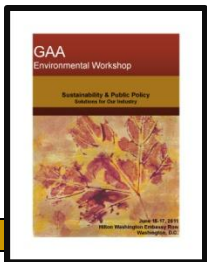


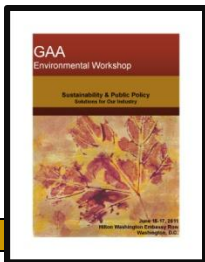
# **Renewability and Sustainability: Wise Use of Natural Resources**

**B. A. (Ben) Thorp**  
**Bioenergy Deployment Consortium**



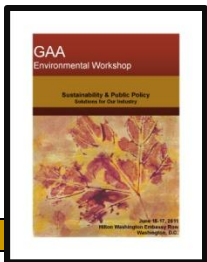
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# Renewability is NOT equal to Sustainability



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# General Regulatory Environment

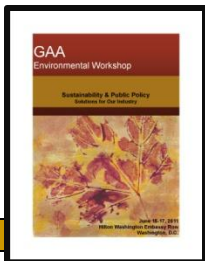


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# Goals and Measurement Interaction

Type of Goal	Type of Measurement System				
	Direct Impact	Direct + Indirect Impact	Green House Gas impact	Life Cycle Analysis	NEXT?
Green	1962				
Permit Compliance	1970's	N/A	N/A	N/A, until 2007	
Recyclable	1980's	1980's			
Low Carbon	2000's				
Renewable					
Sustainable				2007	
NEXT?					

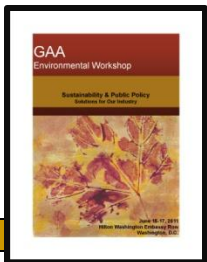
\*Direct means impact “inside the fence”. Indirect impact means impact of imports is included.



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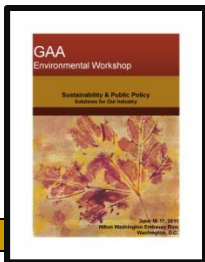
## **3 Major Observations:**

- 1. Goals and measurement systems are not static, but have been evolving.**
- 2. As illustrated by the dates, our nation is moving from the upper left to the lower right.**
- 3. We are not finished.**



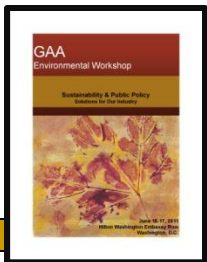
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# Pulp and Paper Wood Use in the U.S.



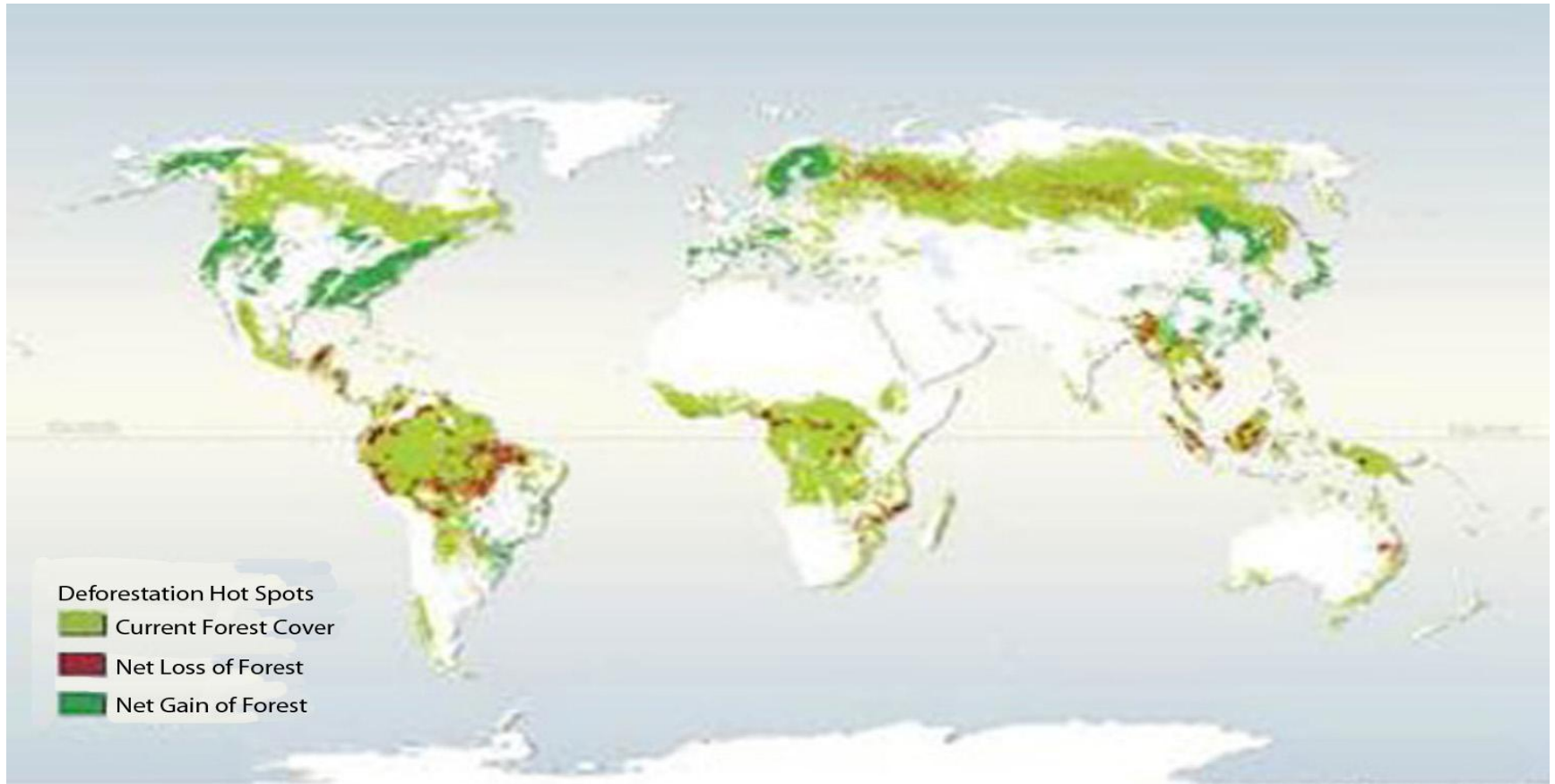
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- **Renewability is using materials that CAN BE replenished.**
- **Sustainability is using materials that ARE replenished. Efficiency and recycling are components**
- **For efficient energy use, we will use British Thermal Units (BTUs) sold divided by BTUs purchased.**

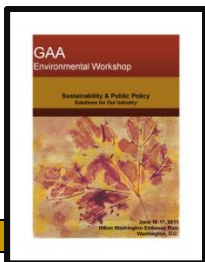


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# World Forest Inventory



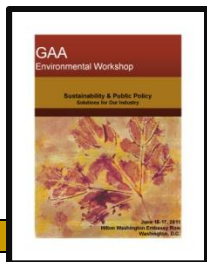
Source: Millennium Ecosystem Assessment



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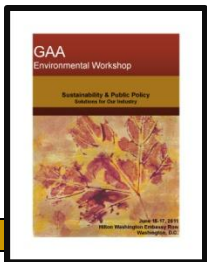


**This makes the U.S. pulp and paper industry both renewable and sustainable for its major raw material.**



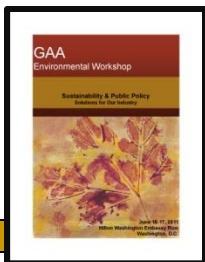
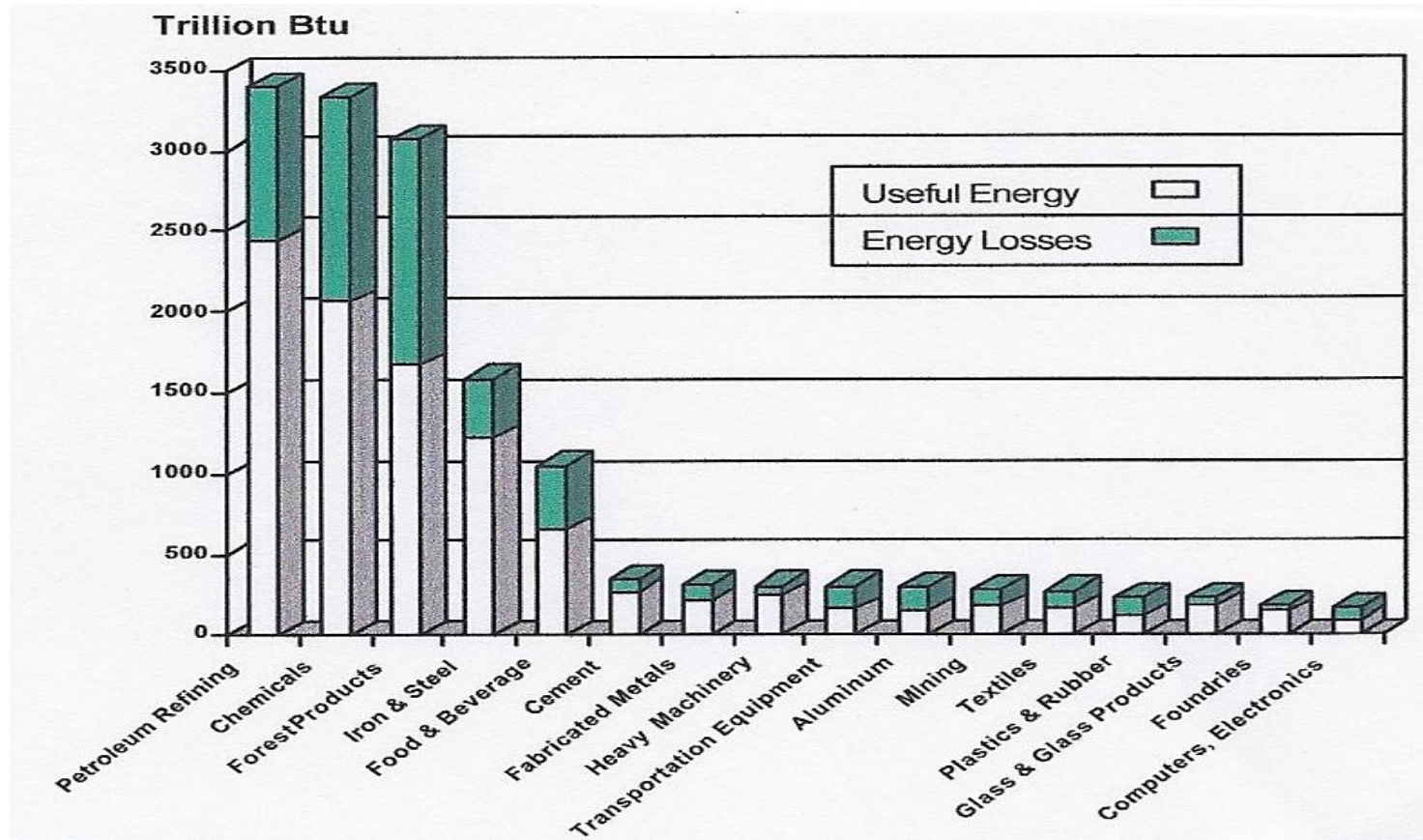
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# Energy Use



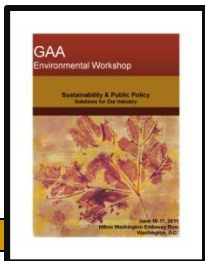
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# Energy Used and Lost for 16 Industries



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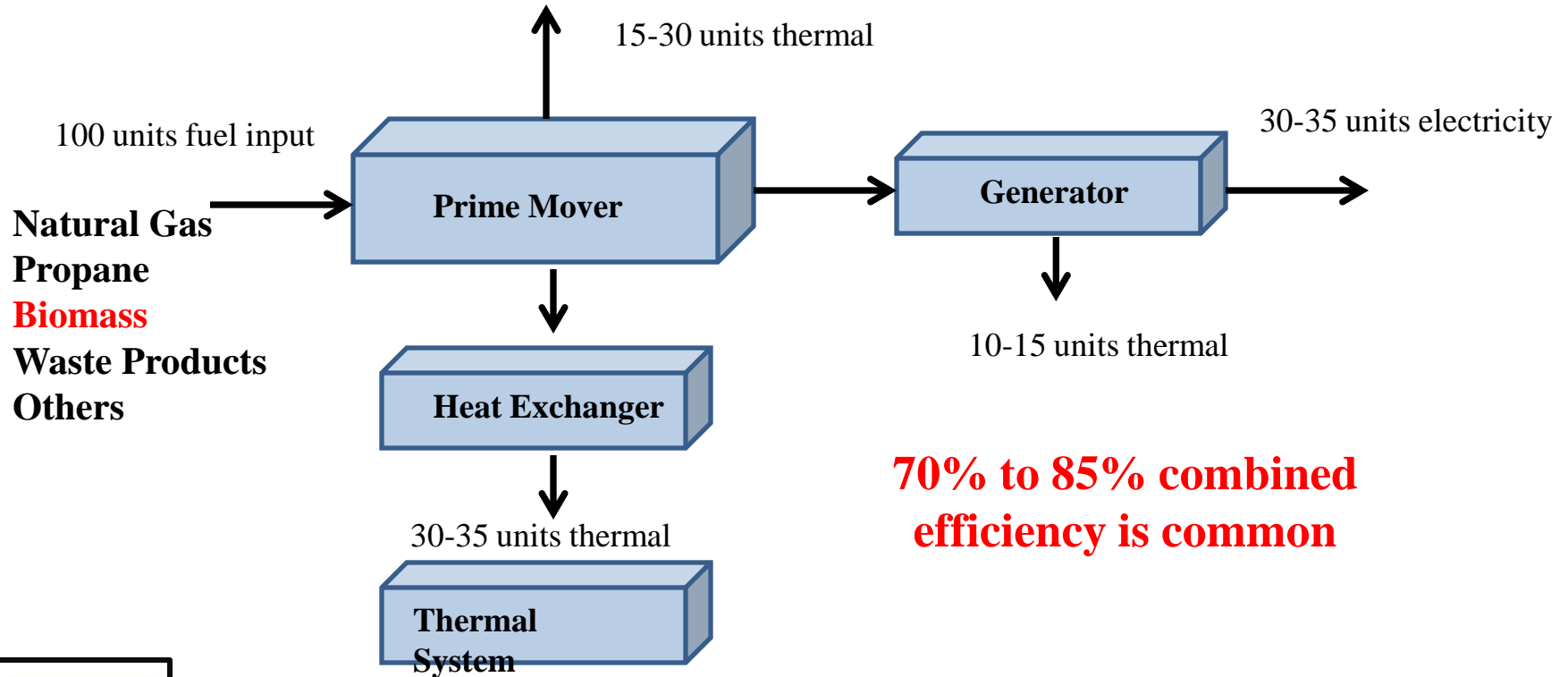
**Pulp and paper is UNIQUE in that it self-produces 65% of its total energy, or about 1.4 Quads from renewable and sustainable sources.**



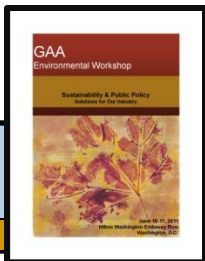
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# CHP System

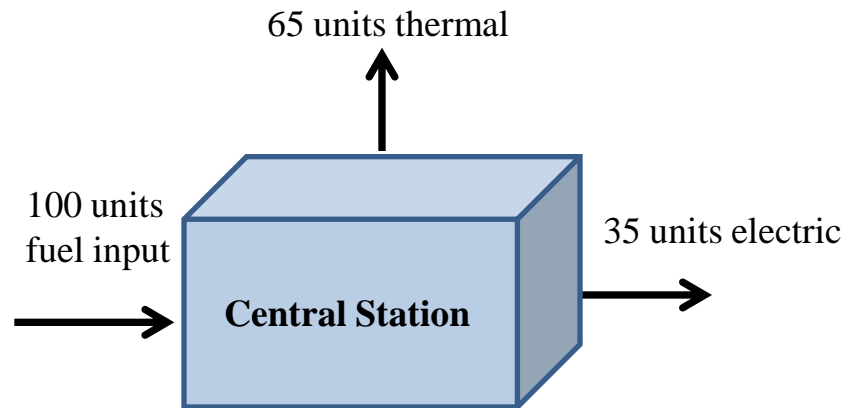
Produce the Power On-Site and Recycle the Waste Heat from the Prime Mover



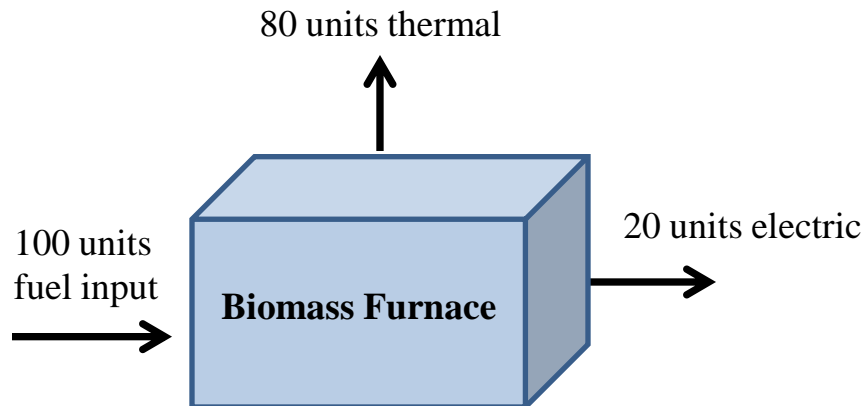
**70% to 85% combined efficiency is common**



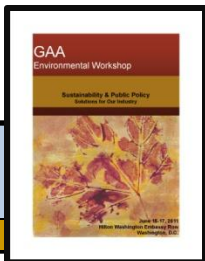
# Conventional Electric Generating Systems



- Stand alone central power plant economy of scale
  - 100 units input = 35 units of electric
  - Remainder lost as heat

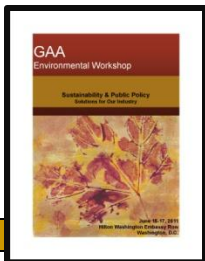


- Stand alone generation of electric from biomass
  - 100 units input = 20 units of electric
  - Remainder lost as heat





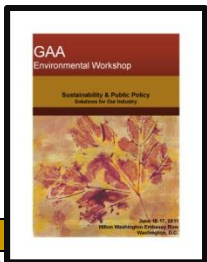
# Photo of a Utility



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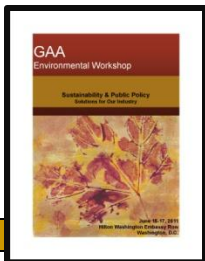
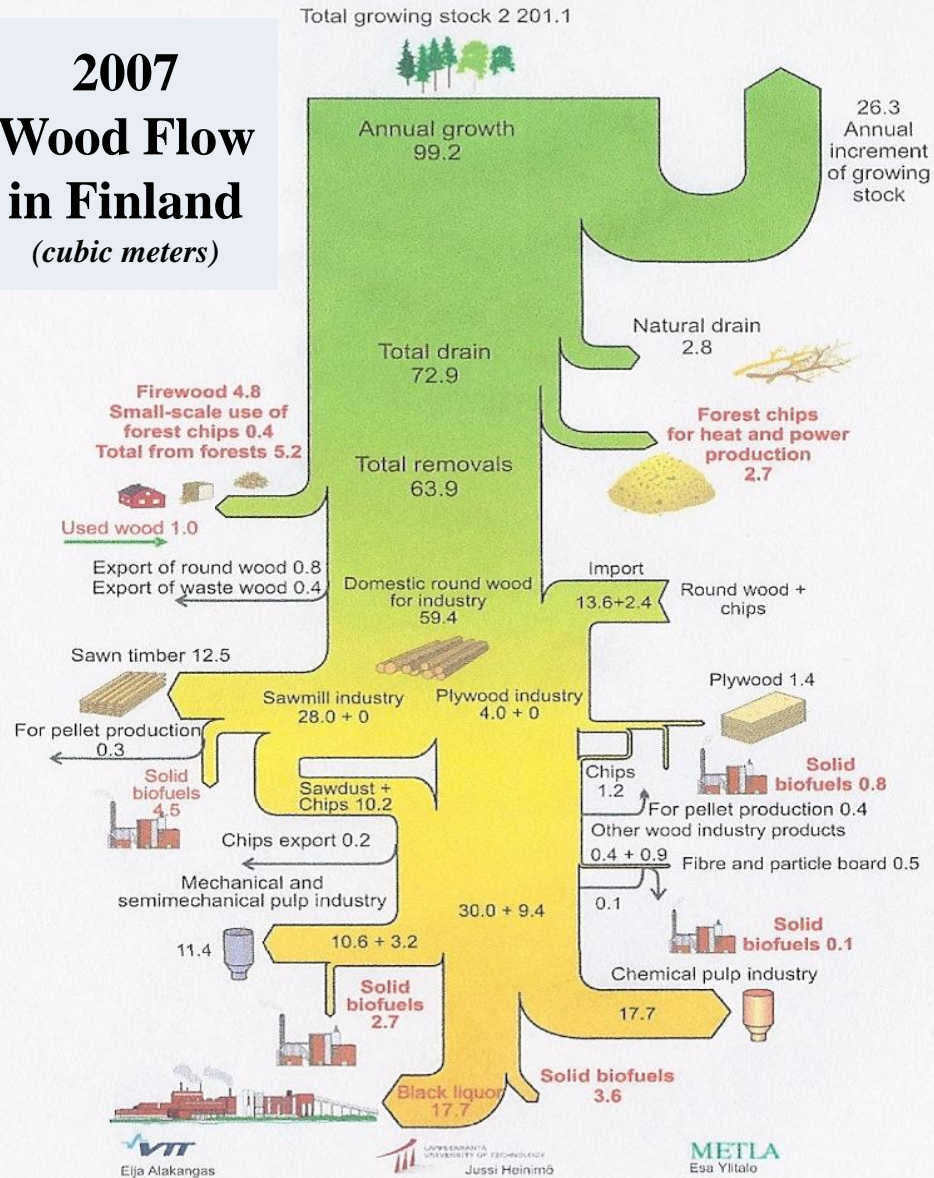
# The Key Question:

## Is 20% Efficiency a Sustainable Practice?





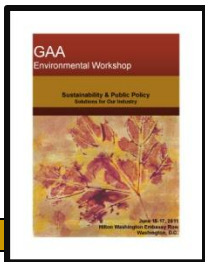
# 2007 Wood Flow in Finland (cubic meters)



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# Major Conclusions

- 1. The pulp and paper industry is sustainable in its use of the major raw material and more sustainable than any other major industry in energy.**
- 2. Over time, the pulp and paper industry can be sustainable in energy, even generating excess energy.**
- 3. The nation will derive benefit from a focus on sustainability and real drivers.**
- 4. The nation can be harmed from a focus on renewability and surrogate measures.**
- 5. The nation should value testimony from industries which are to be regulated.**
- 6. The nation should clearly understand the value chain to be regulated to avoid marked disruptions and avoid unwanted consequences.**



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