

IPR, Innovation and Research Policy Leadership

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“The Intersection of Energy and Agriculture: Implications of
Biofuels and the Search for a Fuel of the Future”

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Preliminary clarifications

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- No, I am not a lawyer
- So yes, I am an economist

EBI: motivating insights?

- Corn source is a mistake
- Ethanol is an inferior fuel
- Solar electricity only part of the answer
- Nuclear
 - Ploughshares into swords?

EBI: Addresses Global Challenges

- warming
- sustainable energy sources

EBI: Addresses Global Challenges

- warming
- sustainable energy sources
- sustainable emergence of new economic giants without large-scale military conflict
 - unprecedented?

EBI: unprecedented scope

- New crop(s)
- New harvesting/handling infrastructure?
- New pretreatment and processing
- New fuel product(s)?

EBI: unprecedented scope

Over ten year horizon: High risk, high payoff:

- Value of *integrated* success: huge
- Probability of integrated success: low

EBI: unprecedented scope

- In typical projects the aim is a new ***product or process for an established industry***
- Aim is to establish a ***new industry to supply familiar products***

Comparison of Agendas:

EBI

Novartis/UC

New crop(s)

Unspecified progress in
plant biology

New harvesting,
handling

New pretreatment

New processing

EBI: Rationale for BP

- Rational part of a portfolio of initiatives
- Complementary benefit: expertise and contacts in biofuels research?

EBI: Rationale for UCB, UIUC

- Important source of financial support
- Small chance of large applied contribution
- Unusually applied focus for these top-ranked institutions:
 - Will the tradeoff be fewer complementary advances to scientific progress, relative to resources used?

EBI: Rationale for UC, UIUC

- EBI poses a greater range of challenges, and more daunting challenges, than posed by typical industry/academic collaborations
- More room for initiative, more risky, more interesting

EBI as innovation generator

Users:

Private

- BP
- Others

Public/nonprofit

- Universities
- National labs
- Government
- NGOs

EBI as innovation licensor

(Apart from BP's own technology)

1. Nonexclusive no-cost license to BP
2. BP gets renewable option to exclusive license with modest capped royalty?

EBI as innovation user

– *Researcher “Background IP”:*

- Supported researchers (simple)
 - Bound by agreement in return for support
 - Nonexclusive, royalty-free licenses?

EBI as innovation user

– *Sources: Researcher “Background IP”*

- Other researchers (through UC, UIUC)
 - Profs have IPR sharing rights
 - Constrains university as licensor?
 - Effect on professor patenting behavior?

EBI as innovation user

– *Sources: Researcher “Background IP”*

- Others (incl. UC, UIUC researchers with IPR assigned to other entities)
- Infant scientific fields, total capitalization less than a few years of EBI?
- Yet already exclusive commitments have apparently constrained EBI research plans
 - *Less synthetic biology in EBI?*

EBI as Innovation user

Examples of Industry sources with current or past connections to EBI researchers include:

- Mendel (biofuel germplasm development)
- LS9 (biofuel to replace oil)
- Amyrys (biofuels to replace gasoline, diesel etc.)

EBI: potential *patent* holdups

- Mendel (germplasm development)
 - Miscanthus hybrids (including Timplant European assets)
 - Monsanto link – checkered history of university sharing
- Ceres
 - Switchgrass IP?
- LS9 (biofuel technology for crude oil substitute)
- Amyrys (biofuels to replace gasoline, diesel etc.)

Patent Landscape

- Big question
- Young field – unpublished patent applications?
- Broad patents in the wings?

EBI: potential *regulatory* holdups

- Miscanthus
 - Brief US experience
 - Unforeseen problems?
 - Exotic
 - Transgenic?
- Switchgrass
 - Indigenous, safer?
- Bioengineered microbes
 - Regulation?
 - Exotic²
 - Transgenic
 - Bioterror?

Beyond the applied project:

EBI as an institutional innovation:

- Unprecedented scale of university/lab/industry collaboration
- May be a precursor of others in UC's and UIUC's futures (independent of State)?
- Choices now will set path for future collaborations

Beyond the applied project:

EBI is establishing (or confirming)
norms for collaborative
innovation:

- Assignment of intellectual property rights
- Licensing policy
- Access to innovations

Beyond the applied project:

EBI: Opportunity for establishing norms for collaborative innovation:

- BP as innovation user has interest in fostering competitive, low-cost innovation suppliers
- Special opportunity: “synthetic biology”

Synthetic biology

- Applies Adam Smith's insight:
- Wealth of Nations (Book 1)
 - Pin factory
 - Division of labor (well recognized)

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- Applies Adam Smith's insight:
- Wealth of Nations (Book 1)
 - Pin factory
 - Division of labor (well recognized)
 - Open Source (not well recognized)
 - User innovation
 - Open access to invention

Synthetic biology

- Systems
- Devices
- Parts
- DNA

Synthetic biology

- Standard parts
- One task per part
- Use leads to cost reduction, increased reliability, increased use

Synthetic biology

- “Tipping” phenomenon in demand for parts (20% cost reduction per use??)
- Most-used parts become the most attractive
- Electronics as an example
- Multiple equilibria

Synthetic biology

- EBI is large relative to current industry
- Opportunity: “tip” the equilibrium standard to open access by insisting grantees deposit parts in a publicly accessible registry
 - Crucial for progress and rate of cost reduction
 - Should be attractive to BP as parts buyer

Needed: Accessible Registry of Standard Biological Parts with Freedom to Operate

How to do it?

1. Foreswear exclusive license demands re parts
 - Consistent with BP precedents

Synthetic biology

- Endy:
- MIT Registry of Standard Biological Parts
- <http://parts.mit.edu>
- Will it work for EBI?

Synthetic biology

- Endy:
- MIT Registry of Standard Biological Parts
- <http://parts.mit.edu>
- Will it work for EBI?
- Ignores IPR

Accessible Registry of Standard Biological Parts with Freedom to Operate

How to do it?

2. Prevent hijack by rivals:

Options to consider:

Pre-emptive patenting

Nonenforcement commitment

Pre-emptive publication

Copyright??

All have problems: merit timely attention

Accessible Registry of Standard Biological Parts with Freedom to Operate

Cases to consider: SNPs consortium
Human Genome Project

Common Factor:
Support by corporate *users*

Synthetic biology

- Will it be like Microsoft or like linux?
- Maybe EBI can influence the outcome

