United States Department of Agriculture
Research, Education, and Economics

Agricultural Research Service

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The bioeconomy: opportunities and challenges for Latin America and the Caribbean

4th International Conference on Biofuels Standards

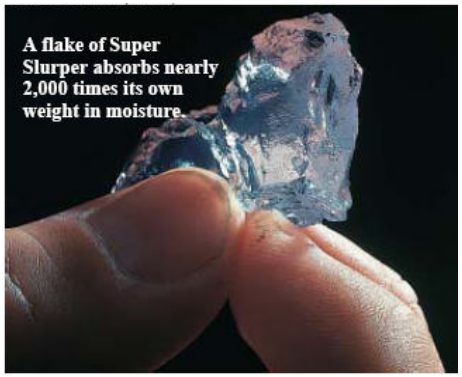
NIST, November 14, 2012

Bioeconomy = Biobased Manufacturing

Biofuels and non-food biobased products

bioplastics

lubricants



superabsorbents

U.S.-based natural rubber

biofuels

soy-based inks

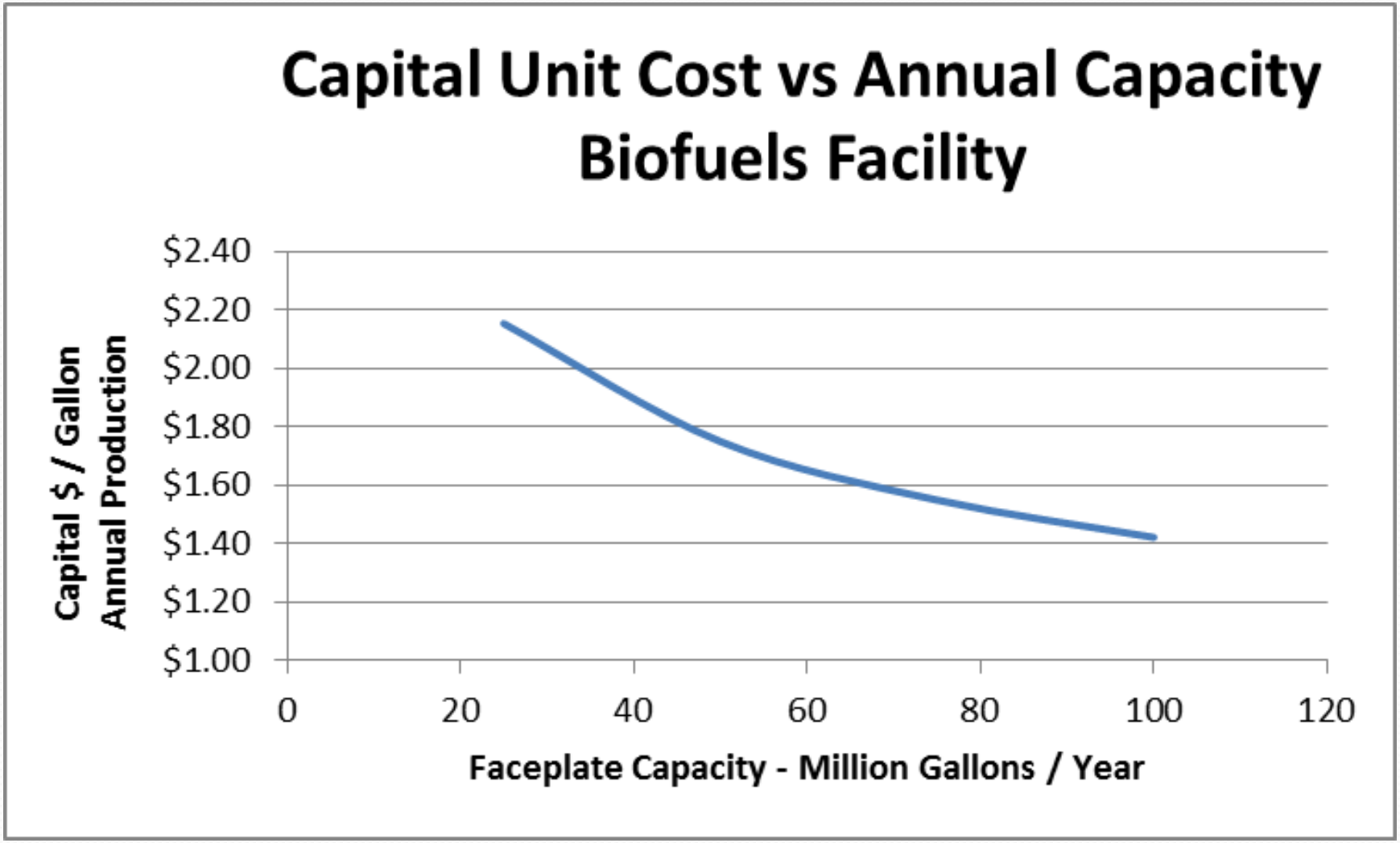
To attract investment capital, first-to-market biobased products must beat…

1. established petroleum- or natural gas-based products manufactured in fully-depreciated assets
2. other biobased substitutes

Requires…

- demonstrated, low-cost and sustainable feedstock production
- lowest-cost logistics and conversion processes (including economies-of-scale)
- innovative conversion technologies (intellectual property protection)

Biobased manufacturing involves economies-of-scale



EOS dominate feedstock logistics costs (but not feedstock costs)

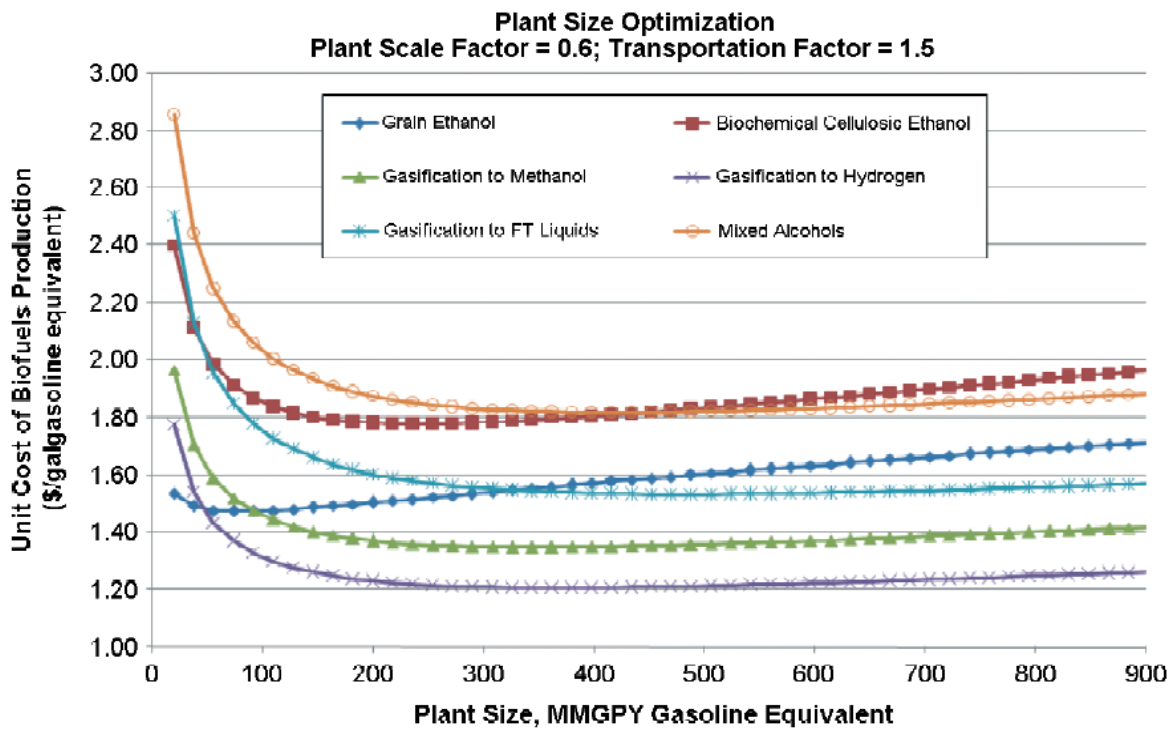
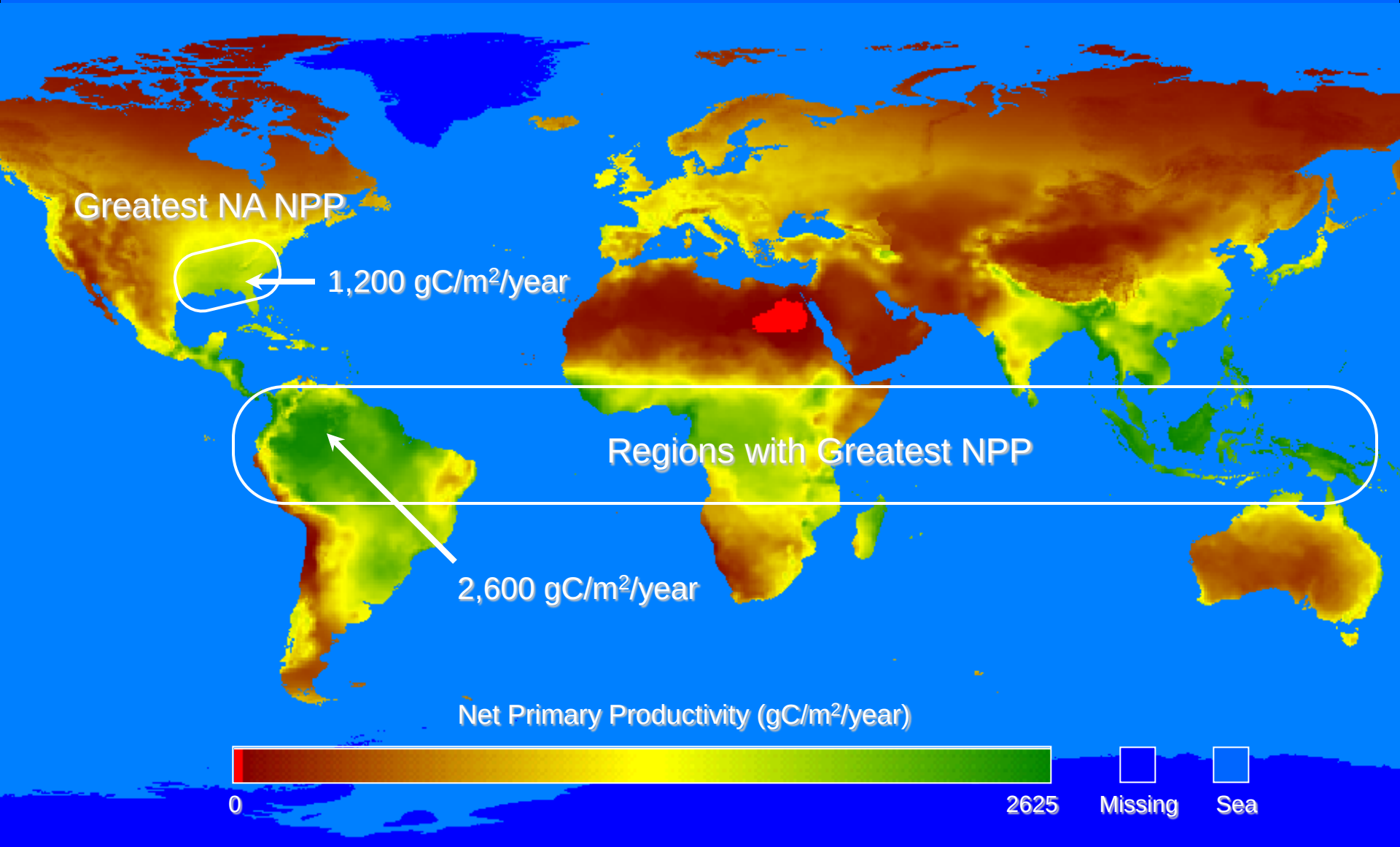


Figure 5. Unit cost of biofuels production versus plant size.

© 2007 Society of Chemical Industry and John Wiley & Sons, Ltd |Mark Wright and Robert C. Brown, *Biofuels, Bioprod. Bioref. 1:191–200 (2007); DOI: 10.1002/bbb*

Likely that LAC would ship fuels to U.S.

Future locations for biofeedstock production defined by Net Primary Productivity



U.S. DOS engagement with LAC for biobased manufacturing

U.S. Caribbean Basin Economic Recovery Act (CBERA)

- Countries in Central America and the Caribbean may export ethanol derived from regional feedstocks to the U.S. duty free
- Currently, CBERA countries (e.g., Costa Rica, El Salvador, Jamaica and Trinidad and Tobago) import hydrous ethanol, mainly from Europe and Brazil, and process it into dehydrated ethanol for export to the U.S.
  - CBERA countries face U.S. tariff quota for ethanol derived from non-regional feedstocks (equal to 7% of the U.S. annual ethanol consumption)

US-Brazil Memorandum of Understanding on biofuels

- Assists third-party countries to develop domestic biofuels industries
  - MOU partners include Inter-American Development Bank (IDB), United Nations Foundation (UNF) and Organization of American States (OAS)
- In 2008, Honduras was selected to participate
  - OAS providing $250,000-300,000 for 500 gal/day (180,000 gal/yr) pilot sugar cane ethanol plant in Honduras

USDA-LAC scientific collaborations for biobased manufacturing

Example A: *Tri-lateral collaboration on non-grain energy sorghum biomass*

- Initiated in 2011 (still under development)…
  - *Argentina:* Estacion Experimental Agropecuaria Obispo Colombres (EEAOC), Instituto Nacional de Tecnología Agropecuaria (INTA), Ministerio de Agricultura, and Maizar (corn and sorghum trade association)
  - *Uruguay:* Instituto Nacional de Investigacion Agropecuraria (INIA)
  - *U.S.:* Agricultural Research Service
- Potential research topics…
  - sorghum biomass genetic improvement
  - developing sustainable production systems
  - assessing whole system sustainability
  - increasing biomass processing efficiency for biofuel production
  - transferring new technologies/information to commercial partners

USDA-LAC scientific collaborations for biobased manufacturing

Example B: *Cellulosic ethanol from a plentiful, non-food agricultural waste (coffee)*

- One of the most important agricultural commodities in the world (and Latin Am.)
  - 7.8 million MT (2009)
  - bean is 55% of the coffee cherry
- Current uses for coffee waste (pulp and husk) utilize only a fraction of available quantity (fertilizers, livestock feed, compost)

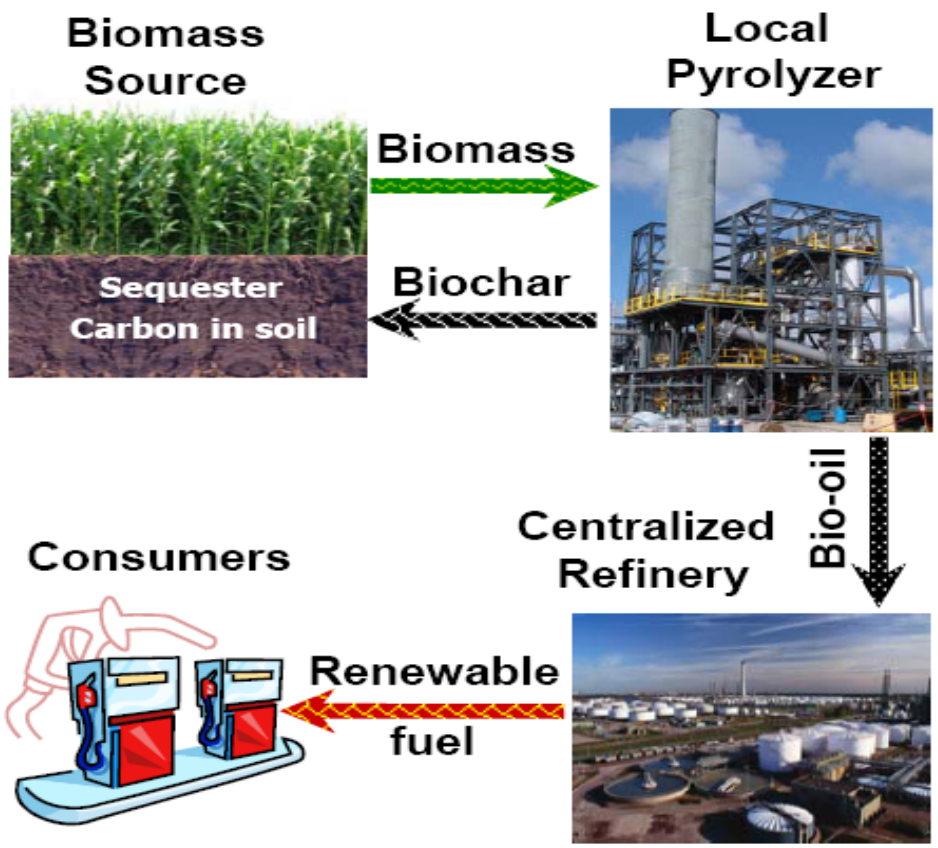
USDA developed mutant yeast to convert coffee bean wastes to ethanol, generating higher returns and reducing unwanted environmental impacts

<u>Collaborators</u>

USDA-ARS (USA)
FNC / Cenicafé (Colombia)
Universidad de Caldas (Colombia)
University of Georgia (USA)
Illinois State University (USA)
EPCA (Environment and Climate Partnership of the Americas)

Future possibility…
distributed bio-oil production via pyrolysis

Can pyrolyze any biomass



Collaborators:

USDA-ARS
University of Pretoria
South African Pulp & Paper Inst.
Embrapa (Brazil)