



## Advanced Manufacturing and Innovation in Chemicals Management

The Case of Green Chemistry (GC)

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## The objectives of the Department of Commerce-International Trade Administration vis a vis GC

- To pursue the goals of the National Export Initiative
- To enhance the Advanced Manufacturing Initiative
- To support the DOC-EPA Environmental Export Initiative
- To address the needs expressed by the international community, and help regain partnerships in chemicals management
- To facilitate the continuum invention->innovation->commercialization->market access.

## Forces behind the Growth in U.S. Chemicals Exports

- Softening of the U.S. internal market, and a solid demand for increased manufacturing overseas, esp. Asia. Solid U.S. industry reputation.
- Reduction/elimination of market access barriers through numerous trade agreements (current TPP, TTIP).
- Weakening of the U.S. dollar.

## Forces at play in a Changing World

- Trade patterns: West versus East; global/complex supply chain.
- Know and Disclose (from a consumer/product point of view): content, products characteristics, labeling, etc.
- Assess and Avoid Hazards (from a citizens/service type of approach): manufacturing practices, health-related impacts, environmental safety, and safe disposal.

## 20<sup>th</sup> Century and International Chemical Regulatory Actions.

- Risk Analysis =  $f(\text{HZ} + \text{Exposure})$ ;  $\text{RA} = f(\text{Risk Assessment (RA)} + \text{Risk Management (RM)} + \text{Risk communication (RC)})$
- 1992. the UN Conference calls for the development of a GHS for chemicals (common and coherent approach to define and classify the hazards of chemicals and to communicate such hazards via labels and safety data sheets with constant updates and upgrades).
- Development of numerous MEAs (Stockholm, Rotterdam, Basel, UNECE LRTAP, Mercury, etc.)
- Surge of national chemicals regulations with often long and complex update processes, lack of harmonization, and more inclusion of downstream users.

## 21<sup>st</sup> Century, and new intelligence

- Recognize the shift in Risk Analysis.  $\text{RA} = f(\text{HZ} + \text{Exposure})$ , and hence reduce business risks overtime as well as throughout the supply chain.
- Bring visibility and transparency:  $\text{RA} = f(\text{RA} + \text{RM} + \text{RC})$
- Spur innovation to sustain and bring lasting consequences on competitiveness, and the bottom line
- Restore public knowledge and public trust
- Ascertain regulatory compliance throughout the supply chain, securing consumers' demand for product information and citizens' interests in life cycle approaches.

## 20<sup>th</sup> Century Chemicals Regulations and the Global Supply Chain

- Increased complexity (esp. increased profusion of compounds, increased requirements in core issues, esp. RA, difficulty to standardize RM processes, numerous holes in RC matters).
- A loss of knowledge/mastery of knowledge by the public sector, while multiple sources of "information" are made available.
- More counterparts (issues of control and sharing of information, responsibilities, liabilities), and challenge in compliance.
- Costly but essential record keeping (relevant and efficient audit trail), and little harmonization.
- MT, and LT Risks along a novel supply chain (buyers, suppliers, investors).

## 21<sup>st</sup> Century, and a new science (GC's potential in new paradigm for sustainable economic development)

- Breakthrough science (esp. synthesis (new molecule), catalysis, computational chemistry, materials chemistry, etc.).
- Energy (esp. solar energy, solar electricity, biomass energy, energy storage with batteries, energy conversion, etc.).
- Resource Efficiency (esp. reduce, recycle, resource substitution, etc.).
- Health (esp. epigenetics and gene-activation, diagnostics, hygiene and infection, materials and prosthetics, etc.).
- Nutrition (esp. agricultural productivity, plant science, soil science, water demand, water quality, contaminants, etc.).

## Summary toward actions

- Pressures are global, but most (trailhead) solutions will also be global.
- Current chemicals priority lists can help focus attention, and set priorities on conflicting demands.
- The danger of “current” priority listing is that it is a “red” list and not a “green” listing (trailhead->base camp->high camp-> summit).
- Investment, research and communication are urgently needed on alternative chemicals as well as novel solutions.
- This knowledge is multidisciplinary, constant, and evolving (be aware of “green washing”).
- The best chances for the future will reside with companies which will dare to Know, and Disclose, Assess and Avoid Hazards, Commit to Continuous Improvements, and Support Harmonization.

## Challenges and opportunities

- GC is a process. Hence interlocutors may be disappointed by the lack of certainty, and/or may feel overwhelmed as they initiate the first steps of the chemicals management schemes.
- Database: Who? What? Where? Nevertheless, the visibility and access to an internationally recognized and adopted list of greener chemicals (products and processes) is essential to their rapid utilization.
- The US has a voluntary approach which lacks certainty, visibility, LT effectiveness evaluation, and hence imposes a high cost on innovators.
- GC is a process, and its current flexibility allows for refinement, improvement, and wider adoption.
- GC creates multidisciplinary/integrated teams, and international coalitions (incl. academia, business, NGOs, and government officials).
- GC works, and companies are starting to expose it via products, processes, and bottom line.
- “The more complex the supply chain, the more likely GC will reconnect the demands of the consumer and the citizen.” A quote from the ASEAN workshop.

## Current DOC-ITA engagement in Green Chemistry

- To respect the lack of USG agreement on the definition of GC, reflect international interests, and include multiple DOC priorities, the dialogues are framed under the “advanced manufacturing and innovation in chemicals management initiatives.”
- In collaboration with the ASEAN Consultative Committee on Standards and Quality (ACCSQ), ITA led the first introductory workshop on GC, in KL, in May 2013.
- In collaboration with the EU High-Level Regulatory Cooperation Forum, and under the ITA Transatlantic Innovation Action Partnership, ITA is launching a dialogue on GC, with EC-DG Enterprise (see Lori Cooper).
- India has expressed interests in GC. ITA will engage
- China has expressed interests in GC. ITA will engage

## Intra-Agency Collaboration

- Sciences? R&D and access to labs? LC Approaches, refinement and harmonization between sectors/regions/worldwide?
- Companies? Clusters? Role of the MEPs, the USEACs?
- Commercialization? How to engage a dialogue soon enough so that the experts and decision makers are better informed as they design and implement chemicals management schemes? How to support an international database for GC?



Goethe said: Choose well, your choice is brief, and yet endless.

I would add: Consistently (with courage and intelligence) choose well since your choice is brief, and yet endless.

## Further information

<http://trade.gov/nei/>

<http://www.manufacturing.gov/amp.html>

<http://www.whitehouse.gov/the-press-office/2012/11/19/fact-sheet-us-asean-leaders-meeting>

<http://www.commerce.gov/blog/2012/10/01/ita-and-epa-launch-environmental-export-initiative-weftec>