Bioenergy – Should We Care and If So, How Much?

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The Role of Biomass in America's Energy Future

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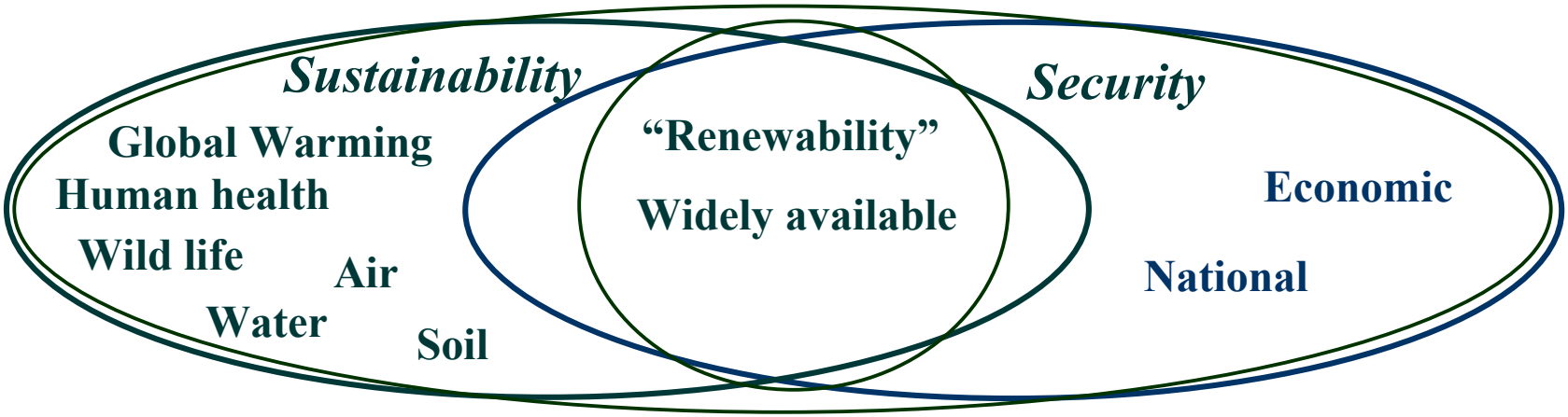
Our Energy Supply Challenges Are BIG

Looking for a solution set:



- Solutions are significant in relation to their scale
- Oil is particularly troublesome among non-sustainable energy resources
- There are inherent risks to putting all our eggs in one "technology pathway basket"

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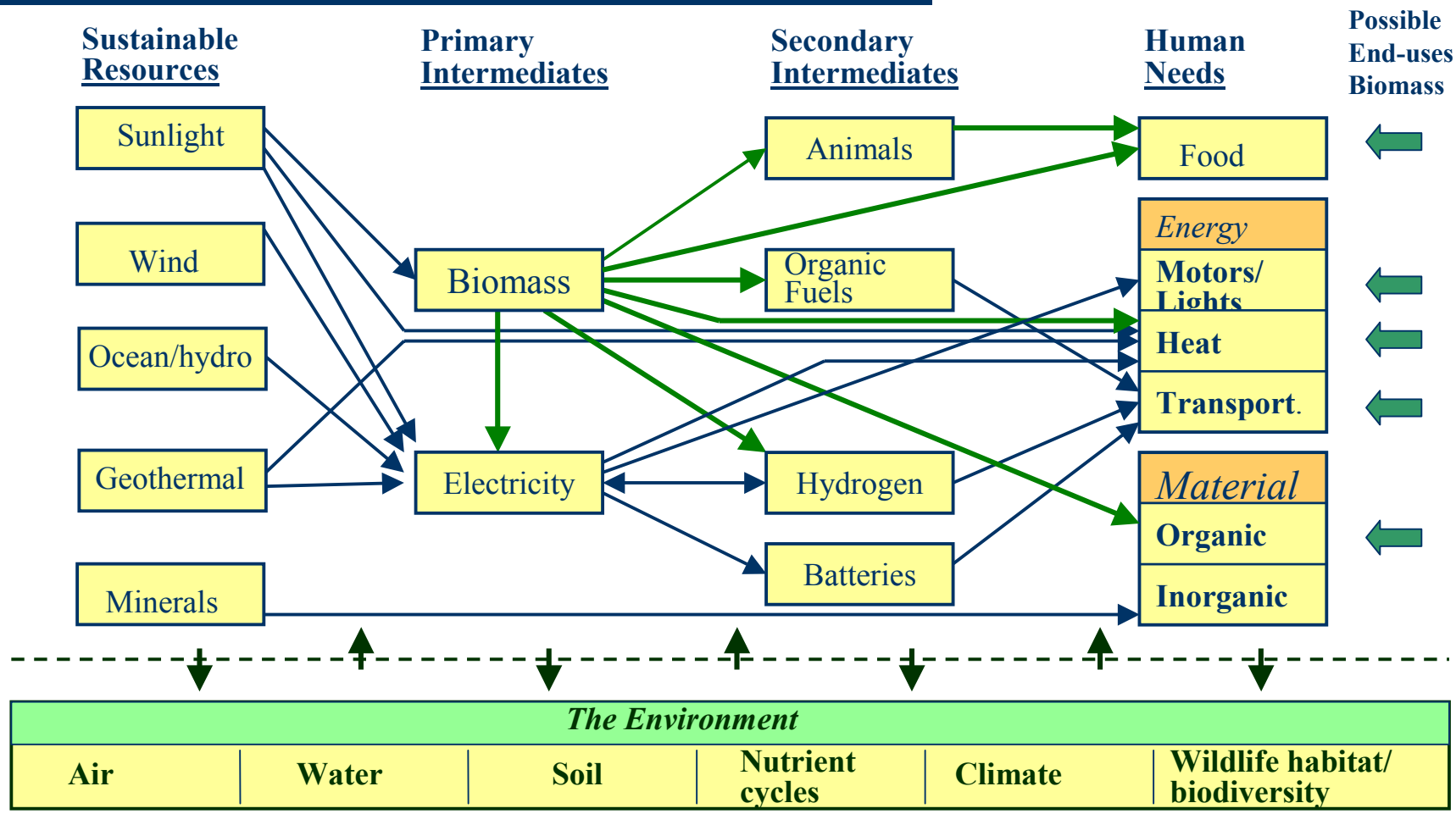
Imagining a Sustainable World



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Biomass Utilization: A Hierarchy of Long Term End-Uses

End-Uses	Foreseeable Alternatives to Biomass		
	Non-Sustainable	*Sustainable*	
Food	**No**	**No**	•Unique
Organic Chemicals &Materials	Yes	**No**	•Unique in sustainable •Relatively small demand
Transportation Fuel			
Liquid (@ 1 atm)	Yes	**No**	•Large demand & impact •Easier transition??
Non-Liquid	Yes	Yes	•Can come from biomass but also wind and solar
Electricity	Yes	Yes	•Can be co-produced with fuels
Heat	Yes	Yes	•Many sources/lowest value form of energy

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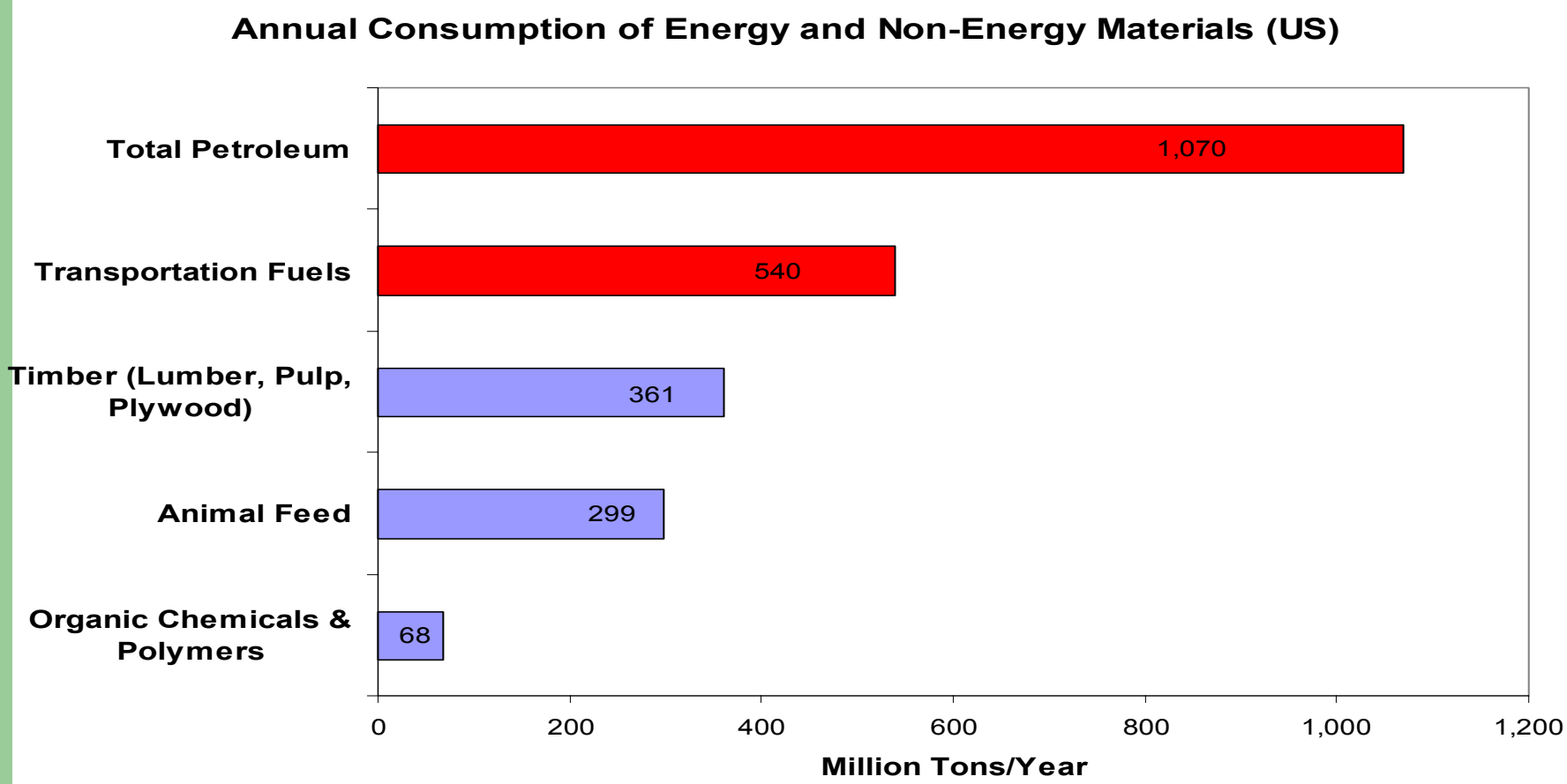
A Rough Measure of the Scale of the Challenge



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Conflicting Messages on Bioenergy

- Incredibly complex mix of feedstock and conversion technologies, each with its own set of impacts and benefits
- Need to be able to understand major distinctions:
  - MSW vs. ag waste ("residues")
  - Row crops vs. dedicated energy crops
  - Combustion vs. gasification
  - Fermentation of simple sugars vs. cellulose
- Even with most environmentally benign options, the message on the scale and sustainability has been mixed

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So What Is the Role of Biomass in America's Energy Future?

- Can pathways be identified by which plant biomass makes a large contribution to meeting future demand for energy services in a sustainable way?
- If the answer is yes, then what do we need to do to make these pathways viable and what can we do now to speed the transition?

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Approaches to Energy Planning & Analysis

1. ***Bury our heads in the sand.*** Pretend that energy challenges are not real or will go away.
2. ***Extrapolate current trends.*** Often championed by "realists".
3. ***Hope for a miracle.*** Acknowledge the importance of sustainable and secure energy supplies, but dismiss foreseeable options as inadequate to provide for the world's energy needs & calls for "disruptive" advances in entirely new technologies.
4. ***Innovate & change.*** Define sustainable futures based on mature but foreseeable technologies in combination with an assumed willingness of society to change in ways that increase resource utilization efficiency. Then work back from such futures to articulate transition paths that begin where we are now.