already complies with the Phase 2 standard)

A.2.a. Potential Industry-wide Cost Increase for HWPW

- Phase 1: (9.4-million x $1.00 x 0.60) = $5.6-million
- Phase 2: (9.4-million x $3.00 x 0.60) = $16.8-million

B. Particleboard (PB)

B.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases

- Wholesale cost of a panel made with UF resin = $10.50 (from price listed in Random Lengths)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 30% of the cost of the UF panel = $3.15
- Labor accounts for 19% of the cost of the UF panel = $2.00

B.1.a. Phase 1: How it Might Be Met for PB

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (< 1.0)

B.1.a.i. Projected Resin-related Cost Increase for Phase 1 PB

- Resin Cost ($/lbs): UF = $0.24; (UF + 4% Melamine) = $0.30; Low UF co-blend = $0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = $3.94
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = $3.62
- Increase in panel price for (UF + 4% Melamine) = $0.79
- Increase in panel price for Low UF co-blend = $0.47

B.1.a.ii. Projected Labor-related Cost Increase for Phase 1 PB

- None – assumes that use of the above resins constitutes “drop-in technology”

B.1.a.iii. Potential Wholesale Panel Price for Phase 1 PB

- (UF + 4% Melamine) = $11.79 (7% increase)
- Low UF co-blend = $10.97 (4% increase)

B.1.a.iv. Conclusion for Phase 1 PB

- Potential cost increase for producing a Phase 1 panel is about 4% to 7% -- used 5% to calculate industry-wide costs to bracket the mid to upper end cost

B.1.b. Phase 2: How it Might Be Met for PB

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either PF or (UF + 8% Melamine)

B.1.b.i. Projected Resin-related Cost Increase for Phase 2 PB

- Resin Cost ($/lbs): UF = $0.24; (UF + 8% Melamine) = $0.36; PF = $0.48
- % increase in cost for (UF + 8% Melamine) = 50%; ∴ (UF + 50% Melamine) resin cost = $4.73
- % increase in cost for PF = 100%; ∴ PF resin cost = $6.30
- Increase in panel price for (UF + 8% Melamine) = $1.58
- Increase in panel price for PF = $3.15

B.1.b.ii. Projected Labor-related Cost Increase for Phase 2 PB

- (UF + 8% Melamine) and PF: 10% increase in labor cost = ($2.00 x 1.1) = $2.19
- Change in panel price due to labor increase = $0.19

B.1.b.iii. Potential Wholesale Panel Price for Phase 2 PB

- (UF + 8% Melamine) = ($10.50 + $1.58 + $0.19) = $12.27 (17% increase)
- PF = ($10.50 + $6.30 + $0.19) = $13.84 (32% increase)

B.1.b.iv. Conclusion for Phase 2 PB

- Potential cost increase for producing a Phase 1 panel is about 17% to 32% -- used 30% to calculate industry-wide cost to bracket mid to upper end cost

B.2. Potential Industry-wide Cost Increase for PB

General Assumptions for Potential Cost Increases

- California PB consumption = 622-million ft^2 = 19.5-million 4’ x 8’ panels
- Cost increase for Phase 1 = 5% per panel (i.e., $0.53 per panel)
- Cost increase for Phase 2 = 30% per panel (i.e., $3.15 per panel)
- % of production affected in Phase 1 = 45% (55% of U.S. production already complies with the Phase 1 standard)
- % of production affected in Phase 2 = 100% (0% of U.S. production already complies with the Phase 2 standard)

B.2.a. Potential Industry-wide Cost Increase for PB

- Phase 1: (19.5-million x $0.53 x 0.45) = $4.6-million
- Phase 2: (19.5-million x $3.15 x 1.00) = $61.3-million

C. Medium Density Fiberboard (MDF)

C.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases:

- Wholesale cost of a panel made with UF resin = $14.00 (from price listed in Random Lengths)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 27% of the cost of the UF panel = $3.78
- Labor accounts for 19% of the cost of the UF panel = $2.66

C.1.a. Phase 1: How it Might Be Met for MDF

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (1.0 to 1.1)

C.1.a.i. Projected Resin-related Cost Increase for Phase 1 MDF

- Resin Cost ($/lbs): UF = $0.24; (UF + 4% Melamine) = $0.30; Low UF co-blend = $0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = $4.73
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = $4.35
- Increase in panel price for (UF + 4% Melamine) = $0.95
- Increase in panel price for Low UF co-blend = $0.57

C.1.a.ii. Projected Labor-related Cost Increase for Phase 1 MDF

- None – assumes that use of the above resins constitutes “drop-in technology”

C.1.a.iii. Potential Wholesale Panel Price for Phase 1 MDF

- (UF + 4% Melamine) = $14.95 (6% increase)
- Low UF co-blend = $14.57 (4% increase)

C.1.a.iv. Conclusion for Phase 1 MDF

- Potential cost increase for producing a Phase 1 panel is about 4% to 6% -- used 10% to calculate industry-wide cost to bracket upper end cost

C.1.b. Phase 2: How it Might Be Met for MDF

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either MDI or (Low UF (< 1.0) + 12% Melamine)

C.1.b.i. Projected Resin-related Cost Increase for Phase 2 MDF

- Resin Cost ($/lbs): UF = $0.24; (Low UF + 12% Melamine) = $0.46; MDI = $1.40
- % increase in cost for (Low UF + 12% Melamine) = 90%; ∴ (Low UF + 12% Melamine) resin cost = $6.62
- % increase in cost for MDI = 483%; ∴ MDI resin cost = $22.05
- Increase in panel price for (Low UF + 12% Melamine) = $3.40
- Increase in panel price for MDI = $18.27

C.1.b.ii. Projected Labor-related Cost Increase for Phase 2 MDF

- (Low UF + 12% Melamine) and MDI: 30% increase in labor cost = ($2.66 x 1.3) = $3.46
- Change in panel price due to labor increase = $0.80

C.1.b.iii. Potential Wholesale Panel Price for Phase 2 MDF

- (Low UF + 12% Melamine) = ($14.00 + $3.40 + $0.80) = $18.20 (30% increase)
- MDI = ($14.00 + $18.27 + $0.80) = $33.07 (136% increase)

C.1.b.iv. Conclusion for Phase 2 MDF

- Potential cost increase for producing a Phase 1 panel is about 40% -- used 40% to calculate industry-wide cost to bracket upper end cost for (Low UF + 12% Melamine); wide-scale use of MDI is not anticipated but is provided for comparison

C.2. Potential Industry-wide Cost Increase for MDF

General Assumptions for Potential Cost Increases

- California MDF consumption = 277-million ft^2 = 8.7-million 4’ x 8’ panels
- Cost increase for Phase 1 = 10% per panel (i.e., $1.40 per panel)
- Cost increase for Phase 2 = 40% per panel (i.e., $5.60 per panel)
- % of production affected in Phase 1 = 75% (25% of U.S. production already complies with the Phase 2 standard)
- % of production affected in Phase 2 = 100% (0% of U.S. production already complies with the Phase 2 standard)

C.2.a. Potential Industry-wide Cost Increase for MDF

- Phase 1: (8.7-million x $1.40 x 0.75) = $9.1-million
- Phase 2: (8.7-million x $5.60 x 1.00) = $48.5-million

D. Combined Industry-wide Cost Increase

D.1. Potential Phase 1 Cost Increase

- Phase 1 for HWPW: (9.4-million x $1.00 x 0.60) = $5.6-million
- Phase 1 for PB: (19.5-million x $0.53 x 0.45) = $4.6-million
- Phase 1 for MDF: (8.7-million x $1.40 x 0.75) = $9.1-million
- Combined: ($5.6 + $4.6 + $9.1) = $19.3-million

D.2. Potential Phase 2 Cost Increase

- Phase 2 for HWPW: (9.4-million x $3.00 x 0.60) = $16.8-million
- Phase 2 for PB: (19.5-million x $3.15 x 1.00) = $61.3-million
- Phase 2 for MDF: (8.7-million x $5.60 x 1.00) = $48.5-million
- Combined: ($16.8 + $61.3 + $48.5) = $127-million

E. References

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