Green and Sustainable Manufacturing
Sprouting new green initiatives to stay competitive

Panelist: **Bill Russell**
ISE Research Fellow and Principal
Transitioning to Green

Panelist: **Steve Fromkin**
Environmental, Health and Safety Manager
Alcoa Howmet

Panelist: **Joe D’Urso**
Group Product/Services Manager
NJ Manufacturing Extension Program

Moderator: **Joe Schneider**
Founder, LinkingB2B
The Sustainability Megatrend

Copyright Transitioning to Green, LLC, 2011
Sustainability Is A Major Business Issue Today

You cannot ignore the impact your company has on the community and the environment.

CEOs used to frame thoughts like these in the context of moral responsibility, but now, it’s also about growth and innovation.

In the future, it will be the only way we do business.

Paul Cescau, CEO, Unilever
UN Global Compact CEO Survey

In June 2010:

93% - View Sustainability As “Important” or “Very Important” to Their Companies

96% - Sustainability should be Fully Embedded into Strategy and Operations (Responded “Agree” or “Strongly Agree”)

80% - Economic Downturn Has Raised the Importance of the Issue
## Manufacturing Trends and Risks

**Rate your organization’s progress toward world-class Green/Sustainability:**

<table>
<thead>
<tr>
<th>Level</th>
<th>National</th>
<th>New Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=No progress</td>
<td>20.8%</td>
<td>21.0%</td>
</tr>
<tr>
<td>2</td>
<td>32.0%</td>
<td>29.4%</td>
</tr>
<tr>
<td>3</td>
<td>27.2%</td>
<td>28.9%</td>
</tr>
<tr>
<td>4</td>
<td>14.7%</td>
<td>14.2%</td>
</tr>
<tr>
<td>5=World-class</td>
<td>5.4%</td>
<td>6.5%</td>
</tr>
</tbody>
</table>

**Rate the importance of Green/Sustainability to your organization’s success over the next five years:**

<table>
<thead>
<tr>
<th>Level</th>
<th>National</th>
<th>New Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=Not important</td>
<td>15.6%</td>
<td>16.3%</td>
</tr>
<tr>
<td>2</td>
<td>22.6%</td>
<td>25.8%</td>
</tr>
<tr>
<td>3</td>
<td>26.7%</td>
<td>26.3%</td>
</tr>
<tr>
<td>4</td>
<td>19.4%</td>
<td>14.4%</td>
</tr>
<tr>
<td>5=Highly important</td>
<td>15.7%</td>
<td>17.3%</td>
</tr>
</tbody>
</table>

Source: Next Generation Manufacturing Study [www.njmep.org](http://www.njmep.org)

Copyright Transitioning to Green, LLC, 2011
Manufacturing Trends and Risks

What best describes your measurement system for reviewing return from Green/Sustainability efforts?

<table>
<thead>
<tr>
<th>Measurement System</th>
<th>National</th>
<th>New Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td>No measurement system per se or reviews</td>
<td>53.4%</td>
<td>49.7%</td>
</tr>
<tr>
<td>Ad hoc monitoring of basic measures and ad hoc reviews</td>
<td>25.0%</td>
<td>26.4%</td>
</tr>
<tr>
<td>Company-specific metrics monitored regularly by operations staff</td>
<td>8.4%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Regular monitoring and review of company-specific metrics by CEO and senior staff</td>
<td>8.8%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Regular monitoring and review of company-specific metrics by CEO and senior staff and transparency and clarity throughout the organization</td>
<td>4.5%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

Source: Next Generation Manufacturing Study [www.njmep.org](http://www.njmep.org)
## Manufacturing Trends and Risks

To what extent does the geographic region in your state have the support services, peer groups, training opportunities and resources available to support the following?

<table>
<thead>
<tr>
<th></th>
<th>National</th>
<th>New Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green/Sustainability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1=No support</td>
<td>18.3%</td>
<td>32.4%</td>
</tr>
<tr>
<td>2</td>
<td>30.6%</td>
<td>31.6%</td>
</tr>
<tr>
<td>3</td>
<td>30.1%</td>
<td>24.0%</td>
</tr>
<tr>
<td>4</td>
<td>13.3%</td>
<td>8.4%</td>
</tr>
<tr>
<td>5=Full support</td>
<td>7.7%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

| **Supply-chain management and collaboration** |          |            |
| 1=No support         | 14.2%    | 33.6%      |
| 2                    | 24.7%    | 28.0%      |
| 3                    | 32.5%    | 24.7%      |
| 4                    | 20.3%    | 9.2%       |
| 5=Full support       | 8.5%     | 4.5%       |

Source: Next Generation Manufacturing Study [www.njmep.org](http://www.njmep.org)

Copyright Transitioning to Green, LLC, 2011
The Sustainability Journey

- Pre-Awareness
- Awareness
- Intention
- Action
- Dedication
- Continuous Improvement

- Initiation
- Planning
- Execution
- Monitoring
- Continue Stop Change

Transformation

Copyright Transitioning to Green, LLC, 2011
Implementing Your Sustainability Program

Organizational Strategic Plan, Mission, Vision

- Initiate Program & Form Green Team(s)
- Sustainability Assessment
  - Gaps? (Yes/No)
  - Adjust Mental Model
- Identify Opportunities for Improvement
- Develop & Plan Portfolio
- Implement Projects

Portfolio/Program/Project Management

Copyright Transitioning to Green, LLC, 2011
The Sustainability Portfolio

**Programs**

*Eco-Elements*
- Energy
- Water
- Air
- Waste

*Functions*
- Facilities
- Finance / Accounting
- HR
- IT
- Communications / Marketing
- R&D

**Projects**

- Strategic Planning
- Sustainability Assessments
- GHG Emissions & Climate Risks
- Supply Chain Analysis
- Employee Education
- Metrics Software Selection & Implementation

Copyright Transitioning to Green, LLC, 2011
The Virtuous Cycle

- 95% of Sustainability Programs Are Cost-Neutral
- Positive ROI
- Better Organizational Performance
- Improved Stakeholder Relationships
- Enhanced Reputation
- Improved Risk Profile
- Increase Sales

Copyright Transitioning to Green, LLC, 2011
On the road to sustainability

Presented by
Steve Fromkin
Manager, Environmental, Health & Safety
Alcoa Howmet - Dover Operations: Overview

- Began Manufacturing Operations in 1949
- Our plant spans 127 acres of property with 4 manufacturing facilities
- 15 acres are under the roof
- Located adjacent to the Rockaway River
- Approximately 1000 employees
Investment Casting Process

- Die Construction
- Wax Injection
- Wax Assembly
- Shell Build
- Dewax
- Casting
- Shell Removal
- Cut-Off
- Heat Treat
- Finishing
- FPI/Visual
- X-Ray Inspection
Sustainability Road Map

Initial Phase

- Gained Executive Team commitment
  - Passion for change….
- Posed as a business proposition – Strategic Competitive Advantage
- Survival tool in NJ’s business climate for Manufacturing
- Formed cross functional Waste Minimization Teams in 1997
- Employee engagement programs
- Each year since, established clear objectives and targets around sustainability initiatives: Waste Minimization, Pollution Prevention and Resource Conservation

Implementation Phase

- Built upon culture of continuous improvement by utilizing proven methodologies:
  - Kaizen - cross functional engagement
  - Six Sigma
- Capital Ex Investments
  - SOTA, BACT for process waste water and air sources
  - Replaced inefficient bag houses
  - 5 new cooling towers
- Worked with agencies to help set up reuse-recycling programs and provide clarity
- Chemical/material substitution
Achievements

- 48 waste streams recycled or beneficially re-used
- 75% reduction in water use
- Elimination of thermal waste water direct discharge to the Rockaway River
- 100% reduction in soluble concentration of silver, other metals, suspended solids, hydrocarbons in process waste water
- 80% reduction in fugitive particulate air emissions with investment
- 82% reduction in generated hazardous waste
- 75% reduction in regulated landfill disposal
- 40% reduction in overall landfill waste disposal
- Reduced electricity use by 15%
- Over $1.5 million in annual savings
- Approximately $8 million in savings since 1999
Alcoa Howmet Recycles

- White and assorted paper
- Cardboard
- Newspapers
- Magazines
- Telephone books
- Fax toner cartridges (select)
- Xerox toner cartridges are sent back to supplier for reuse
- Plastic drinking bottles
- Aluminum cans
- Shipping Packaging Materials – save and given to “shipping” dept for reuse
- Scrap computers
- Fluorescent light bulbs
- Mercury Switches
- Ballast
- Sodium Vapor Lights
- Batteries
- Pallets (ALL)
- Scrap metal
- Carbide
- Aerosol cans (empty)
- Lead screen (scraps) from X-RAY
- Scrap x-ray film
- Silver from X-RAY spent fixer
- Cooper Wire
- Used oil
- Used penetrant
- Crucibles (select)
- Potassium Hydroxide (KOH) from Low Temp – continued use program for pH adjustment
- 55-gallon metal drums
- Nitric acid drums sent back to supplier for reuse
- Revert
- Sodium nitrate sludge (metals reclaimed)
- Metal dusts
- Waste Water Treatment Sludges (metals)
- ECM grinding sludge (metals)
- Aluminum turnings from tool room
- Nickel foil from mold prep
- White and brown aluminum oxide fuse
- Wax
- Ceramic Shell
- Refractory Brick
- Steel Shot
- Scrap metal
- Wet Saw Sludge (metals)
- Waste Water Sludge (metals)
- Furnace Sweeping (metals)
- Dust collector filters (metals)

48 waste streams recycled or beneficially reused!
…On the road to Sustainability

- Recognition
  - New Jersey Department of Environmental Protection – Environmental Stewardship granted in 5 categories
  - New Jersey Business & Industry Association - Environmental Excellence Award
  - Special U. S Senate recognition for Environmental Excellence from NJ US Senators: Frank Lautenberg and Robert Menendez
  - Morris County Municipal Authority – Waste Minimization Award
  - Institute for Sustainability Enterprise recognition of contribution to sustainability
  - World d Resources Inc. – Recycling Initiatives awards
Alcoa Howmet
Sustainability
Examples
Ceramic Shell Material is Alcoa Howmet’s Dover Operation’s Largest Process Waste Stream by Weight – 75% is now beneficially reused
• Prior to 2008 100% of generated scrap and waste wax was landfilled. 2008 and going forward, this waste stream is 100% recycled!
Eliminated Regulated Landfill Waste Streams

- Wet Saw Sludge
- Waste Water Treatment Filter Cake

Prior to 2006: 100% Both Waste Streams Were Landfilled

2008: Both are 100% Recycled!!
State Of The Art (SOTA) Wastewater Process Control

X-ray Electrolytic units with multiple levels of filtration

Ultra filtration hydrocarbon removal system

Dissolved metals Treatment Facility
Since 2000 – replaced 15 old, efficient bag house style dust collectors with new super efficient SOTA equipment! Total Investment: $3.75 million
Installation of 4 New Closed Loop Cooling Tower Systems. Old Systems Were Pass Through Direct Discharge Systems. New Systems resulted in 15,000,000 Gallons Per Year Water Conservation and Has Eliminated a Direct Discharge to the Rockaway River. In addition, flow restrictors have been utilized throughout the plant to reduce water where ever feasible. Total Investment: 5.5 Million Dollars
Installed Energy Management System to track energy usage on a real time basis. Enables plant to strategically operate compressors and associated equipment out of peak hours.
Installed T8 Electronic ballast and lighting throughout many areas of the plant. Lights are more efficient and both the bulb and ballast last 4x more than standard mercury lighting systems.
Compressed Air System Energy Savings Improvements: Installed flow control valve set to manage air pressure as low as possible and “state of the art” air dryer which substantially reduced drag.
Next Major Sustainability Initiatives:
- Educate supply chain to understand Alcoa’s value and expectation
- Incorporate “Green” into pre qualification process
- Audit supply chain

2011 - Install 5.2 MW/hr solar array – 2^{nd} largest in NJ!
Growing Green Manufacturing in New Jersey

Joe D’Urso
NJMEP, Inc.
Presentation Outline

• NJMEP Introduction
• Green Job Definitions
• NJMEP Green Job Activity
• Some Federal & State Programs that Assist Green Job Creation
  – Green Supplier Network
  – SESP Grants
  – Rutgers CAES
  – NJ Smart Start
  – NJ Business Action Center
    • An Entry Point into all NJ Programs
National Network under Direction of US Dept of Commerce & NIST MEP

Primary Charter is to Assist Small & Medium Sized Manufacturers

Public Sector Mission with a Private Sector Mindset

669 Clients Served in Last 12 Months

3501 Projects Completed since 1999 with Clients documenting

13,316 Jobs Saved or Added

$233,931,343 Invested
Create high performance enterprises through a strategy of transformation versus a transaction-based relationship.

**The Client’s needs are …**

- Strategic Planning (Financial)
- Succession Planning
  - Product
  - Process
- Information Technology
- Distribution Strategy
- Human Resource Plan
- Manufacturing Strategy
Creating High Performance Firms

Create high performance enterprises through a strategy of transformation versus a transaction – based relationship

The Client’s needs are...

Strategic Planning (Financial)

Succession Planning
- Product
- Process

Human Resource Plan

Information Technology

Distribution Strategy

Manufacturing Strategy

Your Supplier

- Strategic Planning (Financial)
- Succession Planning
  - Product
  - Process
- Distribution Strategy
- Information Technology
- Human Resource Plan
- Manufacturing Strategy

Your Customer

- Strategic Planning (Financial)
- Succession Planning
  - Product
  - Process
- Distribution Strategy
- Information Technology
- Human Resource Plan
- Manufacturing Strategy
Green Jobs can take many forms:

**Output Model***

- Design and Manufacture Alternative Energy Products and Components
- Design and Manufacture “Green” Products, Process Model*

**Process Model***

- Implement Process Improvements to Reduce Environmental Impact
  - Energy, Waste, Emissions
- Utilize “Local” Supply Chains to Reduce Energy Use in Transportation

* US Bureau of Labor Statistics
Process Improvement

• Numerous Lean Projects have helped Clients to Increase their Output per Unit of Resource Used
  • Increased Output per Person
  • Reduced Cycle Time
  • Reduced Space Consumed
  • Reduced Utilities Consumed
  • Reduced Set-up Time and Scrap
Green Supplier Network (GSN)

- Federal EPA & NIST MEP Program
- Focus - Small & Mid-sized manufacturing suppliers
- Expands Lean definition of waste to include Environmental considerations
- Measurable business and environmental impacts
- Lean & Clean on-site reviews
- Lean & Clean Value Stream Map
- GSN Environmental Calculator
• **State Energy Sector Partnership (SESP)** Grant Programs

• **Energy Efficiency Industries**

• **Renewable Energy Industries**
  – Energy-efficiency building, construction, retrofit industry
  – Renewable electric power industry
  – Energy efficient & advanced drive train vehicle industry
  – Biofuels industry
  – Deconstruction and materials use industry
  – Energy efficiency assessment industry serving residential, commercial, or industrial sectors
  – Manufacturers that produce sustainable products using environmentally sustainable processes and materials.
- **Geothermal Heat Pump**
  - **Outcome:** I.G.S.H.P.A. certification

- **Solar Technician & Installation**
  - **Outcome:** Certificate

- **Solar Manufacturing Fundamentals**
  - **Outcome:** Certificate

- **ISO 9000 – Quality**
  - **Outcome:** ISO 9000 Certification

- **ISO 14000 - Environmental**
  - **Outcome:** ISO 14000 Certification
• Building Performance Institute (BPI) Residential Building Analyst
  – Outcome: BPI Residential Certification

• Building Performance Institute (BPI) HVAC
  – Outcome: BPI Mechanical, Heating & Cooling Certification

• Building Performance Institute (BPI) Building Analyst Multi-family
  – Outcome: BPI Multi-family Certification

• Mechanical Insulation Green Awareness Training
  – Outcome: Green Awareness/Mechanical Insulation Certificate

• Mechanical Insulation Energy Appraisal
  – Outcome: Insulation Energy Appraisal Program Certificate
Rutgers CAES Program
Center for Advanced Energy Systems
www.caes.rutgers.edu

- Assessments
- Benchmark Studies
- Technical Information
- Access to Toolsets
NJ SmartStart Program
www.njcleanenergy.com/commercial-industrial/home/home

Funding & Technical Assistance

• Lighting
• Renewable Energy
• Energy Reduction HVAC

New Jersey businesses are saving money and energy as well as their environment with valuable assistance from New Jersey's Clean Energy Program. NJSEP offers commercial, industrial, and municipal entities significant financial incentives, indispensable technical assistance, and expert design support to integrate energy efficiency into facilities of every age and size.

Thousands of new construction, renovation, and retrofit projects have already benefited from the vast array of solutions offered through NJSEP. In 2018 alone, NJSEP invested over $172 million in projects across the state. Learn how your business can take full advantage of all that NJSEP has to offer.

NJ Clean Energy Program™
Join the thousands of New Jersey businesses who have taken advantage of the programs, services, and incentives offered by New Jersey's Clean Energy Program that save energy and money and reduce greenhouse gases. Now, more than ever, it makes good business sense to adopt energy-efficient practices, install energy-efficient equipment, and support and install renewable energy systems.

Not only will your energy improvements contribute to the economy and environment of New Jersey, you'll also realize bottom line savings for your business.

Investing in New Jersey's Clean Energy Program gives businesses the opportunity to help reduce energy usage and lower greenhouse gas emissions and is an important part of the Energy Master Plan to reduce overall energy use by 20% by 2020.

For additional information and energy saving tips and ideas, log on to NJCleanEnergy.com/ssb or call 1-866-NJSMART.
Some New Jersey Programs with Links

New Jersey Business Action Center
(an entry point into assistance from NJ)

www.state.nj.us/njbusiness/bac/index.shtml
Some New Jersey Programs with Links

- Environmental, Geographic & Urban Redevelopment
- Brownfields Remediation
- Economic Recovery Tax Credit [pdf 108KB]
- Economic Redevelopment and Growth (ERG) Grant
- Effluent Equipment Tax Credit [pdf 88KB]
- Foreign Trade Zones
- Municipal Redevelopment
- New Jersey Environmental Infrastructure Trust
- New Jersey Housing and Mortgage Finance Agency
- New Jersey Neighborhood Revitalization State Tax Credit
- New Jersey Redevelopment Authority
- Portfields
- Redevelopment Authority Project Tax Credit [pdf 91KB]
- Remediation Tax Credit [pdf 88KB]
- U.S. Small Business Administration Export Financing Assistance
- U.S. Small Business Administration
- Research and Development Tax Credit [pdf 73KB]
Some New Jersey Programs with Links

- **Job Creation & Retention Incentives**
- **Business Employment Incentive Program (BEIP)**
- **Business Retention and Relocation Assistance Grant (BRRAG)**
- **Employee Training Grants**
  - New Jobs Investment Tax Credit [pdf 95KB]
  - Urban Enterprise Zone Employees Tax Credit [pdf 109KB]
  - Work Opportunity Tax Credit
- **Manufacturing**
  - Loans, Loan Guarantees, Bond Financing & More
  - Manufacturing Equipment & Employment Investment Tax Credit [pdf 67KB]
- **New Jersey Manufacturing Extension Program**
- **Registered Apprenticeship Incentive Program**
- **Non-Profit Organizations**
- **Loans, Loan Guarantees, Bond Financing & More Urban Enterprise Zones Fund for Community Economic Development**
- **Real Estate**
Development Assistance
Leasing Opportunities
Site Solutions
Small to Mid-Size Businesses
Export-Import Bank of the United States Export Financing Assistance
HMO Assistance Fund Tax Credit [pdf 62KB]
Loans, Loan Guarantees, Bond Financing & More
Main Street Business Assistance Program
New Jersey’s Small Business Set-Aside Program [pdf 259KB]
Federal US Agriculture Financing
Technology & Life Sciences
Edison Innovation Fund
Edison Innovation Zones
Leasing Opportunities
Technology Business Tax Credit Certificate Transfer Program Urban Enterprise Zone Employees Tax Credit [pdf 109KB]
Urban Enterprise Zone Investment Tax Credit [pdf 73KB] Urban Redevelopment
Urban Transit Hub Tax Credit Program
• Questions?
• Handout w/ websites is available
Green and Sustainable Manufacturing
Sprouting new green initiatives to stay competitive

Bill Russell
http://www.transitioningtogreen.com
wgrussell@transitioningtogreen.com

Steve Fromkin
www.alcoa.com/howmet
Steven.Fromkin@alcoa.com

Joe D’Urso
www.njmep.org
jdurso@njmep.org

Joe Schneider
www.LinkingB2B.com
Joe@LinkingB2B.com
973-984-0624
Collaborative Learning Lab™
Profitable, Green, High-Performance Manufacturing

Your company can increase profits, sales, competitive advantage and employee productivity—all while decreasing costs and being more socially and environmentally responsible.

This program will show you how!

In this no-nonsense, bottom line Collaborative Learning Lab you will discover how manufacturers profit from being Green.

How Sustainability Benefits Your Company
- Growth & Increased Sales
- Decreased Costs & Operating Expenses
- Increased Profits
- Create Competitive Advantages
- Greater Employee Productivity and Stability
- More Customer & Supplier Loyalty
- Better Utilization of Assets
- Stronger Support From Your Community
- Reduced Environmental Footprint
- Proactive Regulatory Compliance

Dates and Locations
Alcoa Howmet in Dover, NJ
April 13, 2011
Alcoa, Kingston, NY
May 4, 2011
From 8:30 am until 4:30 pm
Continental Breakfast & Lunch

What you get:
- Eight hours of information, concepts, and techniques.
- An interactive plant tour exercise is included for each facility. See our presentations come alive and drive home understanding and action.
- Access to resources and support materials.
- A FREE consultative assessment of your most pressing need or opportunity.
- A FREE copy of "The Sustainable Enterprise Fieldbook" if you register by April 1, 2011. The coauthor of this book is the primary sponsor.

What You Invest:
The fee for attendance is $295 per company for one or two attendees. Group pricing available on registration form. Money back guarantee.

REGISTER NOW ONLINE OR CALL 973-984-0624
http://transitioningtogroupen.com/manufacture

Sponsoring Partners

ALCOA World’s Leading Producer of Aluminum
How Sustainability Benefits Your Company

- Growth & Increased Sales
- Decreased Costs & Operating Expenses
- Increased Profits
- Create Competitive Advantages
- Greater Employee Productivity and Stability
- More Customer & Supplier Loyalty
- Better Utilization of Assets
- Stronger Support From Your Community
- Reduced Environmental Footprint
- Proactive Regulatory Compliance