



Limits to Growth: Wood Pellet Production in the U.S.

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Fact: Bioenergy projects use real wood.

- Bioenergy projects primarily target mill and forest residues, debris and other byproducts.
- Some projects also target low value trees from forest thinnings or pulpwood material as a feedstock.
- Bioenergy project developers typically prefer waste materials with few or no markets than compete with an existing industry in the marketplace.



Bark residues at lumber mill



Scrap pallets: urban waste



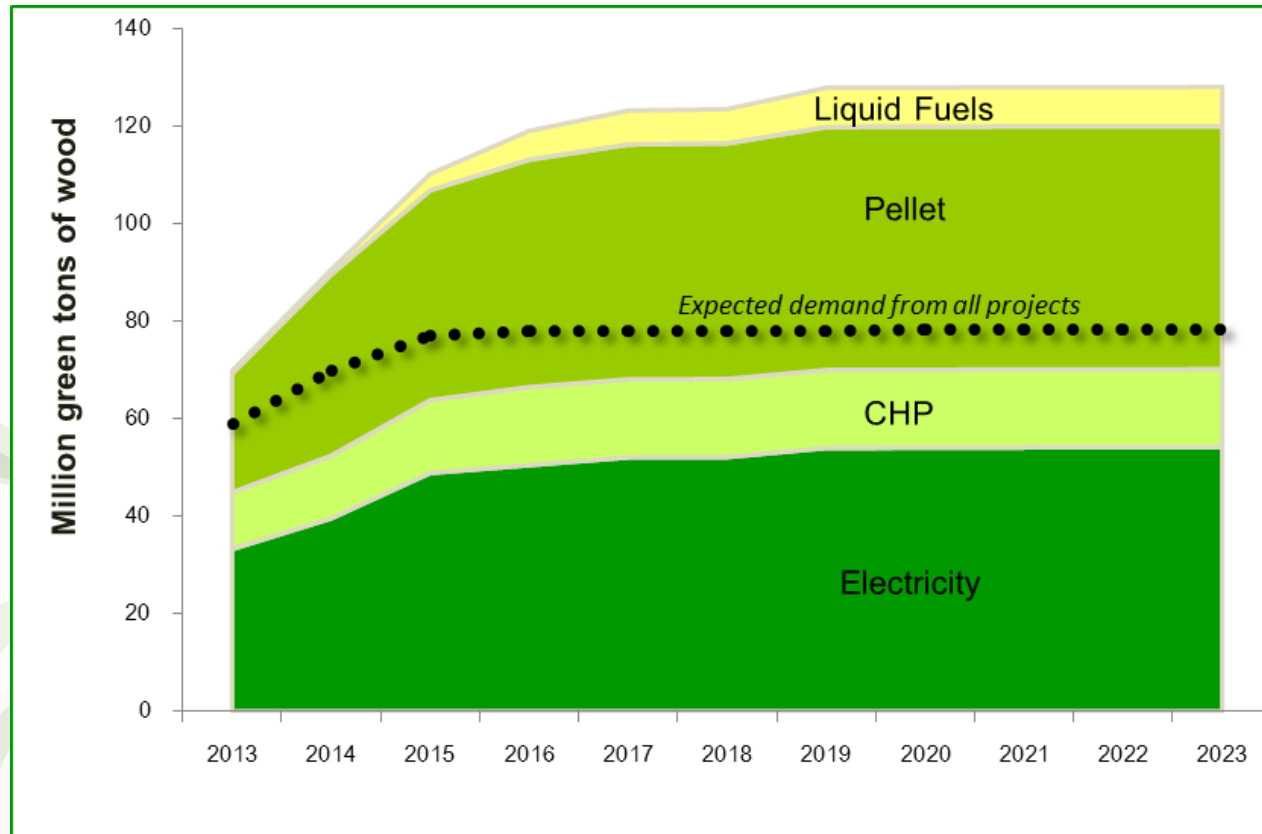
Logging residues

Bioenergy Projects: Screen for Success

- Technology
 - Does the project rely on proven or unproven technology?
- Status
 - Is the project under construction or operating?
 - Is the project on hold or is the plant shut down?
 - Has the project received/secured/signed **two or more** of:
 - Financing
 - Air quality permits
 - EPC contracts (Engineering, Procurement & Construction)
 - Power purchase agreements for electricity facilities
 - Interconnection agreements for electricity facilities
 - Wood supply agreements
 - Location

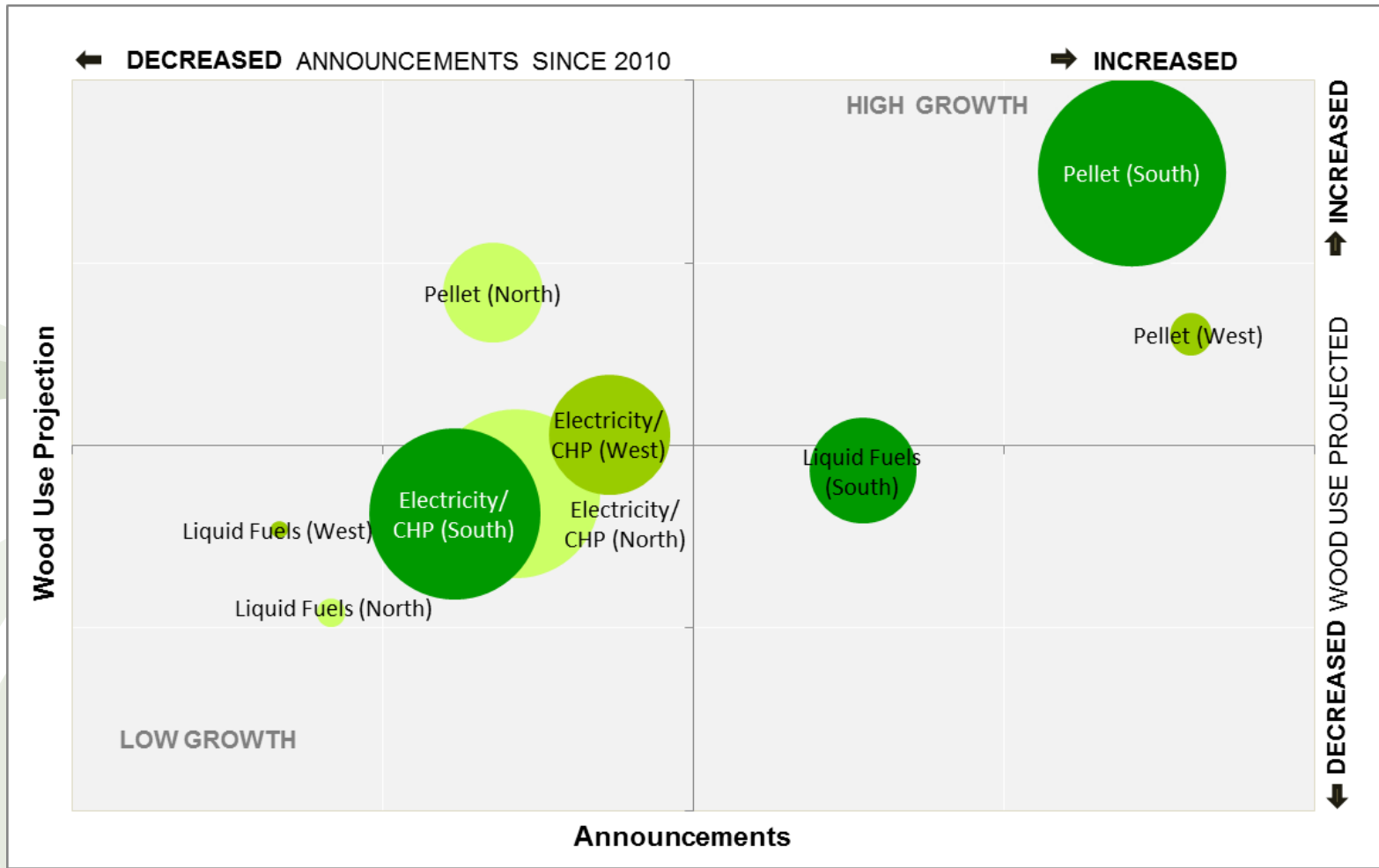


Bioenergy Demand: US Case Study



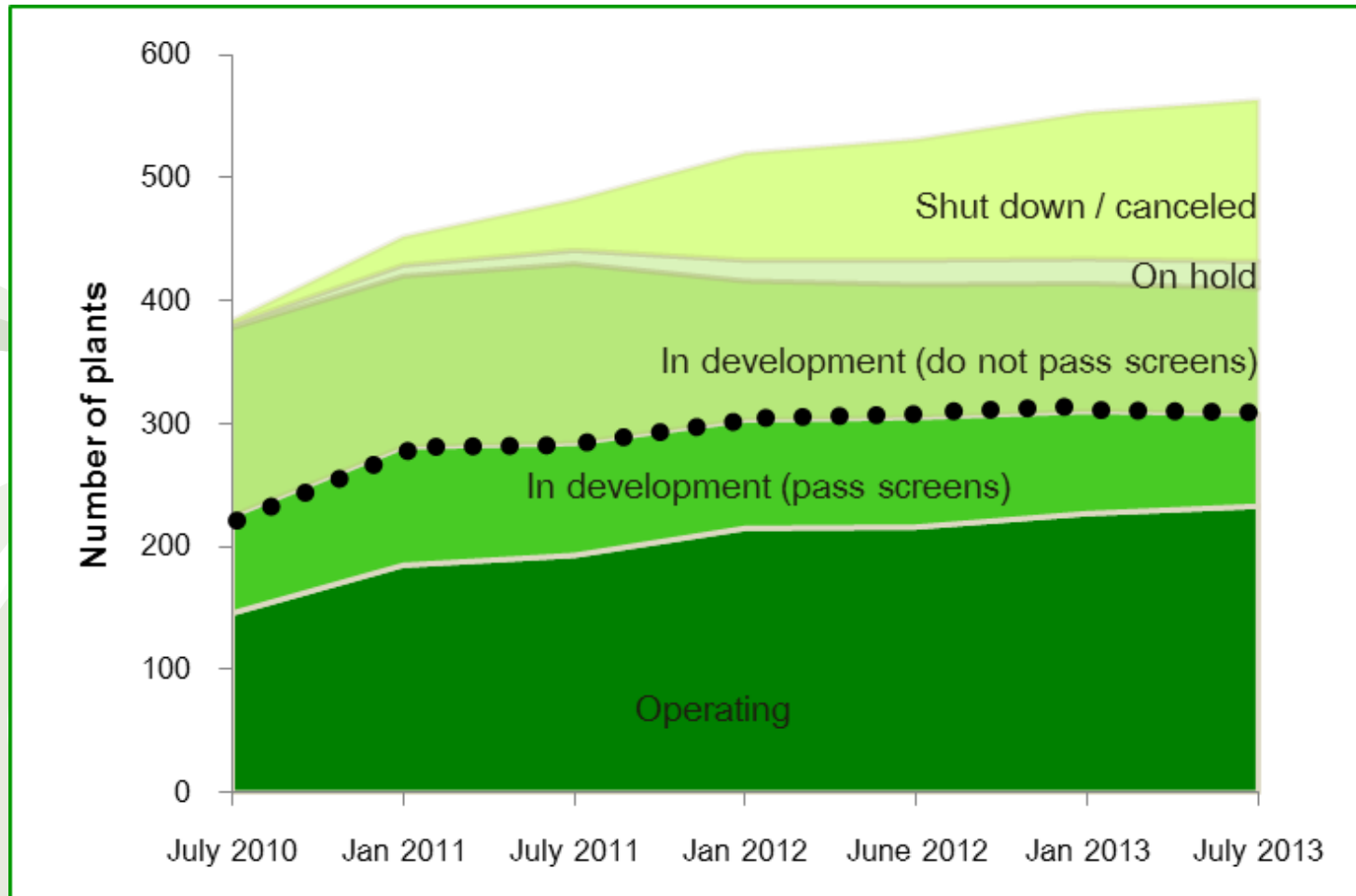
- Projects: 459 → Expected: 296 (64%)
- Wood demand: 128.6 MM → Expected: 78.5 MM (61%)

Relative Growth of Bioenergy Since 2010



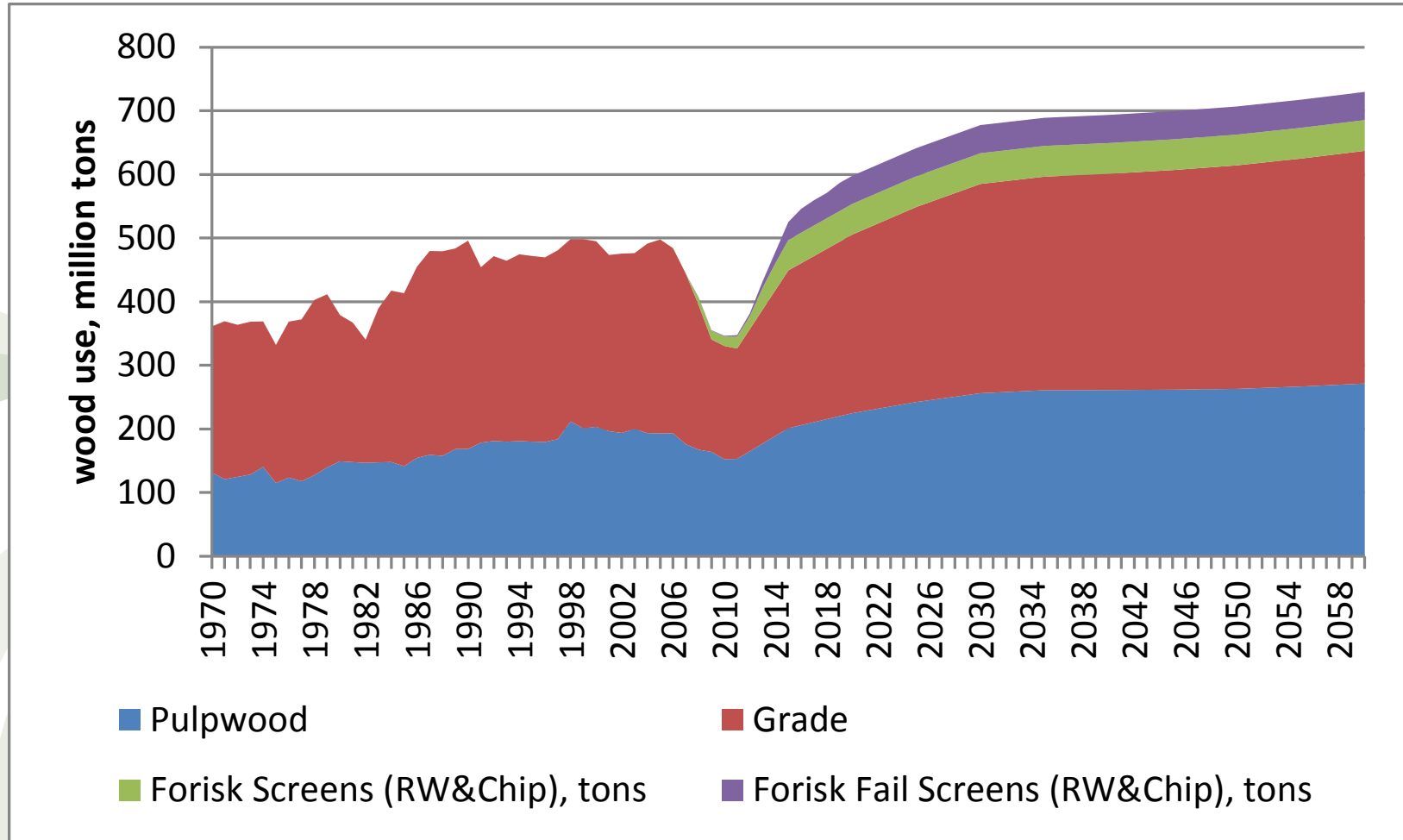
Lessons Learned: why do projects fail?

U.S. Bioenergy Plant Progress; July 2010 - July 2013



Source: Forisk Consulting, as of July 2013

Projected Wood Demand: U.S.



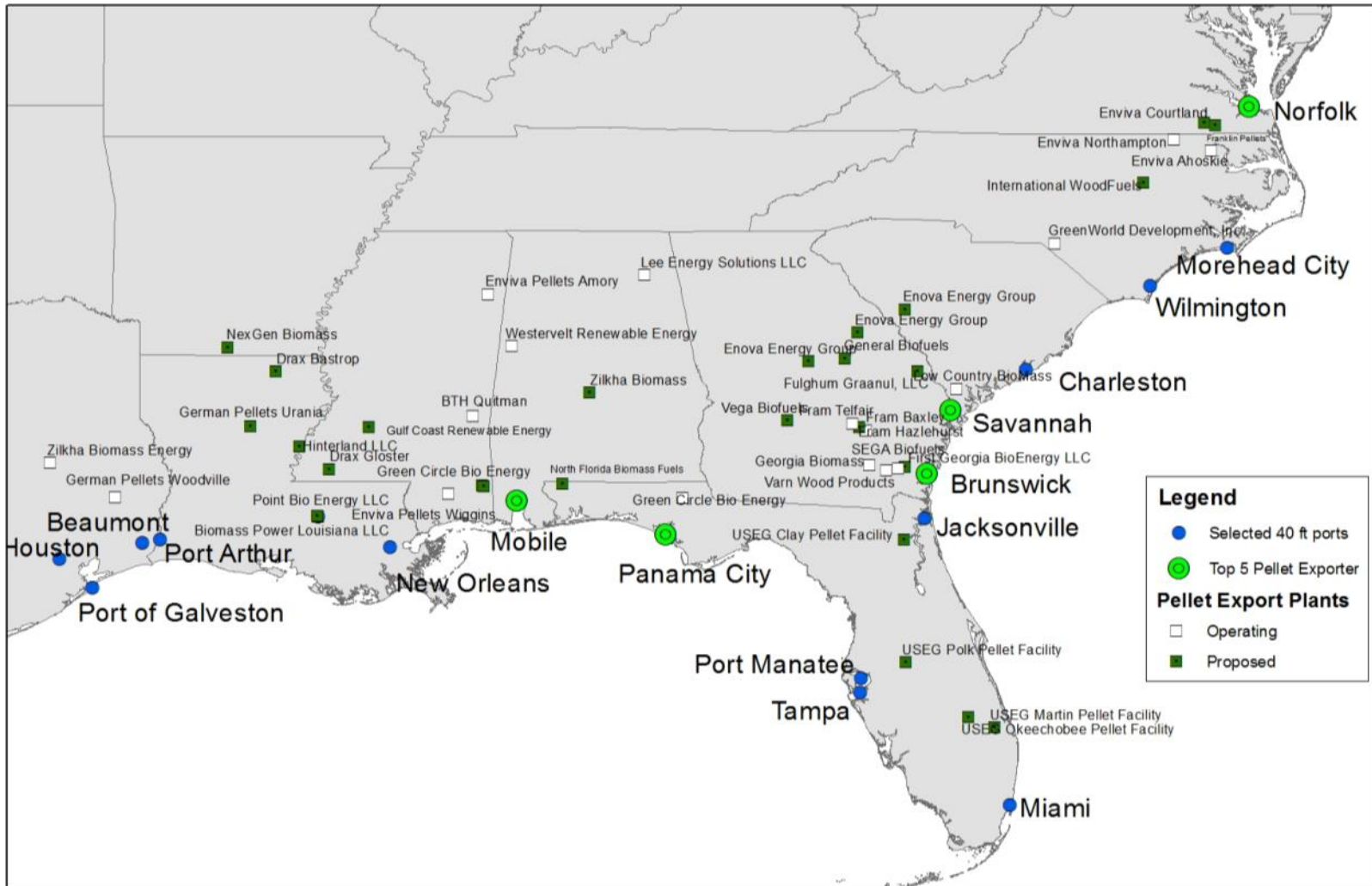
Source: Forisk Consulting, Ince & Nepal 2012

Export Demand Drives Wood Pellet Project Growth in the U.S. South

- Wood pellet plants rely on known, proven technologies.
 - This facilitates the financing and development of new projects.
- Pellet projects require lower levels of capital investment relative to liquid fuel and large scale electricity projects.
 - Pellet projects require \$150 million or less while the others require hundreds of millions of dollars.
- Project developers and investors are responding to actual demand from actual customers (in Europe).
 - the pellet projects announced as of July 2013, 58% (31 of 55) focus on the export markets.
 - For the South, export oriented projects account for 93% of the total.

No. of Export-Related Pellet Announcements, July 2013			
Region	Domestic	Export	Total
North	14	4	18
South	2	27	29
West	6	0	6
Total	22	31	53

Pellet Projects Face Practical Limits to Growth in the U.S. South



Pellet update: North and West

- 45 pellet plants in the North account for 55% of US domestic pellet production capacity
- 26 pellet plants in the West account for 25% of US domestic pellet capacity
- Recent announcements:
 - Cate Street Capital planning 3 export torrefied pellet facilities
 - East Millinocket, ME (275,000 ton)
 - Millinocket, ME (100,000 ton)
 - Eastport, ME (250,000 ton)
 - Chip Energy in Goodfield, IL had a groundbreaking ceremony for a recycled biomass pellet plant; the plant may be operational by October 2013

About Forisk Consulting

- Forisk provides management consulting and educational services to senior management and investors in the forest products, wood bioenergy and timberland investing sectors.
- Founded in 2004.
- Current research includes:
 - Timber Market Analysis and Forecasting
 - Timberland Ownership and Investment Vehicles
 - Wood Bioenergy
 - *Wood for Bioenergy: Historical Context and a Practical Path Forward*
 - Book published by the Forest History Society in 2012