

Biomass Technical Advisory Committee BioChemicals Biobased Manufacturing

Jobs Advanced Manufacturing Innovation Economy Sustainable Growth Global Competitiveness

> Corinne Young November 14, 2012



Historic Opportunity to Reset Chemicals Industry... Transition to New Economy



97% of all products sold are derived from manufacturing of petrochemicals.

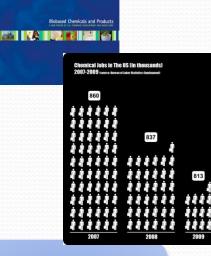
US Business Dependent on Chemical Industry accounts for about ¼ GDP, \$3.6T

US chemical industry is the largest industry in the world, consumes 20% of US industrial energy supply.

US chemicals employment down 20% last 2 decades.

Between 1997 -2003, US trade balance in chemicals plummeted from \$20B surplus to \$10B deficit.

If US companies capture projected 19% of new estimated \$1 trillion biochemical market, could created over 237,000 direct US jobs in sustainable chemistry sector, while shifting the balance of trade in the chemical sector again to a surplus.



Green Chemistry, also known as sustainable chemistry, is the lesign of chemical products and processes that reduce or minate the use or generation hazardous substances. Green chemistry applies across the life cycle of a chemical product, including its design, manufacture, and use.



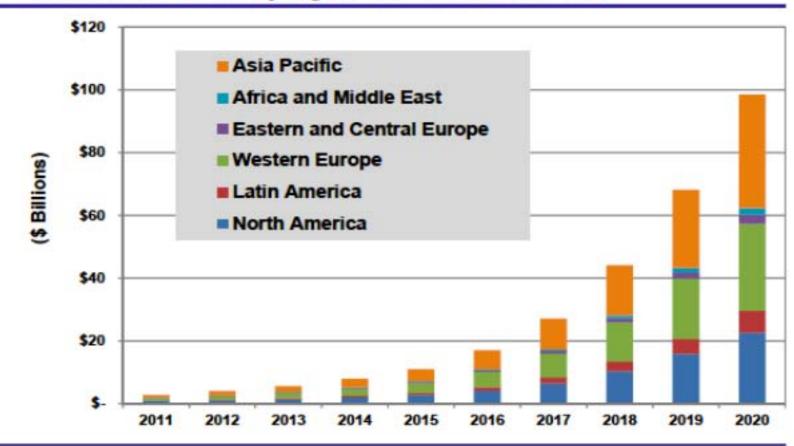
Sec Vilsack, MI Future Jobs Tour:
"The biobased products sector brings together 2 of the most important economic engines for rural America: agriculture and manufacturing. Today, more than 3,000 companies are producing more than 25,000 biobased products made from renewable sources grown here at home, and supporting 100,000 American jobs

Development could help sustain U.S. manufacturing into the 21st century while preventing the further erosion of good quality jobs..., the shift towards alternative approaches to chemical manufacturing will reduce toxic releases, lower health risks, decrease reliance on nonrenewable resources, and improve our quality of life without compromising economic performance.



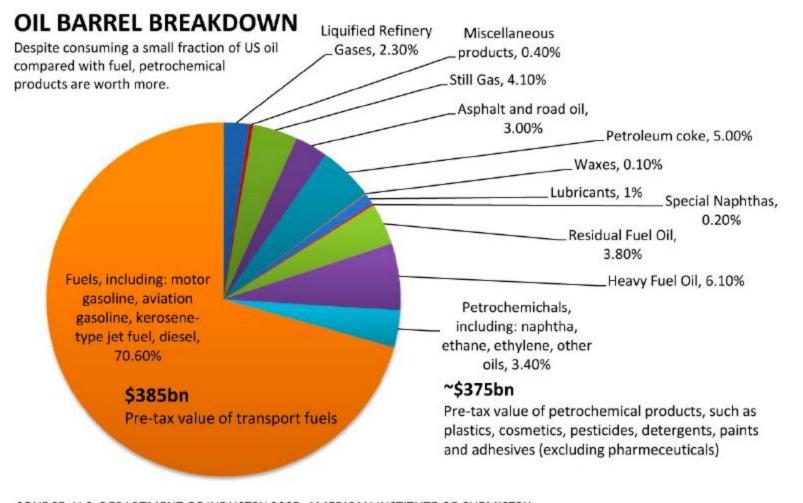
Expanding Global Markets...US Opportunity or Lose

Chart 1.1 Green Chemical Market by Region, World Markets: 2011-2020



(Source: Pike Research)

Why...Chemical Added Value Increase in ROI Over Fuels, Sustainable Economics



SOURCE: U.S. DEPARTMENT OF INDUSTRY 2005, AMERICAN INSTITUTE OF CHEMISTRY

Advanced Manufacturing Cross Sector, Full Value Chain Jobs... Innovation Hubs, Cluster Development, Community Lifelines

Cross sector growth



The process typically starts with growing plants such as sugar care. corn and portotoes that are high in starches, the raw materials that replace petroleum products in biophetics.



Compost and Renewal

The organic weste will compost: and return to the ninth as much to help new crops grow, completing the cycle.

Shapping 27% (David Burth Compatting Compat ARTL) mass long



The plant materials are harvested and processed to extract their starches.

The Life Cycle of Bioplastics

Some broglastics decompose in a flighty short period of time, and the full life cycle of such products is shown here. Other troplastics aren't biodegradable. But even in those cases, the use of plant-based raw materials means. that pollution is being removed from the atmosphere while the plants grow. giving bioplastics a green appeal.

Desposal

When disposing of a bipplootic product that is fully biodicandable. consumers can place it in an ntganic-wards rollection bin.



The stranches are processed of their in Dio-refinences through of special rep-

we made i to produce the chemical compounds that react to make plactics. The compounds can be refined to fit the specifications manufacturers. need for different products.



Manufacturing

Biophistics manufacturers use pellets or granules of the compounds. to make utomals, plates, cup linkings. corporing and other products.

Transportation

Fuels, oxygenates, anti-freeze, wiper fluids molded plantics, car seats, belts, Hoees, bumpers,

Industrial

Corregion inhibitors dust control, boiler water treatment, gas purification, emission abstement, specialty lubricants, house, seals

Textiles

Carpets, fibers, fabrics, fabric coating, fours custions, upholetery, drapes, Lycra, spandes

Safe Food Supply

Food Packaging, preservatives, fertilizers, pesticides, boverage bottles, appliances, bevarage can coatings,

Environment

Water chemicals, flocculants, chalators, cleaners and

Communication

Molded plantics, computer casings, optical fiber coatings, liquid crystal displays, pens Pancils, inks dyss, paper products

Housing

Paints, resign, siding, insulation, coments, coating

Recreation

Footgear, protective equipment, camera and film, bicycle parts & tires, wet suits, tapes-CD's, DVD's, golf equipment, camping goar, boots

Health and Hyglene

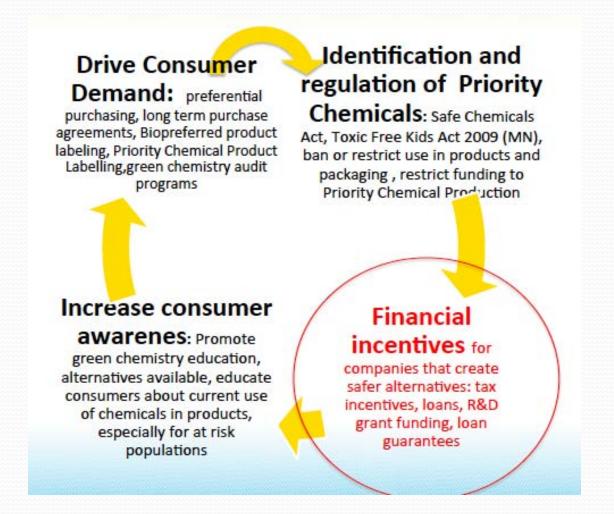
Plastic eyegiasse, coemetica, detergente, pharmaceuticale, suntan lotion, modical-dental products, disinfectants

Not Just Jobs...Careers for New Economy

Job Classification	Number of Employees	Base Rate (\$/hr)	Multilpier for Benefits	Hours Worked per Year	Annual Wage & Benefits
Plant Manager	1	\$79	1.3	1,920	\$197,184
Operations Mgr	1	\$60	1.3	1,920	\$149,760
Services Mgr	1	\$45	1.3	1,920	\$112,320
Logistics Mgr	1	\$45	1.3	1,920	\$112,320
Chief Engineer	1	\$60	1.3	1,920	\$149,760
Shift Supv.	5	\$30	1.3	1,920	\$374,400
Operators	15	\$20	1.3	1,920	\$748,800
Maintenance	5	\$20	1.3	1,920	\$249,600
Analytical	2	\$30	1.3	1,920	\$149,760
Administrative	<u>3</u>	\$20	1.3	1,920	\$149,760
Total Labor	35				\$2,393,664

Drivers...

Incentives Missing Link to Maintain Global Competitiveness



Connect Dots with White House BioEconomy, Advanced Manufacturing Initiatives...

Grow It Here, Build It Here, Make It Here Bioindustrial Farmers/Foresters Processing USDA, Grants from White House -- B&I,REAP

Tax Proposals

- PTC: S 3491, HR 4953
- ITC: S 1764

- Loan Guarantees **High Priority Projects**
- -- Farm Bill, S 3240
- §9003 Loan Guarantees
- §9008 **Biomass** Grants

Initiatives:

Advanced Manufacturing & BioEconomy Blueprint

- DOE (Biomass, AMO, ARPA-E)
- USDA (Biomass, Critical Ag Materials)
- Commerce NIST
- · DOD (DARPA, SERDP/ESTCP)



Thank You Corinne Young LLC



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