Environmental CleanTech: Assessing Value Chains and Venture Opportunities

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Programs:

1. Seed (Frankel) and ‘A’ round (Wolverine) investments
2. CleanTech Entrepreneurship Education (engineers + MBAs)
3. Venture grade assessment of technologies and products (Dare to Dream + funds)
4. Business plan competitions (Eng+ MBA; CleanTech Ventures)
5. CleanTech company turnaround (CleanTech Venture Assessment)
Strategic Opportunity

Drivers:

1. Cost of scaling going down - fossil fuel costs going up
2. Influx of private capital
3. Governments compete to build regional economies and develop high-paying jobs
4. Shift of regulatory and financial support to more efficient technologies
5. Explosive demand for energy and water infrastructure in China, India, and other developing nations
6. Consumer demand for cleaner products and services
7. Certainty of climate change drives business innovation

“...layering environmental factors into corporate strategies... As they look up and down the value chain, they keep environmental impacts/opportunities firmly in mind...”

“...new laws encourage value chain thinking by imposing a real cost on companies that do not design products with the end of life in mind.”


“...the infrastructure challenges of energy, materials, and water mean that the cleantech revolution will be a lengthy one compared with the almost instant revolution of personal computers, the internet and WiFi”

“...investment opportunities track needs in existing corporate value chains or emerging transformational technologies and industries to address environmental challenges.”
Research to Ventures

1. Approximately 2% of the disclosures in the research university technology transfer pipeline results in the development of a business

2. For every successful company, there is a two order of magnitude of failed or unsuccessful ventures

3. On average $30M of R&D expenditure results in a successful company

“Failure is often driven by the overemphasis on technology, in the absence of understanding market needs, unawareness of strategic principles that help positioning the technology-based product in the context of existing industries in this innovation space, and a fiscally-sound value proposition for investors or partners to enable the venture.”
CleanTech and the Value Chain

- An organization's set of linked, value-creating activities, ranging from securing basic raw materials and energy to the ultimate delivery of products and services.

1. Value chain indicates which segment in the supply chain is capable of extracting value ($ vs. product)
2. Operating margins are potential proxy indicator.
3. Use value chain analysis, supplemented by strategic and financial assessment frameworks to help position startups and reposition companies.
4. Current application to bioenergy, wind, PV, batteries, water, and green building companies.
Business Assessment Framework

Market Domain

Large/growing?
Move from
Initial market segment to another

Macro-level

Feature, Product, Business
(Faley, 2007)

Market segment

Micro-level

Target segments
benefits and attractiveness


Industry Domain

Porter’s 5 Forces

Value-capture position
(IA vs CA)
(Teece, 1986)

Product Differentiation
(Intellectual Assets)

Team Domain

Missions, aspirations, Propensity for risk

Ability to execute CSFs

Connectedness up, down, and across value chain

Sustainable advantage

Porter’s 5 Forces: Industry Analysis

- Threat of New Entrants (Barriers to Entry)
- Bargaining Power of Suppliers
- Industry Competitiveness
- Bargaining Power of Buyers
- Threat of Substitute Products/Services
Determining the optimal value-capture vehicle for your Intellectual Asset Niche

If control the IA and the CAs, then you have the potential to create an extremely well-positioned business.

Intellectual Asset Position is:

- **Strong**
  - Complementary Assets are: Specialized
  - License to or Partner with CA holder
- **Weak**
  - Complementary Assets are: Generic
  - IAs have no capturable value

If control the IA and the CAs, then you have the potential to create an extremely well-positioned business.

Note: This assessment assumes that you are the IA holder, but do not currently have the complimentary assets necessary to fully commercialize your IA.

Ref: David Teece, 1986
Commercialization Path: Business Environmental Influences

- **Is it a Feature, Product, or Business?**

  **Cannot make the product:**
  - Cannot reasonable acquire complimentary assets
  - Don’t control ancillary IP
  - *Licensed or joint ventures are most likely outcomes.*

  **Make, but cannot sell product:**
  - Market channel is unavailable
  - Product is sold bundled with other products (and supply chain is non-existent or monopolized)
  - “Business” is likely a *product development concern*, that gets acquired at some point (which should be defined)

  **Small or Niche Business:**
  - Market small or narrow
  - Product line extensions non-existent or limited
  - Limited ability to cross into other markets
  - Acquisition only likely exit
  - (See J. Mullins, *The New Business Road Test* © 2003)

  **Potentially large growing business (IPO or acquisition possible)**
Process

- Strategic (IP, market/industry, Porter’s), financial, and market screening

  **Industry**: What is the competitive differentiator of the new technology or concept, and how are you positioned?

  **Market**: What is the unmet target market need? Macro-markets?

  **Finance**: Can you build a sustainable business on your product, and provide acceptable ROI?

  **Innovation**: What is your strategy to sustain new products?
Example 1: Water Value Chain

Source Water 10%
Treatment 5-20%
Diagnostics 5-10%
Transport (2%)
Utilities 6-10%
Retail 5%
Metering 3-5%

Percent based on operating margins or proxy industries in the segment
Product Concept: Miniaturized microbial sensor (using microfluidic and integrated opto-electronic technology)

Industry: Industry standards exist; strong incumbents; off-line analysis; price-elastic.

Market: Contract and research labs, (future: point of use?),

Finance: High cost for manufacturing, validation, maintenance, etc… Low volume sales.

Innovation/Need: Expand analytes, ease-of-use, and front-end sample preparation valued (time consuming)

Result: Move sensor technology from ‘detection’ to ‘sample preparation’ focus.

The issue was not whether the technology is good or not, but whether the product that embeds this technology (miniaturized sensor vs. robust sample prep.) is properly targeted.
Example 2: Green Buildings

- Equipment/Material: 7-20%
- Gen/Sub Contract: 4-8%
- Eng. Design/Arch: 10-12%
- Financing (15%):
- Ops/Maint.: 10-40%
- Developer: 20-70%
- Real Estate Broker: 2-3%
Impact of Value Assessment on Technology Focus

**Product Concept:** Plant-based construction materials

**Industry:** High established standards; strong incumbents-alternative materials. Price sensitive.

**Market:** LEED still poorly defined; driven by architects and environmentally-sensitive homeowners/developers

**Finance:** Low value; high volume-low cost; ROI impact

**Innovation:** focus on applications not encumbered by industry standards, and by providing the architect creative design opportunities for which customers are willing to pay more (i.e. not price sensitive)

**Result:** Move from ‘construction’ materials to ‘creative design components’.

The issue is often not whether the technology is good or not, but whether the product that embeds this technology (construction materials vs. creative design components) is properly targeted.
Final Message

• Part of the endless debate in the formation of new technology-based businesses (including CleanTech) is whether one should start with the marketing side (so-called “market pull”) or the technology (so-called “technology-push”).

• It is like walking; it simply does not matter which foot you begin with—right or left—the important thing is which foot you move next (the opposite one). It is when you move the same one over and over without moving the other (left-left-left or right-right-right versus left-right, left-right....) that you get in trouble.

• Similarly if you start with the technology, you need to move to the market side next and vice versa. So-called “technology-push” companies get in trouble when they try to walk technology-technology-technology-technology.

Even if the opportunity is well-defined and strategy is well executed, you may still end up in the wrong place.