Industrial Green Chemistry initiatives in India

Session 1 on “Going Global – Green Chemistry in China & India”
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Flow of presentation

• Overview of Indian Chemical Industry
• Magnitude of Environmental Challenge
• Impact
• Key Challenges
• IGCW’s strategic initiatives
• Approach & sustainable model
• Conclusions
• Questions and Discussion
Overview of Indian Chemical Industry

- Industry worth US$ 35 billion
- Total investment is approx. US$ 60 billion
- 12th largest in the world and 3rd largest in Asia
- Accounts for 14% of total exports and 9% of total imports of the country
- The major sub segments include basic chemicals, organic chemicals, inorganic chemicals, pesticides, dyes & dyestuffs and specialty chemicals.
- Major markets are North America, Western Europe, Japan and emerging economies in Asia and Latin America
- The sector is expected to grow at 6 - 9% p.a. by 2020
79% of industry engaged exclusively in manufacturing
21% engaged in manufacturing as well as trading
> 75% of industry engaged exclusively in manufacturing operates at more than 50% of capacity utilization
### Magnitude of environmental challenge

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<td>7+</td>
<td>50 - 100</td>
<td>20%</td>
<td>15</td>
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<td>Agro</td>
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<td>Pigment</td>
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<td>30 - 50</td>
<td>30%</td>
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<td>Dyes</td>
<td>2 - 2.5</td>
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<td>20 - 30</td>
<td>35%</td>
<td>20</td>
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Total volume of liquid effluents (world) = around 70 bn lits/year
= 7 million trucks/year

Indian Market
Total volume of liquid effluent (India) = 15 - 20 bn lits/year
= 1.5 – 2.0 million trucks/year
= 4,000 trucks/day

Total Organic Mass in effluents (India) = 875,000 TPA (avg. COD = 50K)
Impact

**Impact: huge threat to water bodies & human health**

- **Quantity**  
  approx. 15 - 20 bn kgs of liquid effluents  
  include solid & gaseous effluents  
  include all wastes from all other sectors (mining, steel, power,..)

- **Practice**  
  End-of-pipe-treatment (converting one kind of effluent in to other)

- **Issue**  
  Toxicity not fully known

- **Degradation**  
  very slow, impact unknown after degradation

**Impact on Economics**

- **Direct Cost**  
  loss of solvent, raw material & finished product, loss of utilities,  
  treatment cost, higher overheads, loss of business...

- **Indirect Cost**  
  unreliable supplies, loss of credibility in market, anxiety, etc.
At country level, we are dealing with multiple challenges

- Reducing environmental footprint of our chemical industry (given the growth rate & world looking at us as a manufacturing hub)?
- Saving our limited fresh water resources (given that 1 bn people need fresh water every day)
- Lack of awareness in the industry about environmental issues & Green Chemistry
- Lack of incentives & “Green Friendly” policies
- No eco-system for “enviropreneurs” to show up
- Chemistry & Chemical engineering graduates pursuing other careers
- No courses on Green Chemistry, Green Engineering in existing curriculum
- Teachers not trained in Green Chemistry & Green Engineering
- Academic & research institutions not working on solving real-life problems
- Lack of awareness in common man about environmental issues
- .......
Approach to identify our “Focus Area”

Approach followed by us to identify our “Focus Area”

- Observing & Noticing global & local trends
- Identifying challenges, roadblocks
- Analyzing sensitivity & assessing impact
- Focus Areas

Then, around each “Focus Area”

- Focus Areas
- Measuring Reality of Industry, Community, Society
- Identifying the Need (what is needed & wanted?)
- Generating expression to serve the need
“Focus Area” for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

- **Measuring Reality**
  - Disconnect between various stakeholders of chemical industry

- **Identifying the Need**
  - Connect all stakeholders (like industry, government, academia, researchers, students, etc)

- **Generating expression**

**Industrial Green Chemistry World (IGCW) Platform:**
IGCW Sypo & Expo: Bi-annual event
Social Media (LinkedIn, Facebook, Twitter,...)
"Focus Area" for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

- **Measuring Reality**: Lack of sensitivity & awareness in industry
- **Identifying the Need**: Connect decision makers to GC pioneers & global thinkers
- **Generating expression**: IGCW Sympo: Symposium with series of presentations by thought leaders
“Focus Area” for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

- **Measuring Reality**: Lack of awareness in industry about potential Green Chemistry Solutions
- **Identifying the Need**: Bring solution providers & industry together to enable collaboration
- **Generating expression**: IGCW Expo: Exhibition of Green Chemistry & Engineering solution providers
Reducing Environmental footprint of Chemical Industry

Measuring Reality

Lack of technical knowledge about Green Chemistry tool box

Identifying the Need

Bring domain experts to share their knowledge & train industry

Generating expression

180° Seminar Series: Technical sessions on specific topics
“Focus Area” for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

Measuring Reality

Lack of empowerment for those implementing Green Chemistry technologies

Identifying the Need

Acknowledge & appreciate individuals & companies taking initiatives & contributing to Green Chemistry

Generating expression

IGCW Awards

![Image of IGCW Awards ceremony]
“Focus Area” for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

Measuring Reality
Technical, production & shopfloor people in industry have limited mobility & usually don’t move out

Identifying the Need
Educate operations people in the industry about Green Chemistry solutions

Generating expression
Half day or One Day Seminars in specific industrial clusters

Green ChemisTree Foundation
“Focus Area” for Green ChemisTree Foundation

Reducing Environmental footprint of Chemical Industry

- Measuring Reality
  Top 20% of companies directly or indirectly contribute to 80% of environmental footprint

- Identifying the Need
  Educate team of top 20% companies about Green Chemistry

- Generating expression
  Corporate Green Chemistry awareness programs customized for their R&D and Manufacturing team
Other initiatives and expressions

- Parallel seminars & workshops during Industrial Trade Shows & Exhibitions

- Green Chemistry training workshops for students & teachers
Other initiatives and expressions

- Biomimicry (innovation inspired from Nature) camps for R&D Teams

- Sharing with chemistry & chemical engineering students about Enviropreneurs & inspiring them to pursue career opportunities in our field

- Interacting with government & regulatory bodies

- Participating in exhibitions & conferences around the world to learn from others & generate partnerships

- Collaborating to develop Green Chemistry curriculum
You can participate & contribute to IGCW2013 by:

- Submit abstract to present your specific Industrial green chemistry initiative at IGCW-2013 Symposium
- Nominate your Industrial green chemistry initiative for IGCW-2013 Awards
- Showcase your Industrial green chemistry initiative, technologies, services and/or solutions at the IGCW-Expo
- Register to participate in the IGCW 2013 – Symposium, Seminar Series, Exhibition and Awards
Companies Participated in IGCW 2009

16th GCandE Conference, Washington DC
- 18 June '12 Session - Going Global
Thank you

www.industrialgreenchem.com

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