

Biofuels in Virginia

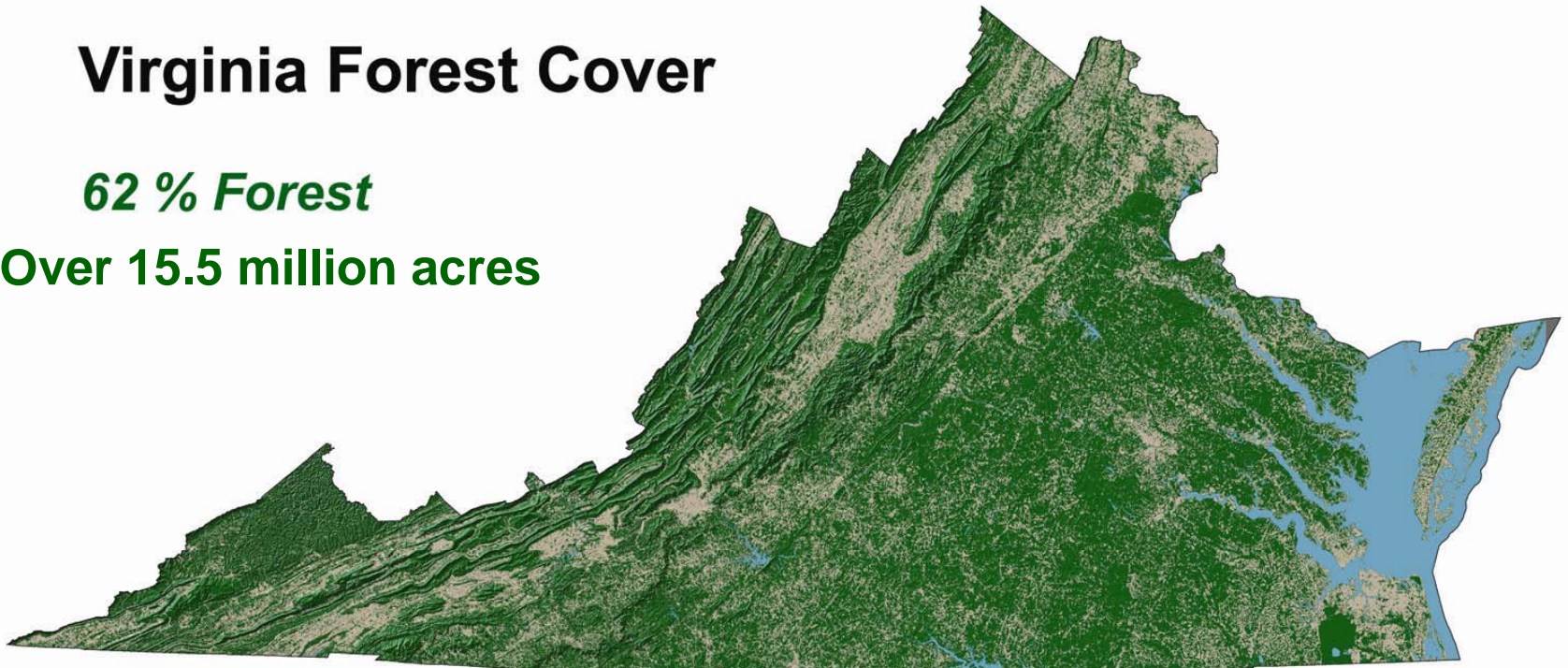


Charles W. Becker III, CF
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Virginia Forest Cover

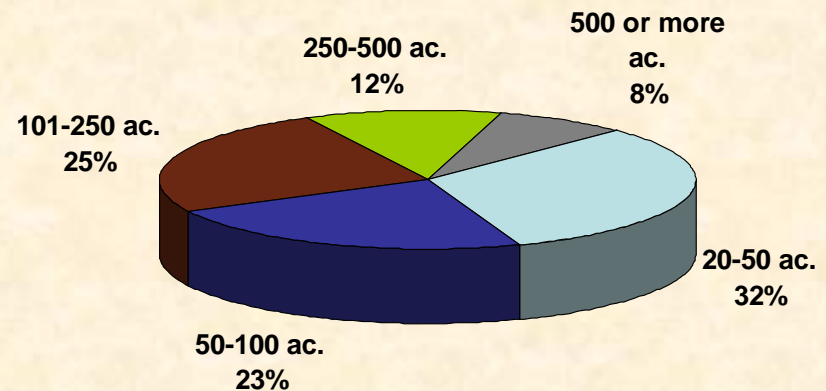
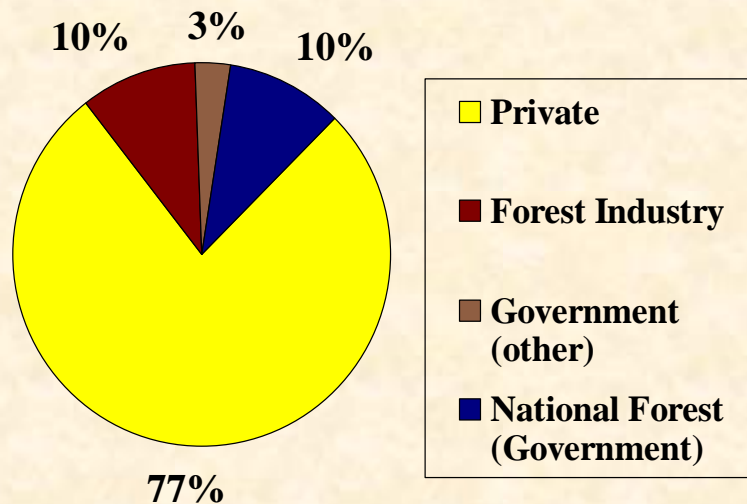
Virginia Forest Cover

62 % Forest
Over 15.5 million acres



From year 2000 Landsat satellite imagery, classified by the Virginia Department of Forestry

Virginia Ownership

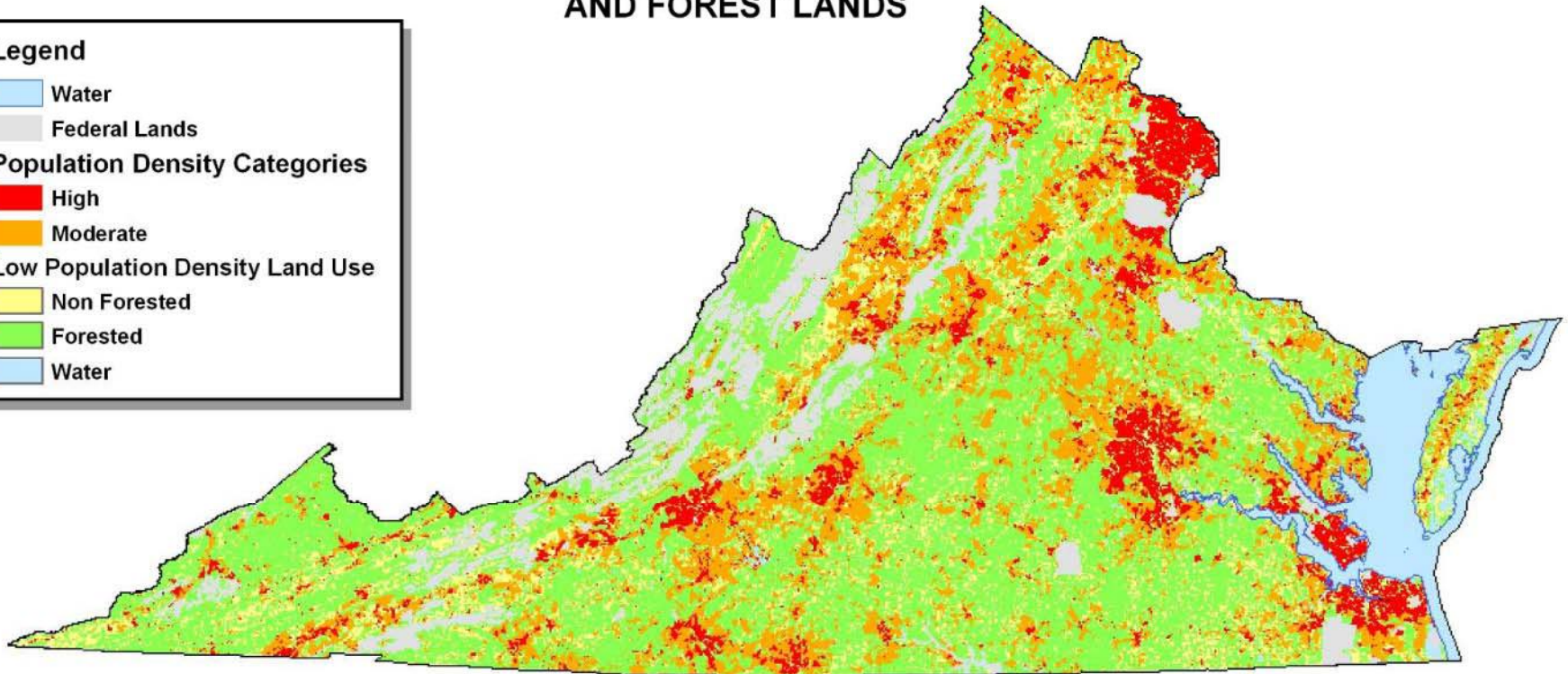
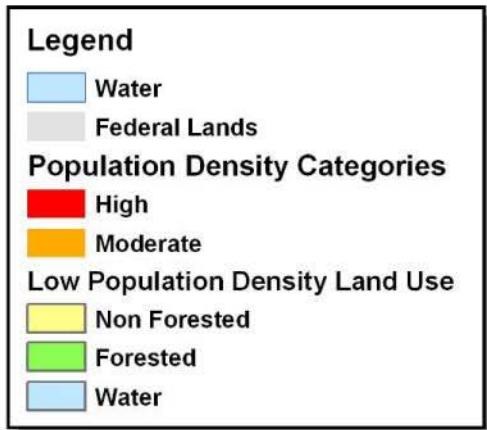


300,000 Landowners with 5 Acres or More

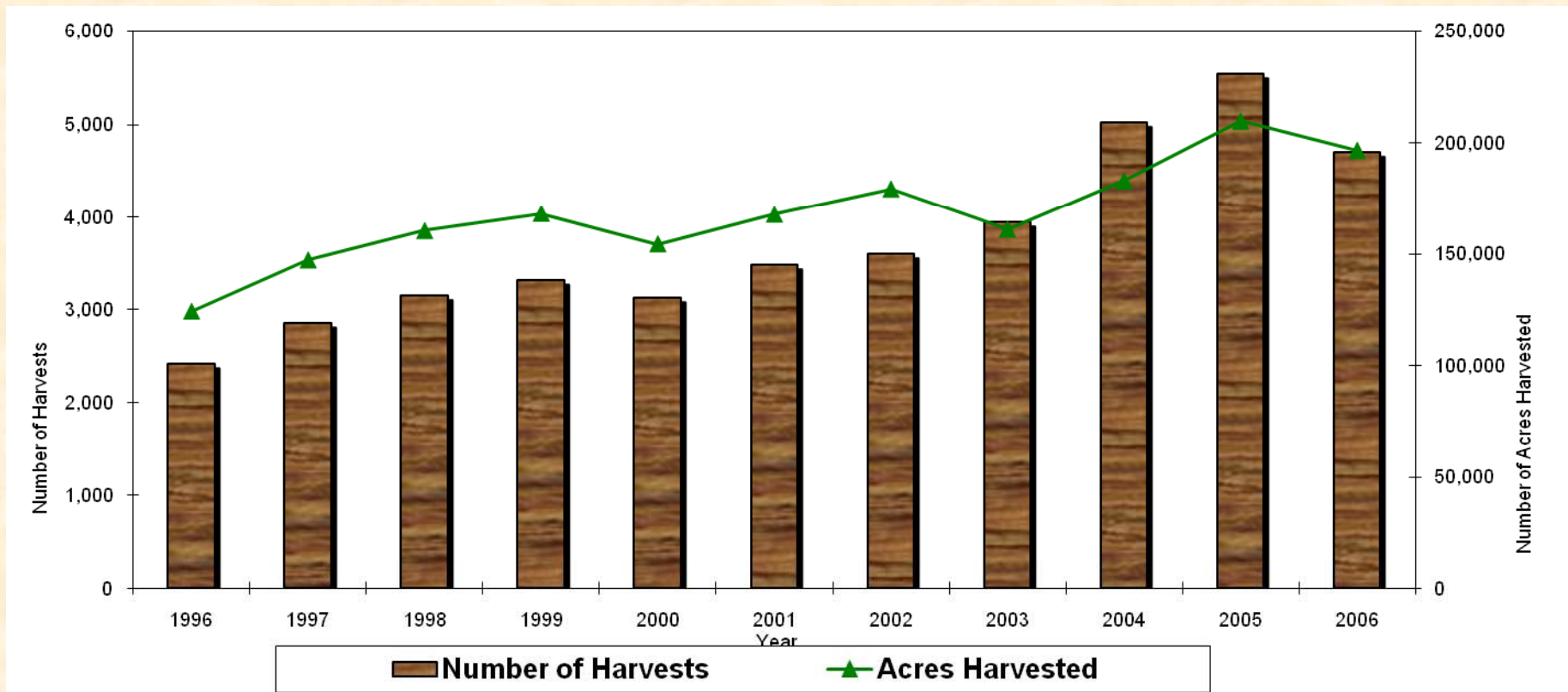
2/3 of landowners own less than 100 acres

Forest Resource Assessment

2000 POPULATION DENSITY
AND FOREST LANDS

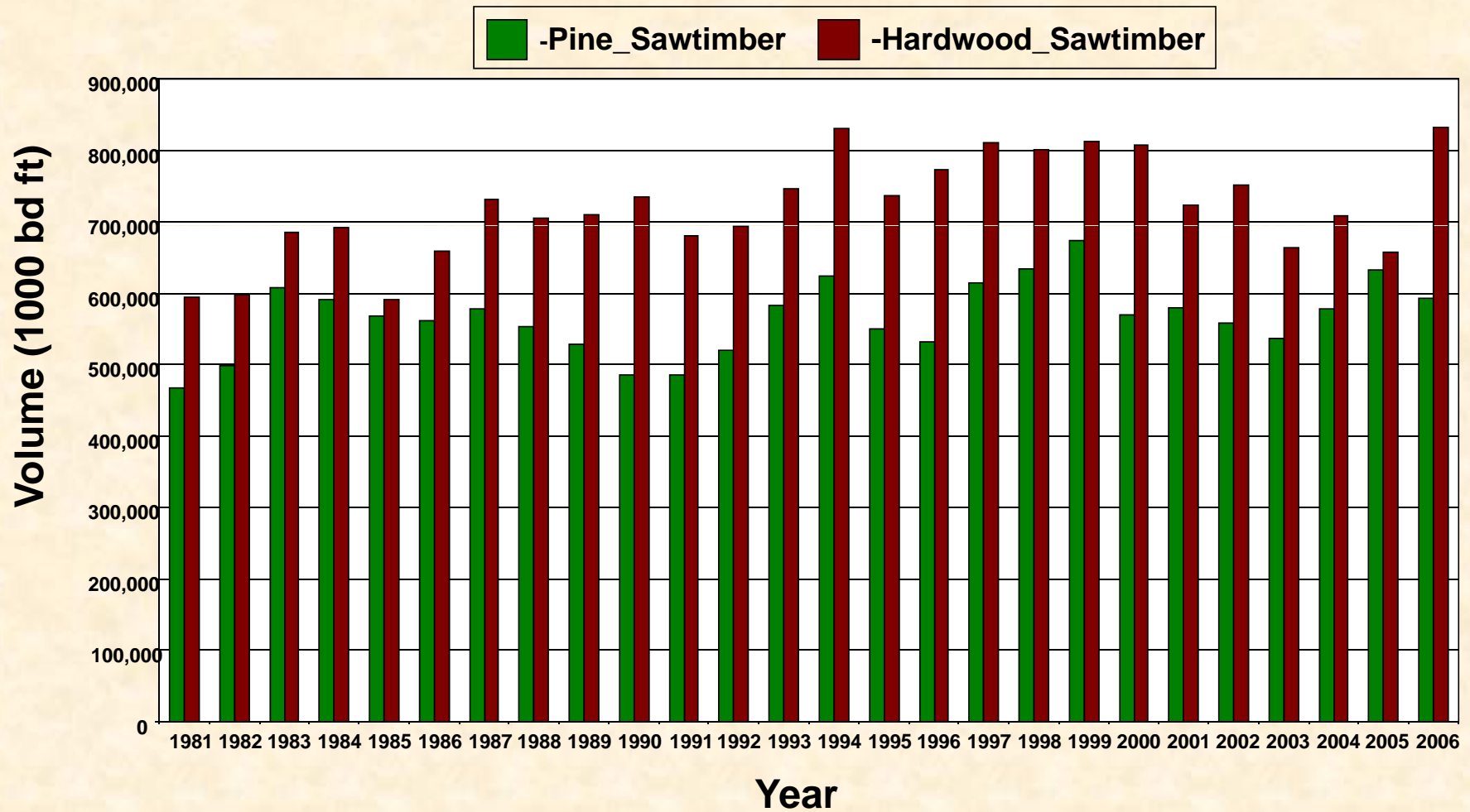


Timber Harvests in Virginia (1996 – 2006)

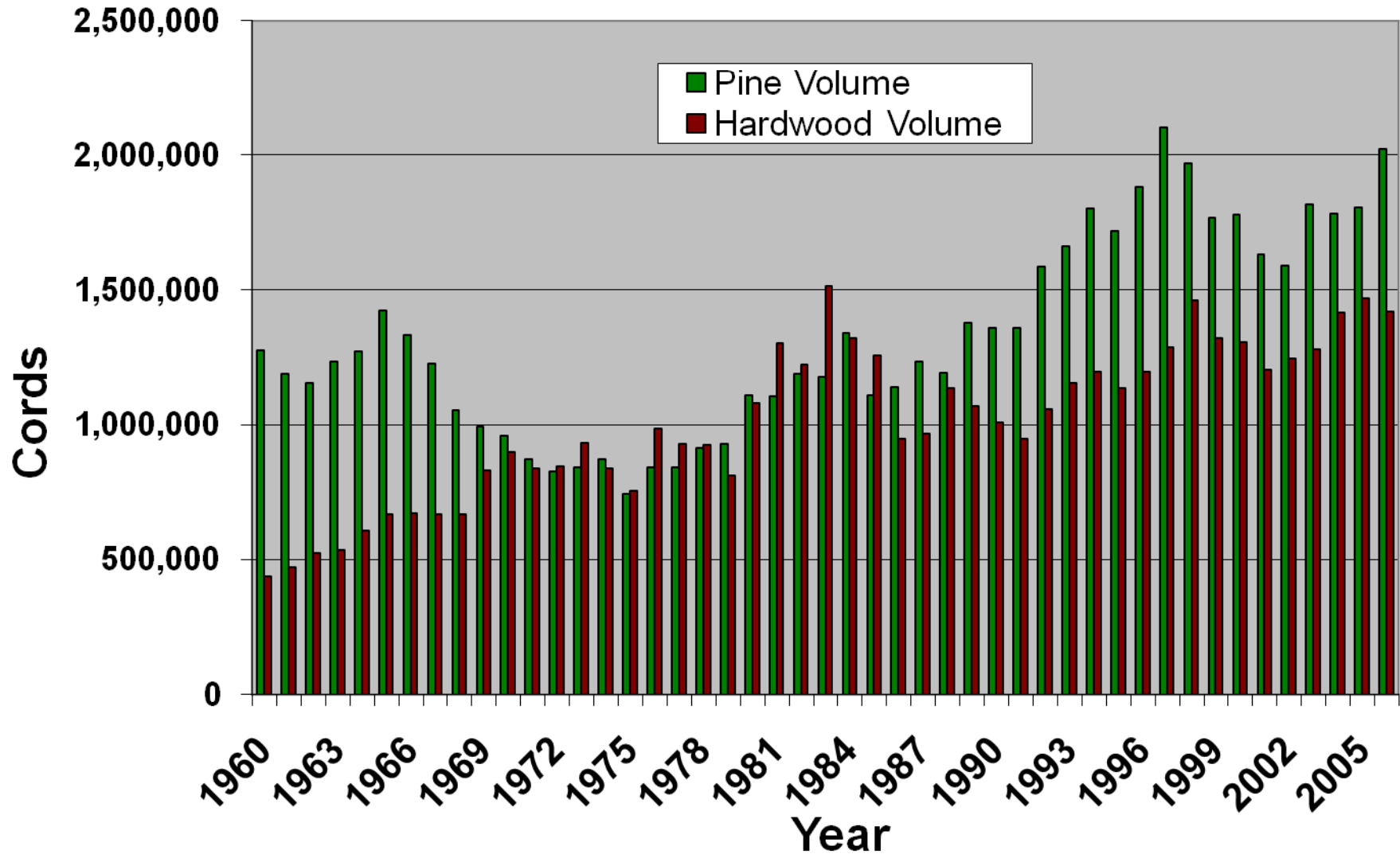


DOF inspects over 5,000 harvests annually with an average size of 40 acres

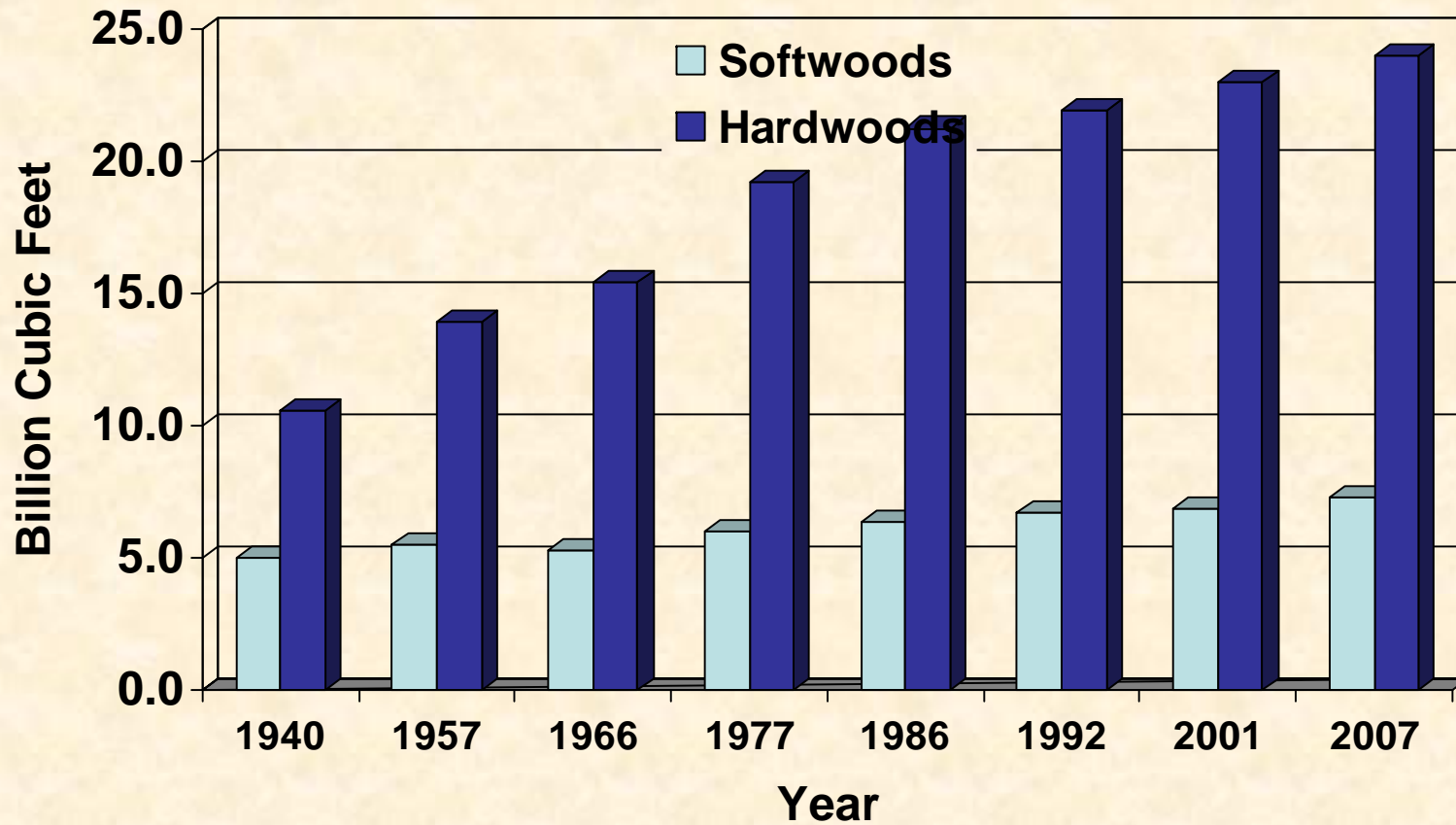
Virginia Sawtimber Harvest



Virginia Pulpwood Harvest



Forest Volume Trends



Timberland Volumes (cubic ft.)

Species Groups	Total	Growing Stock	Rough Cull	Rotten Cull
Pines	6,940,729,989	6,660,447,841	279,103,223	1,178,925
Other Softwoods	467,843,821	386,093,195	81,661,418	89,208
Soft Hardwoods	9,867,553,645	8,048,427,277	1,744,355,002	74,771,366
Hard Hardwoods	14,420,736,260	11,785,547,885	2,523,231,404	111,956,971
Unassigned Hardwoods	1,825,926	730,610	1,095,316	0
Total	31,698,689,642	26,881,246,808	4,629,446,363	187,996,470

Annual Removals (cubic feet)

Species Groups	Total	Growing Stock	Rough Cull	Rotten Cull
Pines	329,152,074	308,041,741	0	21,110,333
Other softwoods	2,645,088	1,906,519	0	738,569
Soft hardwoods	222,042,537	188,976,714	617,414	32,448,408
Hard hardwoods	220,571,487	191,199,258	2,989,347	26,382,882
Total	774,411,186	690,124,232	3,606,761	80,680,192

Annual Mortality (cubic feet)

Species Groups	Total	Rough Cull	Rotten Cull
Pines	86,825,743	0	86,825,743
Other softwoods	3,877,211	0	3,877,211
Soft hardwoods	41,715,561	0	41,715,561
Hard hardwoods	96,443,219	255,614	96,187,605
Total	228,861,734	255,614	228,606,120

Recoverable Logging Residues

Fifty Mile Radius of Roanoke Area

Average Acres Treat per Year	50,801
Average Tons/Acre at 60% Recovery	9.964
Average available logging residues	506,181 tons

Other Sources of Virginia Woody Biomass

- Forest products manufacturing: 2006 - Over 8 million tons, most from sawmills
- Landfills: 2003 - 1,251,960 tons solid wood waste – 665,033 woody brush tons
- Forest management operations
- Right-of-way clearing & maintenance
- Urban trees/forest health/invasive species
- Climatic events/Natural disasters

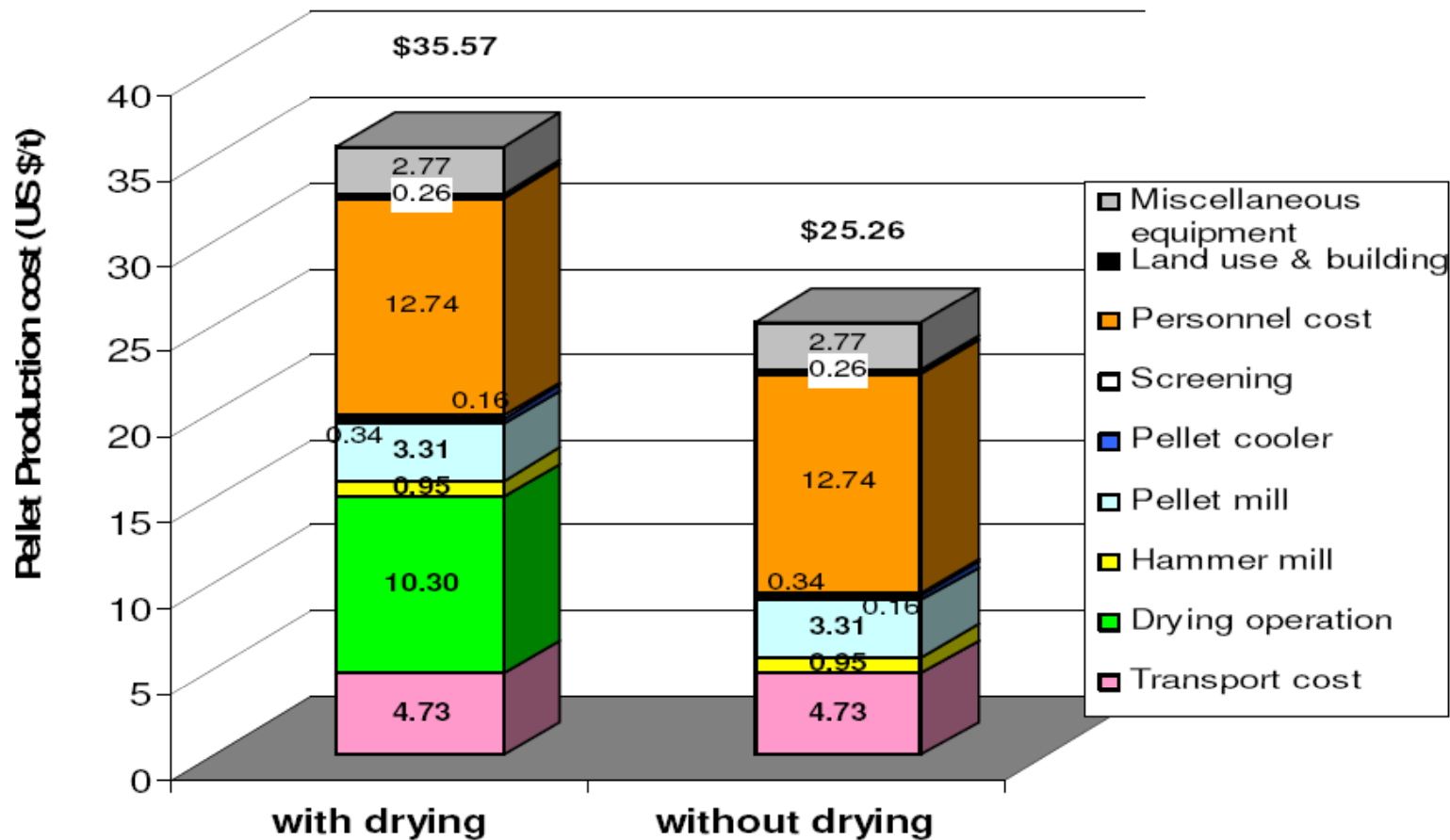
Supply of Forest Biomass

- **Factors Affecting Supply**
 - Costs (influenced by technology, production scale and system, etc.)
 - Accessibility (location, willingness to sell, technology/infrastructure)
 - Energy markets/prices
 - Competing uses of forest resources (e.g., wood products markets, ecological services, etc.)
 - Policies
 - Others (e.g., environmental consideration, social acceptance, etc.)

Biomass Energy Processing and Production

- **Direct Combustion**
- **Densification**
- **Torrefication**
- **Pyrolysis**
- **Gasification**
- **Distillation**

Pellet Production Costs

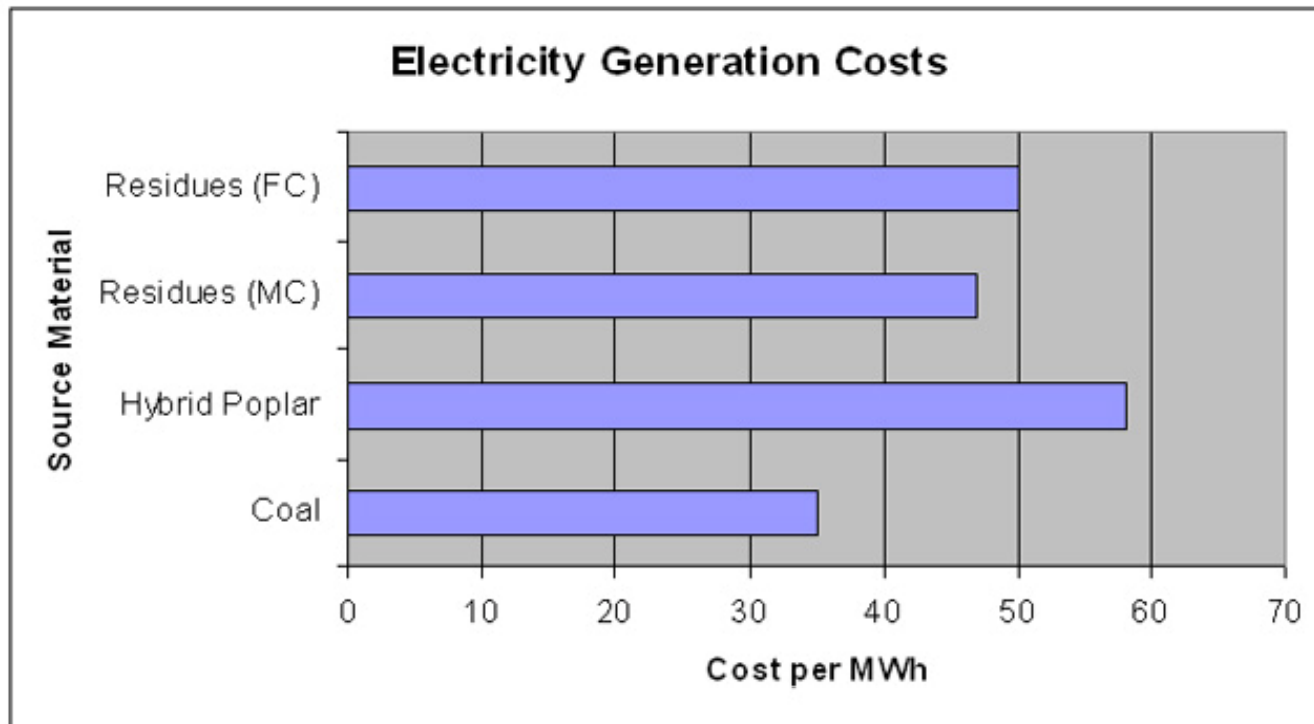


Source: Sudhagar Mani 2006

Electricity Production

(New plants using combined-cycle gasification)

- Conventional coal system - \$35/MWh (2006)
- Biomass systems



Source: Gan and Smith 2002; Gan and Smith 2006

How Can Biomass Energy be More Competitive?

- Reduce fuel costs by improving the efficiency in growing, procuring, transporting, and processing forest biomass.
- Reduce non-fuel costs through improving efficiency in energy conversion (from biomass to secondary energy).
- Develop more combined heat & power generation.
- Provide incentives/credits to reduce carbon dioxide and other emissions.
- Increase co-firing at coal generation plants.

Woody Biomass Use in Virginia

- Forest Products Industries are the major producer and user of biomass energy.
- Dominion Power's 80 MW Pittsylvania station uses approximately 700,000 tons annually.
- Longwood University heats campus with sawdust. Looking at cooling and power.

Woody Biomass Use in Virginia

- Five wood pellet plants are now in operation. Others are being built and more are planned. Over 2 million tons annually are projected.
- Dominion Power and others are exploring co-generation; potential 100,000's of tons
- Energy costs and government incentives should lead to increasing use of woody biomass.

Forestry and Biomass Energy Opportunities

- Improve forest health by developing markets for low grade wood, diseased and damaged trees, invasive species, fuel reduction materials, etc.
- Reduce site prep cost by including biomass harvest.
- Improve urban forests and utilization of urban wood waste.

Forestry and Biomass Energy Opportunities

- Additional markets for forest landowners that should improve economic viability of forest management activities.
- Reduce need for open burning and land filling of woody materials, especially during land clearing and weather-related disasters
- Potential markets for right-of-way maintenance materials
- Potential income from carbon credits

Forestry and Biomass Energy Opportunities

- Increased employment
- Increased tax revenues
- Economic diversification
- Community resilience and stability
- Locally produced energy



Forestry and Biomass Energy Concerns

- Sustainability issues
- Site impacts of residual biomass removal
 - Fertility
 - Organic Matter
 - Erosion/Water Quality
 - Ecology
 - Etc.



Forestry and Biomass Energy Concerns

- Technology
- Infrastructure needs
- Domestic market development
- Off site impacts
 - Air quality
 - Water quality/quantity
 - Transportation
 - Etc.



Policy Decisions Will Impact Biomass Energy Use

- Carbon Tax
- Cap and Trade
- Other emission relate laws
- Renewable fuel incentives
- Government programs
 - National
 - State



Carbon Credits

- Forest biomass/bioenergy production sequestrates and/or offset carbon in several ways:
 - Carbon sequestered in growing trees
 - Carbon sequestered in forest soils
 - Carbon emissions displaced by substituting bioenergy for fossil fuels
- Carbon markets are still under development
- Chicago Climate Exchange,
<http://www.chicagoclimatex.com>



Federal Programs

- 2008 Farm Bill
 - Title IX: Energy
 - Biomass Research & Development
 - Forest Biomass for Energy
 - Community Wood Energy Program
 - Other Potential Sections
 - Title VIII: Forestry
 - Title II: Conservation
 - Title VI: Rural Development

Federal Programs

- U.S. Dept. of Energy – Renewable Energy Biomass Program www1.eere.energy.gov/biomass/index.html
- Wood Education and Resource Center www.na.fs.fed.us/werc
- U.S. Forest Service – Forest Products Lab www.fpl.fs.fed.us/tmu/index.html
- USDA Farm Services Agency – Biomass Crop Assistance Program www.fsa.usda.gov/FSA/webapp?area=home&subject=ener&topic=bcap

What is Virginia's Biomass Energy Future?

- Part of the wood basket of the world
- Well developed, but changing forest industry
- Changing demographics and land ownerships
- Great interest in renewable energy
- Great interest in utilizing and reducing waste
- New and expanding bioenergy use in Virginia
- Available resources, new technologies and products still uncertain.

For More Information

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