

Biofuels 2.0

**Challenges in scale bioenergy production
from forest biomass**

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IEA Conference – Vancouver
August 24, 2009

Weyerhaeuser – Forest Products Leadership

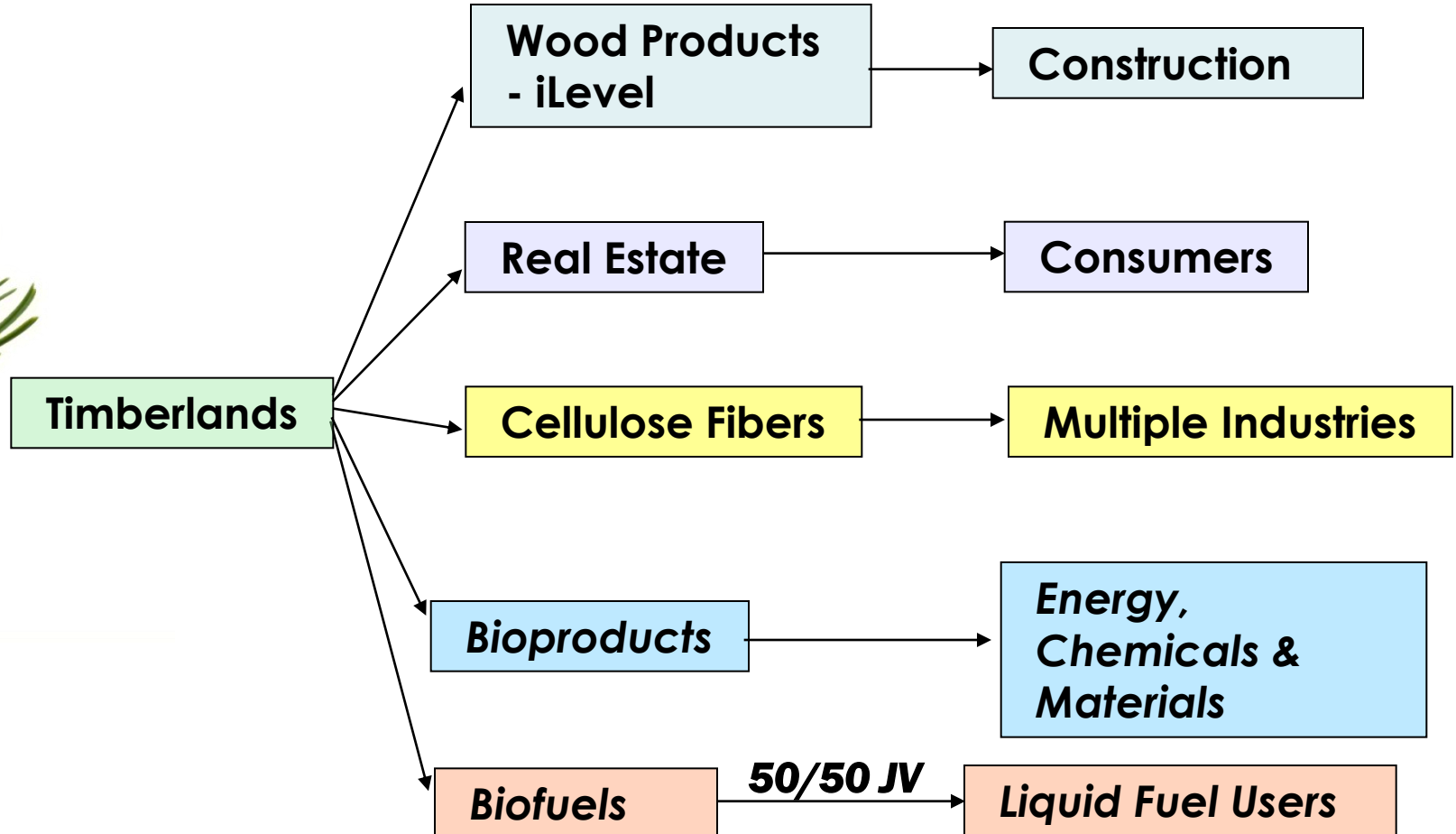


✓ Founded:	1900
✓ 2008 Revenues:	\$8 billion
✓ Fortune 500 Rank:	147
✓ Number of employees	19,000 in 10 countries
✓ Technology staff	350 scientists / engineers
✓ Forestland owned or managed	21.6 million acres
✓ Home offices	Federal Way, WA
✓ Sales and Support	Worldwide



Our Businesses

Our customers



Challenges

- **Feedstock scalability**
- **Transparent Sustainability**
- **Logistics capability and infrastructure to collect, process and distribute both feedstocks and fuel products**
- **Galvanizing Policy**
- **Proven, economical conversion processes**
- **Viable business model for investment**

Creating Scale Biomass

- **New crops.**
- **Improvements in biomass harvesting technology.**
- **Improvements in silviculture.**
- **Innovative ways to integrate biomass cultivation with forest management.**

Adding new biomass sources through harvesting improvements

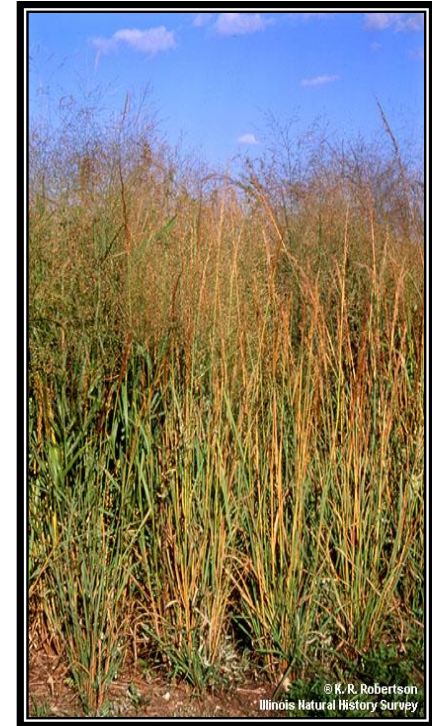
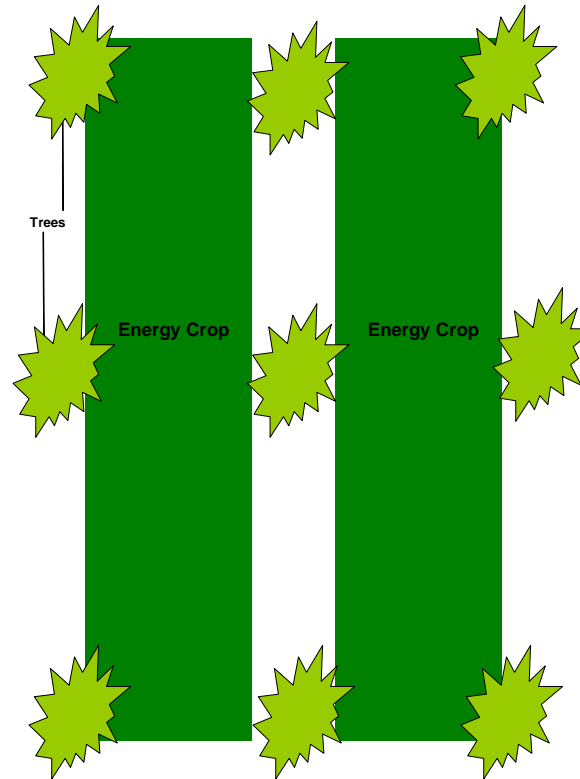


As technology improves and costs decline, more biomass becomes available.

Adding new biomass through Intercropping of Dedicated Energy crops

How might this work

- Grow strips of pine trees and an energy crop
- Perennial energy crop harvested annually for a number of years
- Trees managed for wood products and fiber.



Making changes in how we remove biomass requires careful demonstration of impacts....



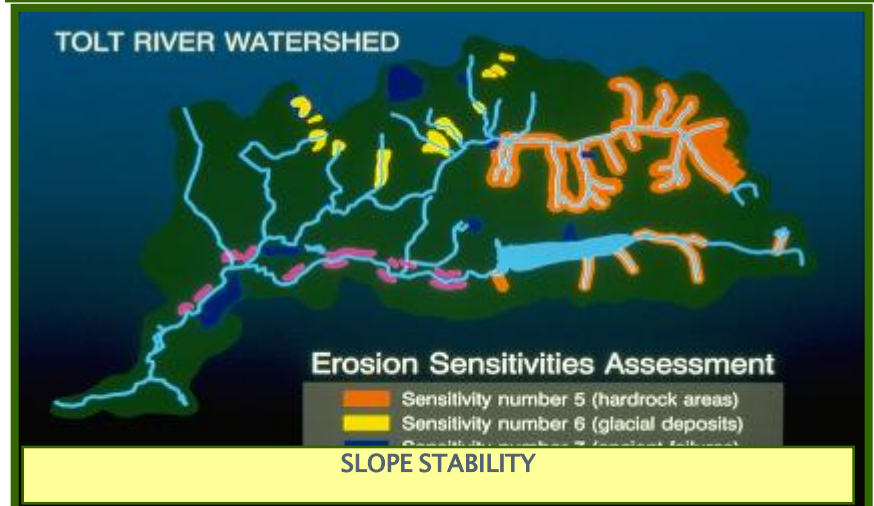
RIPARIAN AREAS/ WATER QUALITY



WILDLIFE



FISH PASSAGE



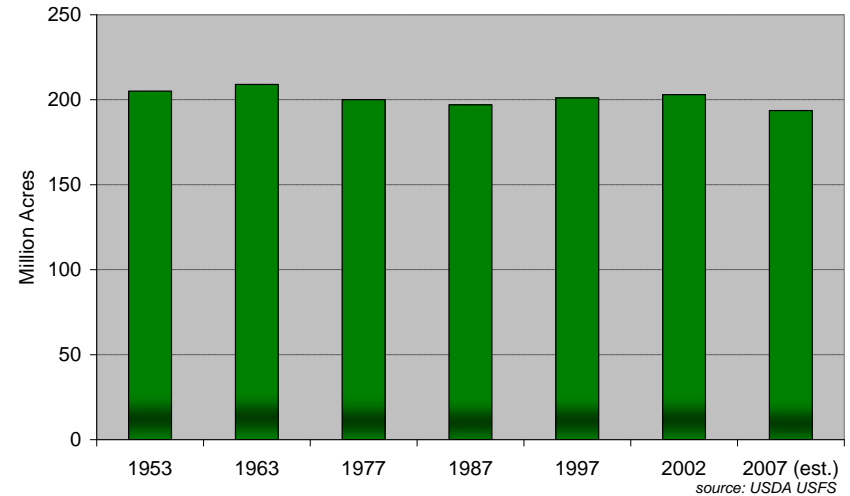
Logistics / Infrastructure



US South: Case study for substantial yield improvement

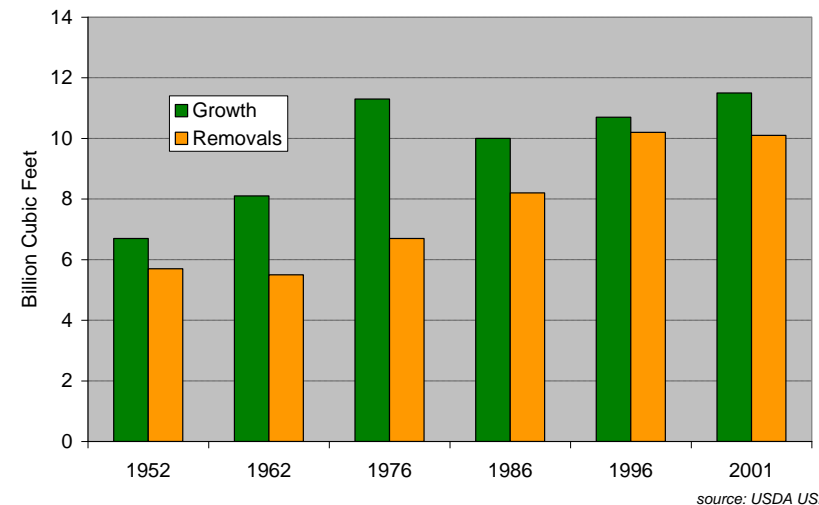
Timber land base has been stable.

US South Timberland Area



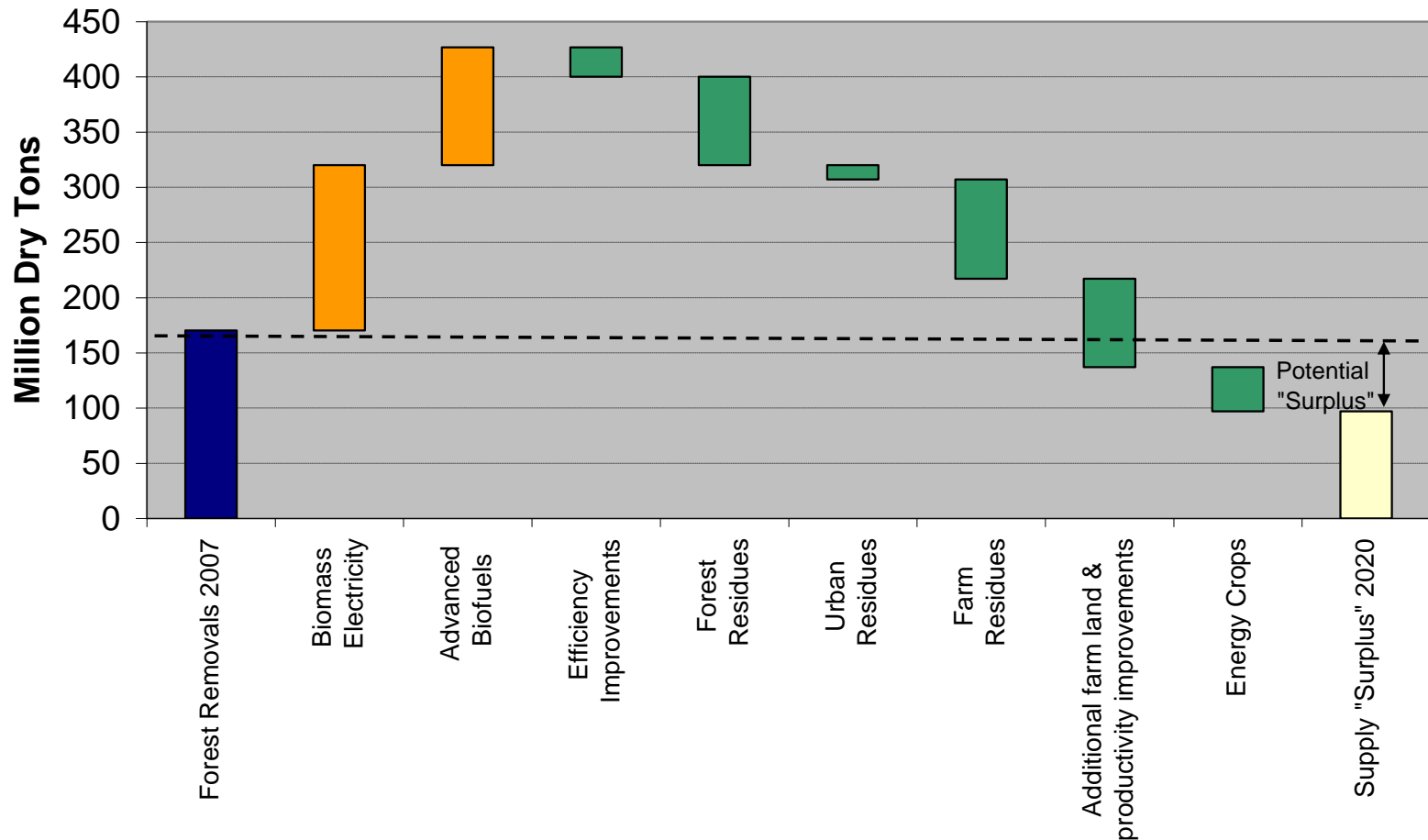
Forest management investment drives output

US South Growth versus Removals



Effects of Incremental Biomass Demand US South

Illustration of Plausible Demand/Supply Balance

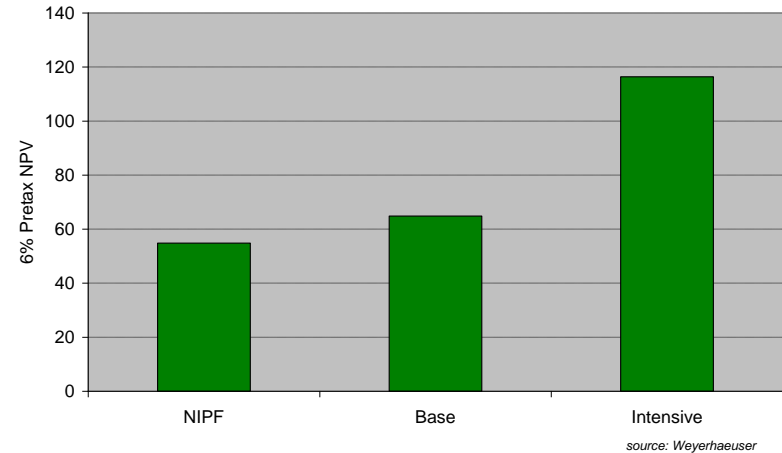


Single Acre Economics – US South

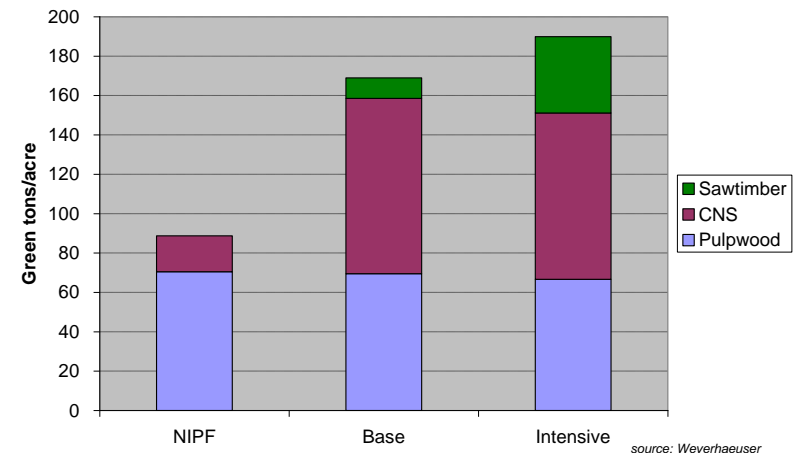
Intensive management produces:

- Better financial returns
- More sawtimber
 - And fiber residuals
- Forest management certification and best management practices promote production from sustainably managed forests

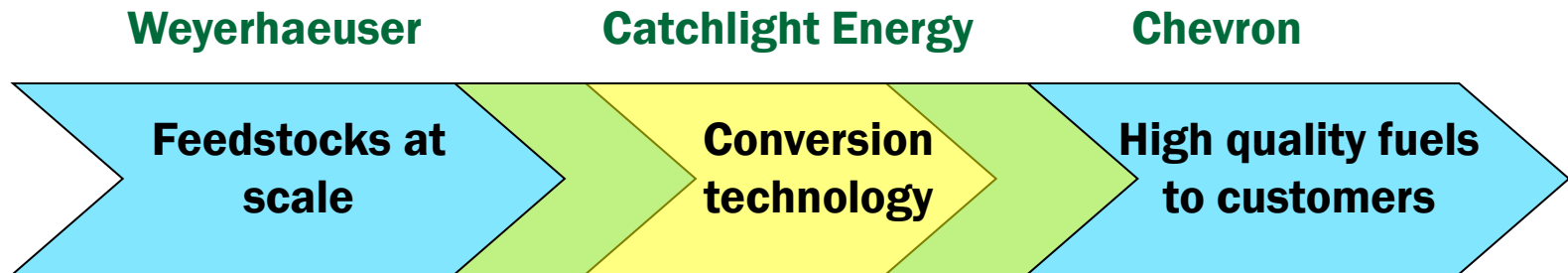
Financial Effect of Intensification



Volume Production Effect of Intensification



Viable Business Model



End-to-end value chain solution
Unique in the market

Conversion Technology

Catchlight Energy builds on the strengths and competencies of the parents

- **WY: handling, feeding, converting biomass**
- **CVX: chemical and thermochemical conversion to liquid transportation fuels**



Long term stability to encourage investment

Equal treatment of forest biomass

Broad renewable biomass definition in the RES.

Incentives to increase biomass supply.

Fiber Supply Issues

Evolving biomass markets are creating tensions among sectors of the industry.

- **Manufacturers are concerned that the developing biomass energy market will impact the cost of fiber.**
- **Forest landowners see the biomass energy market as an opportunity.**

We believe there can be enough fiber for current and new consumers.

Conclusions

We can accomplish scale

Promote production from sustainably managed forests

Good science must drive good policy

All elements of the supply chain must be addressed through partnerships and a road map

Biomass supplies can plausibly meet potential demand

Market is best served with strong, competitive customers for timber *and* biomass

Changing allocation of the resource to different end uses continues as an ongoing process

Forest supplies are growing due to greater investment, and can respond to increases in demand