Green Chemistry Education Webinar

In Pursuit of Green Chemistry: Perspectives on Careers in Industry

March 11th, 2015
What is NESSE?

• International network of early-career sustainable scientists and engineers
• Connecting researchers across disciplines to work towards a sustainable future

To learn more, visit www.sustainablescientists.org
My Path to Green Chemistry

• Started out as an analytical chemist working in the lab
• Performed analysis to support environmental teams
• Noticed the growing environmental requirements
• Completed Master’s in Environmental Policy and Management
• Transitioned to working on environmental materials management full-time.
Why Is HP Interested in Green Chemistry?

Why do companies exist?

“I think many people assume, wrongly, that a company exists simply to make money. While this is an important result of a company’s existence, we have to go deeper and find the real reasons for our being. As we investigate this, we inevitably come to the conclusion that a group of people get together and exist as an institution that we call a company so that they are able to accomplish something collectively that they could not accomplish separately – they make a contribution to society, a phrase which sounds trite but is fundamental.”

David Packard
Co-founder of Hewlett Packard Company
RoHS
The Law That Changed Everything
EU 2006

Lead (Pb)
Mercury (Hg)
Cadmium (Cd)
Hexavalent Chromium (Cr\(^{6+}\))
Polybrominated Biphenyls (PBB)
Polybrominated Diphenyl Ethers (PBDE)

Logo from companion regulation
Waste Electrical and Electronic Equipment (WEEE) Directive
RoHS

The Law That Changed Everything
EU 2006

Lead (Pb)
Mercury (Hg)
Cadmium (Cd)
Hexavalent Chromium (Cr\(^{6+}\))
Polybrominated Biphenyls (PBB)
Polybrominated Diphenyl Ethers (PBDE)

Are the alternatives better?
More Regulations Coming

Substance restrictions have become a major class of regulation for finished electronic products

- More substances
- More jurisdictions
- More reporting
More Regulations Coming

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- More substances
- More jurisdictions
- More reporting

HP wants to use materials no one cares about
Avoiding extra substitutions saves money

\[ \text{DEHP} \rightarrow \text{Transition Costs} \]
Avoiding extra substitutions saves money

- DEHP
  - Any unrestricted
    - Phthalate 1 $X
    - Phthalate 2 $X
    - Non-phthalate $X
  - Transition Costs $3X
Avoiding extra substitutions saves money

DEHP

Any unrestricted

- Phthalate 1: $X
- Phthalate 2: $X
- Non-phthalate: $X

Transition Costs

- $3X

Incrementally better

- Phthalate 1: $X
- Non-phthalate: $X

- $2X
Avoiding extra substitutions saves money

DEHP

Any unrestricted

- Phthalate 1: $X
- Phthalate 2: $X
- Non-phthalate: $X

Transition Costs
- $3X

Incrementally better

- Phthalate 1: $X
- Non-phthalate: $X

$2X

Best

- Non-phthalate: $X

$1X
GreenScreen™

• Substances starts at bottom and can only pass to next level if no criteria apply
GreenScreen™

• Substances starts at bottom and can only pass to next level if no criteria apply

• Requires technical expertise to apply the benchmarks but anyone can understand the simple 1-4 benchmark score
What has changed?

If we articulate environmental requirements to our suppliers, we get better materials.
What else is HP doing in the environmental space?

Carbon Footprint

- **Supply Chain**: 34%
- **Operations**: 5%
- **Products and solutions**: 61%

Greenhouse gas emissions in our supply chain result mainly from the raw materials used in, and manufacture of, our products.

View complete data and goals

*To calculate Scope 1, Scope 2, and Scope 3 emissions, HP has followed the principles outlined in the Greenhouse Gas Protocol. HP calculates intensity as its suppliers’ GHG emissions divided by HP’s annual revenue. This method normalizes performance based on business productivity. Ernst & Young has reviewed HP’s global Scope 1, 2, and 3 GHG emissions for the years included.*
Water Footprint

Our suppliers affect our water footprint primarily through their use of electricity. We encourage suppliers to use and discharge water responsibly, and provide tools that improve water management practices.

View complete data and goals
About supply chain responsibility

1st

IT company to introduce guidance for the treatment of student and dispatch workers
Conflict minerals

1st
IT company to publish the smelters used by suppliers

The mining of minerals used to produce tantalum, tin, tungsten and gold has been linked to the funding of armed groups fueling violent conflict in the Democratic Republic of Congo (DRC). Together known as 3TG, these valuable metals are used in many industries and consumer products, including electronics.

Any possible connection between our products and the funding of armed conflict is unacceptable to us. We are working hard to ensure that the 3TG used in our supply chain is not associated with the conflict in the DRC.

About supply chain responsibility
Conflict minerals
+ Supplier SER requirements
Audits Findings
Capability building
CA Transparency in Supply Chains Act of 2010
Product Stewardship

• Ensure that products meet environmental requirements
• Good entry point for environmental jobs
• Report into the businesses (desktops, laserjet etc.)
Regional Teams—Public Affairs

• Monitor and influence environmental regulations in the regions (Americas, EMEA, APJ)

• Waste/supplies program manager
• WEEE program manager
• Chemical/materials program manager
• Green public procurement
• Energy program manager
• Customer engagement
Legal—Corporate

- Materials strategy and compliance
- Outline the path to compliance with future regulations
- Compliance program manager
- Conflict minerals program manager
- Reuse and recycling program manager
- Materials strategy program manager
Other

• Environmental Marketing
• Corporate sustainability
• Product designers
• Mechanical engineers
• Chemists
• Materials Scientists
Thank You!
Oh the places you’ll go with Green Chemistry!

Kristi Budzinski, PhD
Genentech, Inc.
Education Overview

Undergraduate:
BS-Biochemistry/Math
Research experience: inorganic lab & biochemistry lab

Graduate:
PhD-Chemistry
Research experience: Spectroscopy
Green Chemistry Revelation
From Academia to Industry

- Green Genes
- Genentech, A Member of the Roche Group
- AWIS, Association for Women in Science, San Francisco
**Genentech Background**

**Founder** of biotechnology industry

**Mission:** Our goal is to use the power of genetic engineering and advanced technologies to make medicines that address unmet medical needs, and help millions of people worldwide. Our commitment to sustainable development respects the needs of the individual, the society, and the environment.

**South San Francisco Headquarters**
- 13,000 employees support entire value chain
- Additional manufacturing sites in Vacaville and Oceanside, CA

**Member of Roche Group since 2009**
- Robust GNE/Roche clinical development pipeline
  - 37 marketed products
  - 45 NMEs in clinical trials
- Increased emphasis on corporate environmental sustainability
Corporate Sustainability Goals

SSF Site goals by 2014

- 15% energy reduction
- 10% water reduction
- 50% waste reduction

20% energy, water, and waste reductions in just 2 years
Governance Structure

SSF Sustainability Council

- ENERGY Working Group
  - Green Genes Energy sub-team
- WATER Working Group
  - Green Genes Water sub-team
- WASTE Working Group
  - Green Genes Recycling sub-team
- TRANSPORTATION Working Group
  - Green Genes Transportation sub-team
- WELLBEING Working Group
  - Green Genes Wellbeing sub-team
- GREEN BIOPHARMA Steering Committee
  - Green Genes Green Biopharma sub-team
Employee Engagement

Green Genes

Grass roots: ~3000 members and growing, formed 2002.

Mission Statement:

• To increase our colleagues’ knowledge and awareness of sustainability

• To provide a forum to generate, exchange, and evaluate sustainability ideas to improve the environmental performance of Genentech's operations, our communities, and our homes

• And to have fun while leading by example in our industry.

More green genes members means more environmentally-conscious scientists!
Green BioPharma Program Manager

Engage Leadership and Employees
- Behaviors, decision-making

Develop and Deploy Tools/Metrics
- Educate stakeholders
- Drive performance

Collaborate w/ Vendors
- Promote innovation
- Drive higher value services
- Greener products

Manage Supply Chain and End-of-Life
- Streamline procurement and waste decisions
Creating a Green BioPharma Culture

bit.ly/1b24aRO
lessons from the afterlife

Drummond Lawson
Director, Materials Research and Sustainability
Arc’teryx Equipment Inc.
background

- Undergrad in environmental science / chemistry, grad school in environmental chemistry

- First ‘legit’ job in environmental technology labwork.

- Post-masters internship in materials assessment, applied to product design

- 8 years experience in roles focused on product development, materials research, and sustainability.
so what exactly is a greenskeeper?

Method’s greenskeeping department’s simple mandate: dream up and build the best ideas to make the company, products, and partners operate more sustainably.

- ingredient assessment and packaging assessment as design inputs
- supply chain guidance: transparency, process and operational efficiency
- make the technical basis relevant to the full business: brand communications and sales / retailer engagement

![method](method.png)
Archaeopteryx lithographica

- Arc’teryx: outdoor gear and apparel
- Founded 1989 in Vancouver BC
- Product of obsessive climbers, mountaineers and skiers
- Fast growth built on high performance technical apparel
advanced materials research =

- materials research: build materials chemistry inputs to product development process

- engage upstream suppliers to build differentiated pipeline: link product advantages to product chemistry

- develop proactive materials management approach: anticipate regulatory / supplier changes, influence possible drivers, inform our decisions
reflections

- what technical skill do you want to own?

- be a polyglot. (in a brand, relevance is critical)

- read the fine print. (regulatory / legal / policy world is as important as it is boring)

- hang out with the people in cool glasses. (designers are key partners)
Thanks for joining us!

For more information about the GC3: 
www.greenchemistryandcommerce.org

For more information about NESSE: 
www.sustainablescientists.org