



The Role of Biomass in America's Energy Future

Themes, Working Understandings and Approach

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Presented at the RBAEF Project Public Forum

Washington, D.C.

February 23, 2004



The Role of Biomass
in America's
Energy Future

Outline

- Mature Technology
- Motivation for Change
- Possibilities for Change
- Heading for High Ground





Mature Technology: Why?

- It is more important to know where we can get to rather than where we are
- Provides a consistent basis for comparison
- Unique feature of this project



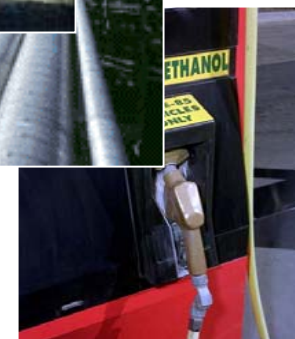
Mature Technology: How?

- Technology performance parameters based on an expert optimist's most likely estimate
- A systematic approach
 - Consistent cost reduction categories
 - 1st vs nth plant for a given technology (several subcategories)
 - R&D-driven innovation
 - Consistent cost accounting framework
 - Calibration with existing mature technologies



Mature Technology: Working definitions

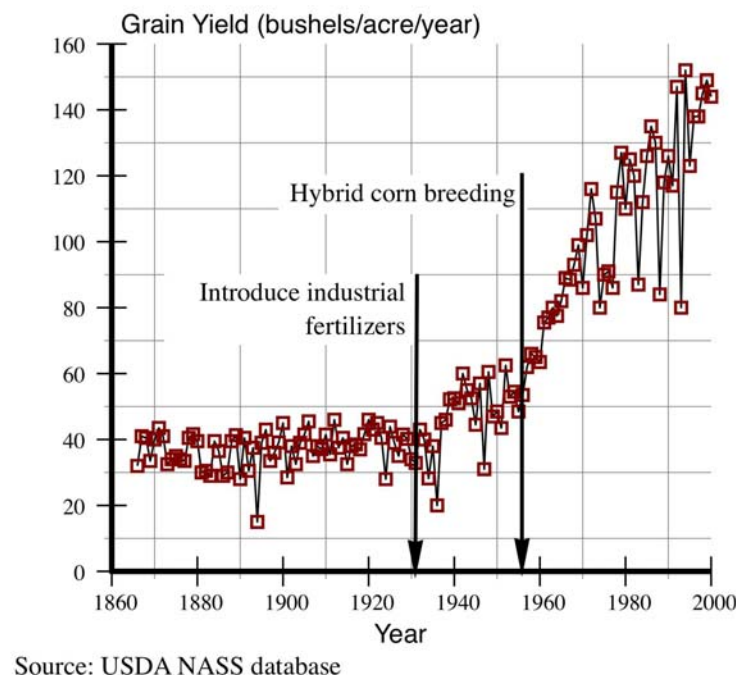
- Processing and Downstream Mobility Chains
 - Additional R&D would lead to only incremental improvement in cost and sustainability





Mature Technology: Working definitions

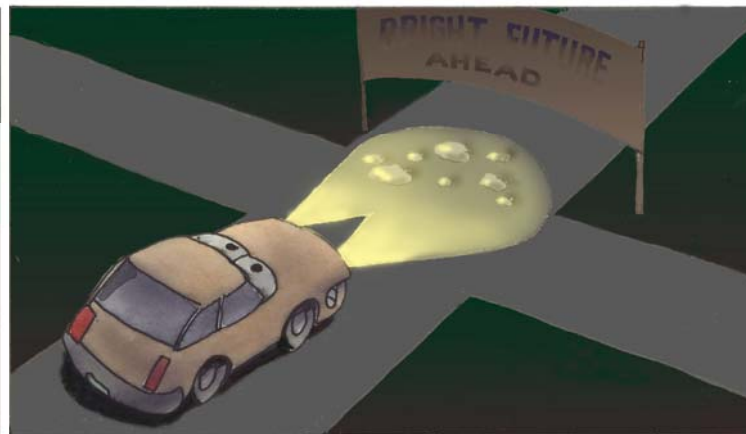
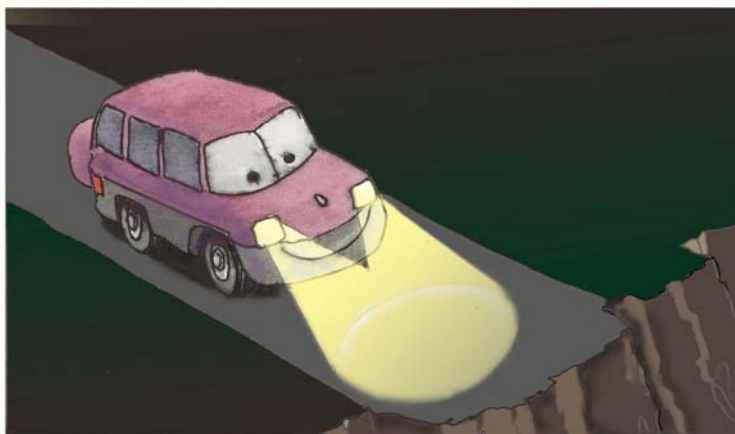
- Feedstock (Cellulosic Energy Crops)
- Asymptote not particularly useful
- Two reference points
 - Achievable in 20 - 30 years
 - A development effort comparable in size and degree of advancement to that of corn production today





Mature Technology: Rationale

- Driving with the low beams on...





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Mature Technology: Rationale

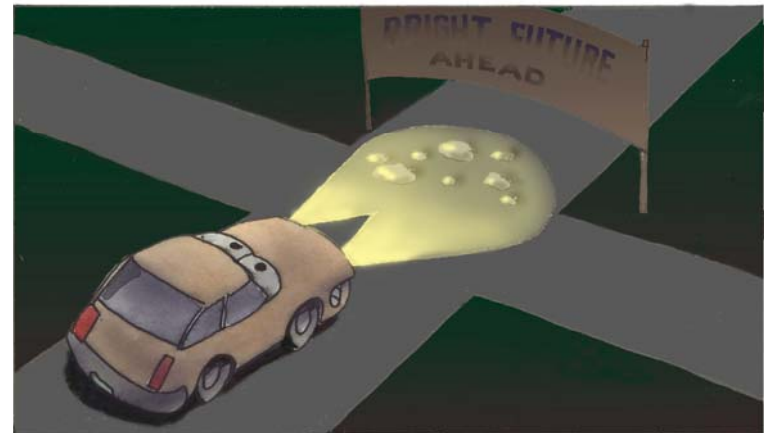
- Driving with the high beams on...





Mature Technology: Rationale

- Avoiding comparison of apples & oranges





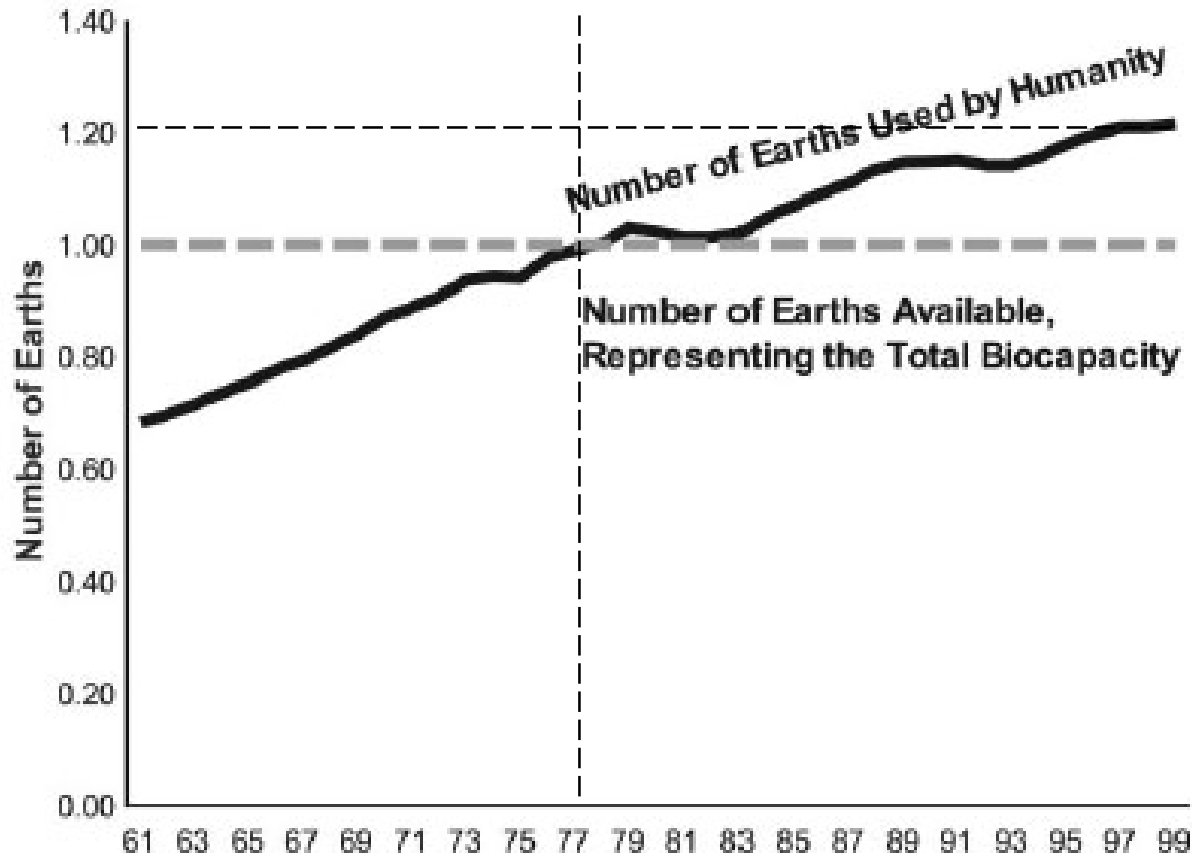
The motivation for change: Our environmental footprint



- Resource supply and waste assimilation expressed as productive land area
 - Understanding the land area needed to meet the demands of society versus the total available land area of the planet



The motivation for change: Exceeding Earth's capacity



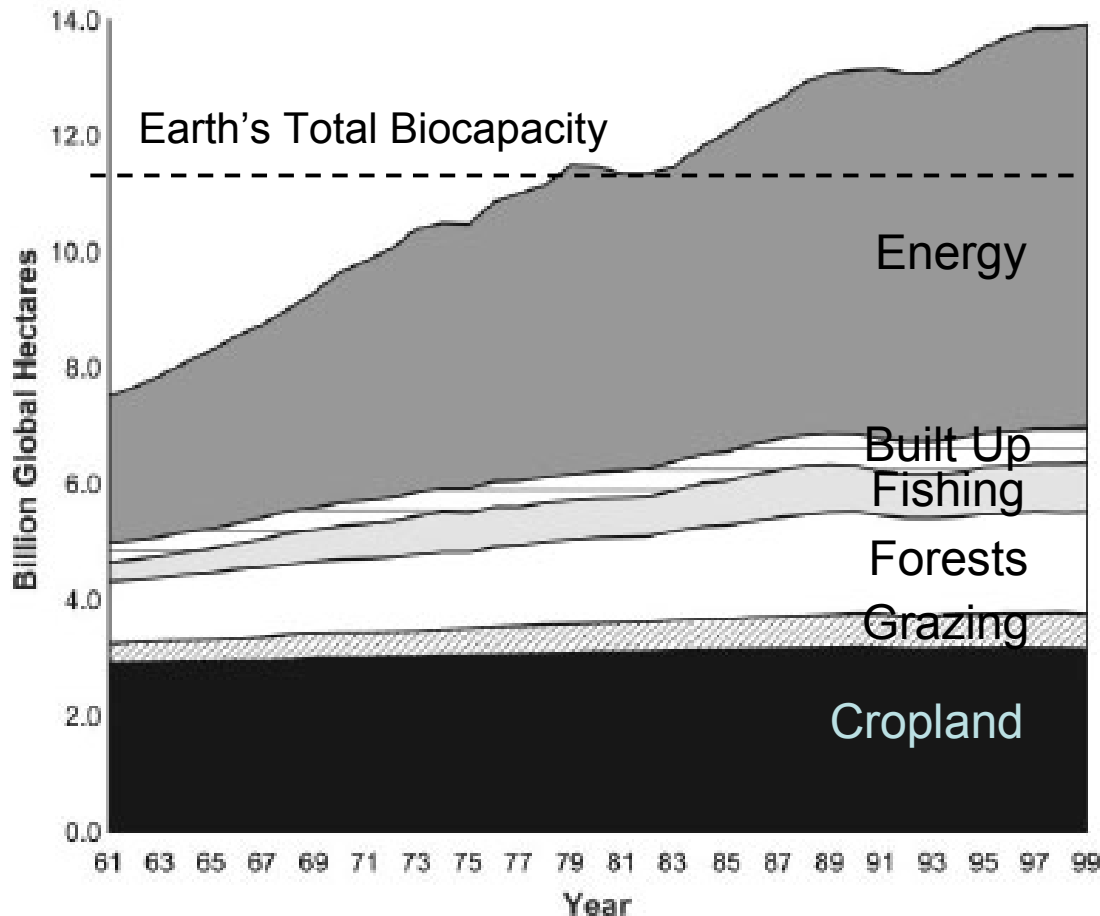
Wackernagel et al (2002) *Proc Nat Acad Sci*

- 1977 milestone: Societal demands exceed capacity of the planet
- At the end of the 20th century, we needed the equivalent land mass of 1.20 "Earths"



The motivation for change

Our environmental footprint

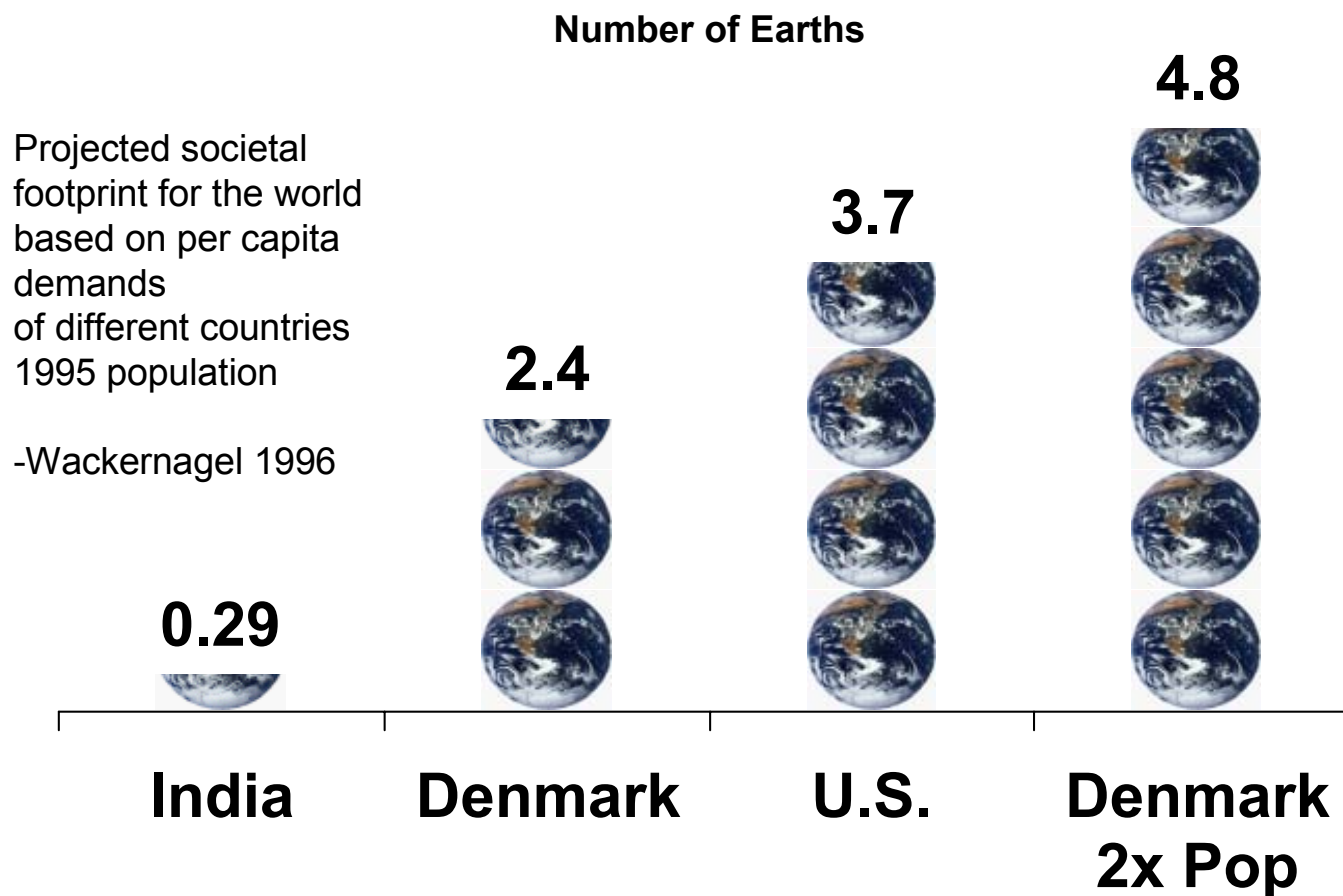


- The lion's share of our demand for the Earth's biocapacity comes from energy and agriculture
- The two "land services" most central to this study



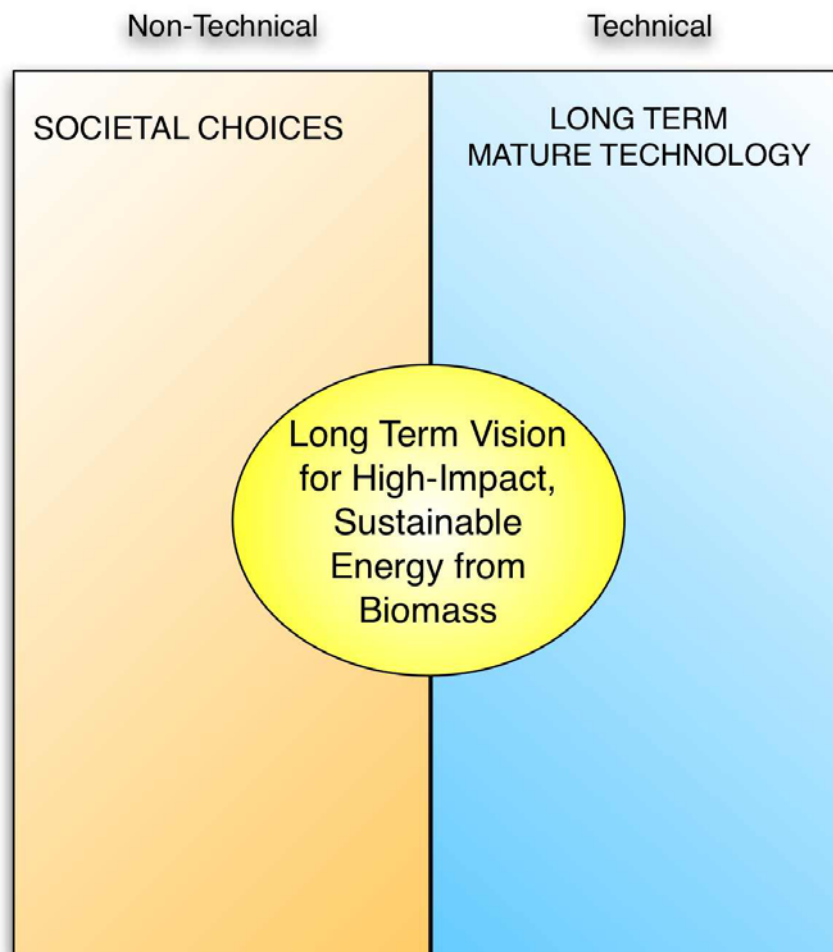
The motivation for change

Demands of developed nations



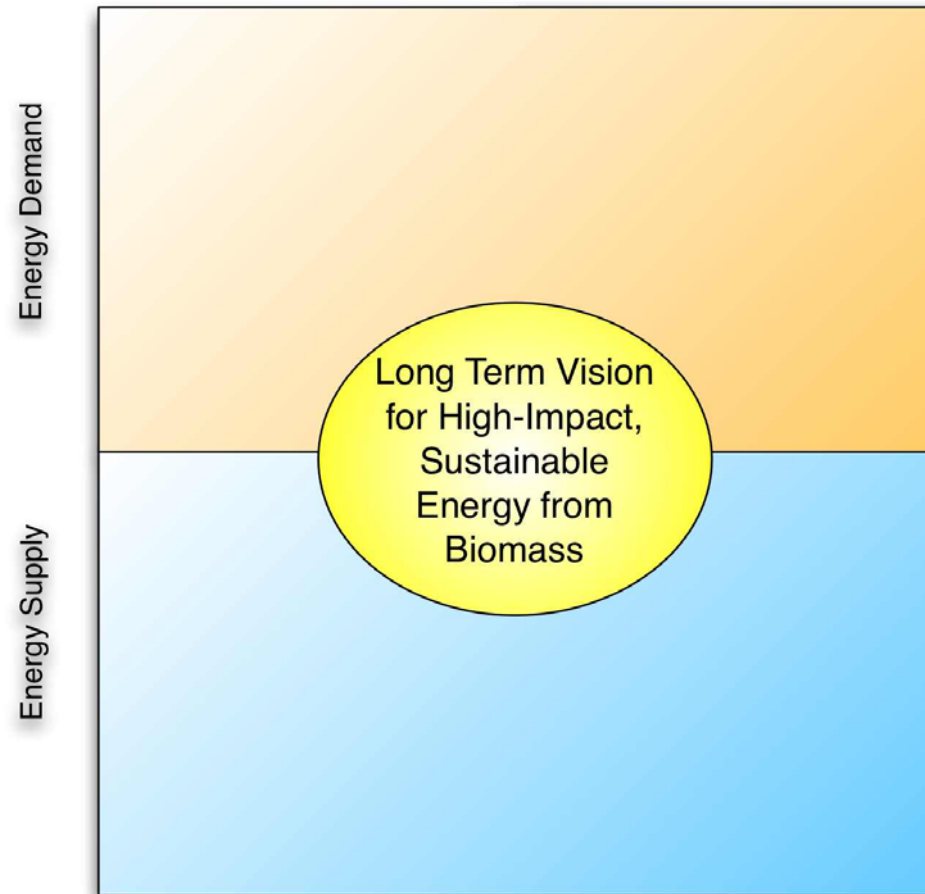


The possibilities for change



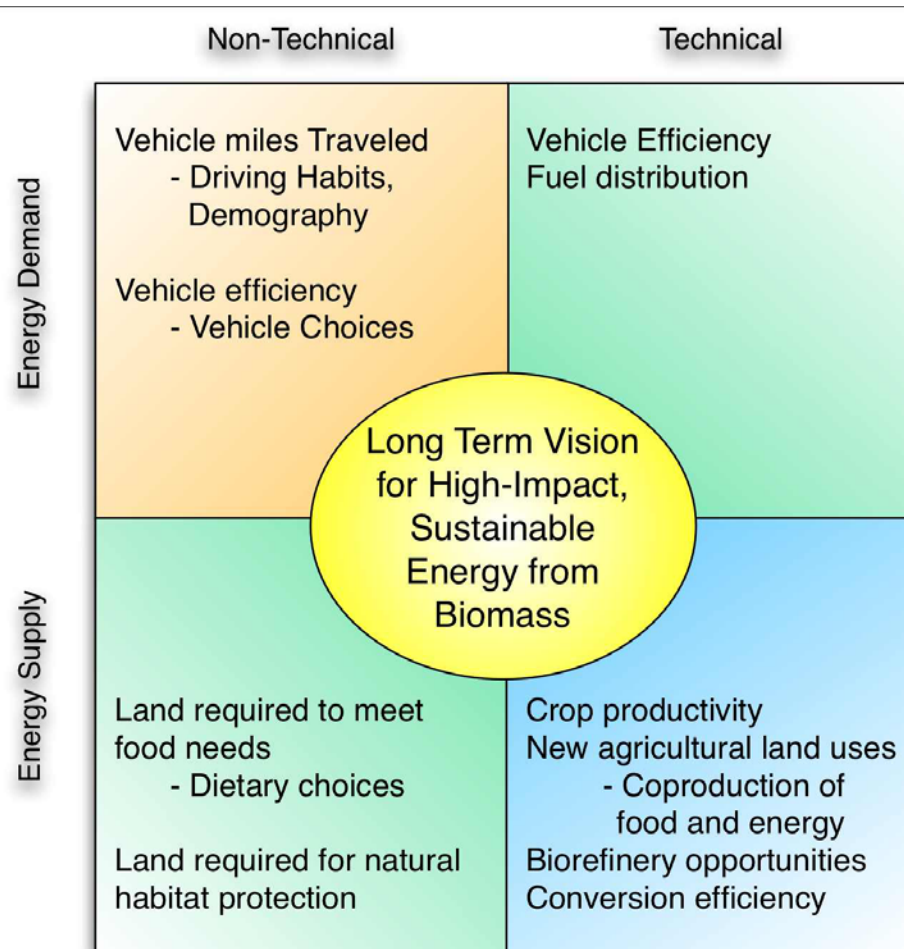


The possibilities for change





The possibilities for change





The possibilities for change

- We will examine the effects of both technical and societal change
- We will establish analytical continuity between analyses that allow for non-technological change and the results of analyses that assume no significant societal change



Heading for High Ground

- We are looking for scenarios in which biomass offers the potential for large impacts on our ability to meet U.S. energy demand
- We need to avoid analysis of marginal long term options and even many promising near-term opportunities
- Criteria for selection of technologies
 - Can make a big difference in energy supply
 - Can do so in an environmentally beneficial way
 - Publicly available information from which mature technology projections can be made