Business Perspective on Biofuels: Stages of Commercialization

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Please sit with your groups
Today: Business Challenges

Today’s class – commercialization of biofuels – stages and challenges

- Overview
- Amyris
- Group exercise
Business section of your course project

- Announcement – handout on bspace
  1. Where is your sector in terms of development toward commercialization?
  2. Where is your sector in terms of funding?
  3. Your strategies for removing obstacles

- Questions?
Class plan for this section of course

- **Today** - Technological and economic stages and challenges of commercialization

- **Next Mon and Wed**: funding opportunities and challenges
  - Private sources available
    - Internal and external to your firms
  - Public sources of funding available
  - Challenges companies face trying to access
Class plan for this section of course

- **Following Monday 4/22**
  - Opportunities for businesses in your sector work to with each other and/or with other stakeholders to overcome some of the problems holding back commercialization of their biofuel technology?
    - On what public policy reforms?
    - On what voluntary initiatives?
    - How?
Special class

- **Next Wed: making the business case for funding biofuel development**
  - Guest speaker from BP (EBI): Craig Vaughn
  - Assignment/in class exercise:
    - Each group will develop a short PPT presentation for Craig (and me) putting forth the “business case” for a new round of funding for your project
      - We’ll give you feedback
Today

- Where are firms in your sector in stages of commercialization?
- What problems have they run into?
  - What valleys of death have they crossed?
  - What are they struggling with?
Groups are dealing with three different kinds of firms

- Biofuels start ups
- Large existing oil and chemicals firms with biofuels and bioenergy initiatives
- Public utilities

Stages similar
Unique as well as similar problems
Successful Commercialization: Aspirational Goals

- Advanced biofuels (utilizing non-food biomass as feedstock) that are capable of gallon-for-gallon (or kWh-for-kWh) replacement of petroleum based fuels at comparable or lower cost
- Low or net zero GHG emissions
- Capable of using today’s fuel and electric power distribution infrastructure and engine designs
- Safe for human and non-human life
Successful Commercialization
KEY PRACTICAL GOAL

- Financial sustainability!
  - **Start ups:** Keep investors and lenders happy
  - **Initiatives within larger firms:** Keep top management on board
  - **Public Utilities:** Keep rate payers and PUC regulators happy
OUR FOCUS TODAY

- Identifying where firms in your sector are in terms of stages of development toward successful commercialization of your biofuel or energy
- Understanding challenges firms face at each stage
- What it takes to bridge “valleys of death”
Solecki et al., Advanced Biofuel Market Report 2012, p. 4
Bloomberg New Energy Finance, “Crossing the Valley of Death,”
Figure 1

THE ENERGY INNOVATION CYCLE AND THE CLEAN ENERGY VALLEYS OF DEATH
ALL Valleys of Death Are Complex

• **Early “tech” valley**
  - Great ideas run into problems at basic R&D/proof of concept stage

• **Later “commercialization” valleys**
  - Scaling up problems
    - Technological
    - Siting, construction etc.
  - Regulatory problems
  - Supply chain problems
  - Internal management/organizational problems
  - “Other”
Financial problems huge

- Funding gaps at every stage
  - Failure to meet cost goals
  - Failure to meet timeline goals
    - underestimate costs – cost overruns
Figure 1

THE ENERGY INNOVATION CYCLE AND THE CLEAN ENERGY VALLEYS OF DEATH

Today:
Group Project research

- Where is your sector in terms of development toward commercialization?
  
1. At what stages of the development process (pilot, demonstration, full commercialization) are existing businesses producing your biofuel technology currently in?

2. What kinds of technical, economic, and other problems are firms running into at each stage that you found? How serious are these problems?

At least 3 companies minimum – ideally more – see if you can find cos in different stages
Today:
Amyris case

- Amyris’s business
- Its early development
- Short group discussion:
  - How would you characterize the main technical problems Amyris faced and breakthroughs it experienced at
    - Pilot plant stage
    - Demonstration plant stage
    - Commercial plant stage
- What has happened since 2010?
On line information sources
doc on B-space

- Company websites
- Search for Energy: http://www.aeoogle.com/
- BiofuelsDigest: http://www.biofuelsdigest.com/bdigest/
- Biomass Magazine: http://biomassmagazine.com/
- Biofuels Journal: http://www.biofuelsjournal.com/
- Renewable Chemicals Digest: http://www.biofuelsdigest.com/biotech/
- Google search (general, books, and/or scholar)
Other sources

- **Long Library (business library)**
  - **Factiva** search engine
    - Go to [http://www.lib.berkeley.edu/BUSI/](http://www.lib.berkeley.edu/BUSI/)
    - Click on Digital Business Library – Data Bases by Subject – scroll down to **Factiva** (under “best sources for business news, press releases, & transcripts”)
  - Other Haas funded sources (Datastream, Frost & Sullivan etc.)

- **Interviews with parties at your companies and other experts**
“Amyris biofuels”

- Google – “Amyris biofuels”
- Aeoogle - http://www.aeoogle.com/
- Biofuels digest
  http://www.biofuelsdigest.com/