When Does It Pay to Go Green?
Green Chemistry and the Corporate Bottom Line

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Business strategy and Green Chemistry

• Where this class fits in
Plan for today

• Lead in/review
• Overview of business strategy as relates to GC
• How it's done in firms – what it takes to carry out a GC initiative
• Challenges facing NatureWorks

Corporate Strategy Perspective on GC

• Joe Guth last Monday:
  Some companies are choosing to bring all their operations and products into compliance with all regs in all nations where they do business, including REACH, RoHS, other EU GC related regulatory initiatives
  ➢ Some are not
Corporate Motivations

• Why will firms choose to invest in GC?
  1. Because they have to - due to regulation or legal decision
  2. Because management thinks it’s the right thing to do (Corporate Social Responsibility (CSR))
  3. Because they think it will give them a competitive advantage

Regulatory drivers

• Problems with US pollution and toxics regulations
  ➢ TSCA incredibly weak
  ➢ CPSA incredibly weak
  ➢ Air and water pollution reg ill suited
    • C/C, end of pipe reg (require BPT/BAT), remediation focused
  ➢ EPA’s “voluntary” approach pretty weak as well
  ➢ Political and ideological opposition to instituting new regulations incredibly strong

• Impact in U.S.?
Non-regulatory Drivers

• Huge focus on this since 1990s
  ➢ Strategies to make market signals align with good outcomes – internalize externalities, provide missing information
    • Eco-labels, supplier management programs (green taxes)
  ➢ CSR – Win/win scenarios, triple bottom lines, etc
    • Business “self help” – right thinking, trainings
      – 12 Principles
    • NGO pressure/partnerships

• Limits?

NON-REGULATORY DRIVERS

A. Hoffman, Competitive Environmental Strategy (2000), 29
**Competitive business strategy**

- **Michael Porter, Harvard**
  - two sources of competitive advantage
    - Cost leadership
    - Product differentiation leadership

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**Orsato - Competitive Environmental Strategies**

- **Many ways**
  - Product innovation
  - Organizational innovation
    - Mfg processes
    - Environmental management systems (EMS)
    - Environmental accounting systems
    - Supplier management systems

*Where does GC innovation fit in?*
**Problems/obstructions/barriers to corporate action**

- **Upfront costs**
- **Uncertainty and risk**
- **Market imperfections**
  - Externalities, public goods
    - Harder capture private benefits
      - Solutions?
  - Imperfect information
    - Management ignorance?
    - Consumers not interested

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**Paradox**

Are all 12 Principles Of Green Chemistry in this sweet spot?

Win/win rhetoric vs Limited profit opportunities
**NO BRAINER**

12. Inherently Safer Chemistry for Accident Prevention

choose substances and the form of a substance used in a chemical process to minimize the potential for accidents, releases, explosions, and fires.

**STRONGLY EVA POSITIVE**

1. **Prevention**
   It is better to prevent waste than to treat or clean up waste after it has been created.

2. **Atom Economy**
   Maximize the incorporation of all materials used in the process into the final product.

3. **Less Hazardous Chemical Syntheses**
   Wherever practicable, use and generate substances that possess little or no toxicity to human health and the environment.

4. **Designing Safer Chemicals**
   Chemical products should be designed to preserve efficacy of function while minimizing their toxicity.

5. **Safer Solvents and Auxiliaries**
   Eliminate or minimize the use and toxicity of auxiliary substances (e.g., solvents, separation agents, etc.).

**CONDITIONAL GAINS**

6. **Energy savings**
   Minimize energy requirements and shoot for room temperatures

7. **Use of Renewable Feedstocks**
   Use renewable raw material or feedstock whenever technically and economically practicable.

8. **Reduce Derivatives**
   Avoid unnecessary uses of derivatization (use of blocking groups, protection/deprotection, temporary modification of physical/chemical processes.)

9. **Catalysis**
   Consider Catalytic reagents (as selective as possible) superior to stoichiometric reagents.

10. **Design for Degradation**
    Design end products to innocuously degrade, not persist in the environment.

11. **Real-time analysis for Pollution Prevention**
    Develop analytical methodologies to facilitate allow for real-time, in-process monitoring and control.
Where does NatureWorks fit in?

**Organizational Process Focus**

- **Strategy 1: Eco-Efficiency**
  - Reduce costs of production by maximizing efficient use of resources
    - Processes, people etc
    - Waste/by product use
  - Generate profits by selling credits on EU and other carbon trading markets
- **Is this always a source of competitive advantage?**
  - Must generate more than normal savings
Organizational Process Focus

• **Strategy 2: Beyond Compliance Leadership**
  - Orsato focuses on corporate reputation here
  - How firms can develop reputation for GC leadership
    - Participation in trade organization voluntary environmental Initiatives (VEIs) relating to organizational management
      - ACC’s Responsible Care Program
    - Partnerships with NGOs
    - Relationship with communities, consumers, media

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Building a Green Corporate Reputation

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td>Beyond Compliance</td>
<td>Sustainability leader in the industry</td>
</tr>
<tr>
<td>Avoiding Negative Reputation</td>
<td>Building Positive Reputation</td>
</tr>
<tr>
<td>Reactive and Defensive</td>
<td>Reflexive</td>
</tr>
<tr>
<td>Stakeholder opposition and confrontation</td>
<td>Stakeholder criticism, negotiation and dialogues</td>
</tr>
<tr>
<td>Consumer boycotts</td>
<td>Consumer engagement</td>
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VEIs - Green Clubs

Non-Compliance: laggard, average, leader

Positive: VEIs - Green Clubs

Negative: Non-Compliance

Beyond Compliance: laggard, average, leader

Beyond Compliance Leadership: VEIs - Green Clubs
Multi-stakeholder voluntary regulation initiatives

How make beyond compliance leadership pay?

NatureWorks?

Product differentiation focus

• Strategy 3: Eco-branding
  ➢ Create a premium product with desirable environmental qualities
    • Problem – information gaps
      – Eco-labels help
  ➢ Challenges of creating an “eco-brand”
    • Cost of creating
      – First mover advantages/disadvantages
    • Cost of third party certification
      – Trust - eco-branding vs greenwashing
    • Differentiation must be difficult to imitate
    • Consumers must be willing to pay the cost

Product differentiation focus

• Does Eco-branding always pay?
  ➢ Risks?
Product differentiation focus

• **Strategy 4: Environmental Cost Leadership**
  - Not only greener – must also cost less
    - Green Chemistry’s role?
  - **NatureWorks?**
    - Promise of biotechnology
      - Bio-polymers (films and fibers)
  - **Does this kind of innovation always pay?**
    - **NatureWorks?**

Inside the black box – or how Nature Works got to this point

• **Strategy process: what does it take to implement a GC project?**
  1. Opportunity recognition
    - Internal need
    - External opportunity/driver
  2. Develop project mission/goals
3. Think through context, rationales for, and needs of your initiative

- What are the drivers for this initiative?
- SWOT analysis → other factors to be considered
- How will this involve/affect the corporate organization?
- Which decision makers will have to endorse?
- What is the “business case” for this plan? How will it pay? How much?

**SWOT ANALYSIS**

- Analyze firm’s strengths & weaknesses
- Analyze external opportunities & risks

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
<th>Threats/risks</th>
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<tbody>
<tr>
<td>What things do we do really well or possess that have great value?</td>
<td>What conditions in the outside world could we really take advantage of?</td>
<td>What conditions in the outside world might really hurt us?</td>
</tr>
<tr>
<td>Weaknesses</td>
<td>How can we leverage our strengths to exploit these opportunities?</td>
<td>How can we leverage these strengths to neutralize or minimize these threats/risks?</td>
</tr>
<tr>
<td>What things do we lack or do very poorly?</td>
<td>How can we address these weaknesses to exploit these opportunities?</td>
<td>How can we address these weaknesses to neutralize or minimize these threats/risks?</td>
</tr>
</tbody>
</table>
4. Set the time frame
- How long will it take?
- What factors could slow our progress?
- How quickly has our firm accomplished similar initiatives in the past?
- What types of resources will we need and where will we get them?
- How long do we have to do this?

5. Develop an action plan
- Steps will take to achieve goals
- Key benchmarks or outcomes for each step

6. Identify Resource Requirements for each step
- Financial
- Staff
- Collaboration from key internal and external groups
- Policy/regulatory
7. **Figure out how you will execute your action plan**

- Define your approach to execution
  - Where will leadership reside?
  - How will you get support of top leadership?
- How will you communicate your approach and plan to people (external and internal) you need to participate?
- How will you generate champions?
NatureWorks: Strategic Challenges

• pre-2005
  ➢ “We know food. We don’t know chemicals”
  ➢ What did Dow bring?
    • Expertise in polymer science, process control methods, plastic supply chain, marketing knowledge etc - knowledge from its drug business
  ➢ Problems?
    • CEO turn over - board communication issues
    • Meshing cultures/ IT systems/ granting access to proprietary tech other property
    • C’s unwillingness to discuss GMO issues, engage in public dialogue re environmental concerns
    • Lack of communication about goals
    • Profitability

NatureWorks: Strategic Challenges

• 2005
  ➢ Why did Dow withdraw?
  ➢ What did Cargill do?
    • strengths of strategy? Risks?
  ➢ strategic plan
    • Ramp up production – develop new product lines
    • Solve marketing problems
What would you advise?

• What is most important?
  ➢ Marketing?
  ➢ Technology?

Sunchips opportunity/ problem

Hyper link - Click on box to see Stephen Colbert talk about this
• Some key biobased plastics competitors in packaging
  - Ecolean packaging
  - Tetra pak
  - Cereplast – CA start up transforming algae into bioplastic