

Environmentally Benign Manufacturing

Introduction to EBM Panel

Tim Gutowski

Director- MIT Lab for Manufacturing and Productivity
Massachusetts Institute of Technology
77 Mass. Ave. Room 35-234
Cambridge, MA 02139

Sponsors: US National Science Foundation, DOE

EBM Panelists

(Delcie Durham, NSF)

Timothy Gutowski (Chair) Thomas Piwonka

Cynthia Murphy (Co-chair) Paul Sheng

David Allen John Sutherland

Diana Bauer Deborah Thurston

Bert Bras Egon Wolff

What is Environmentally Benign Manufacturing?

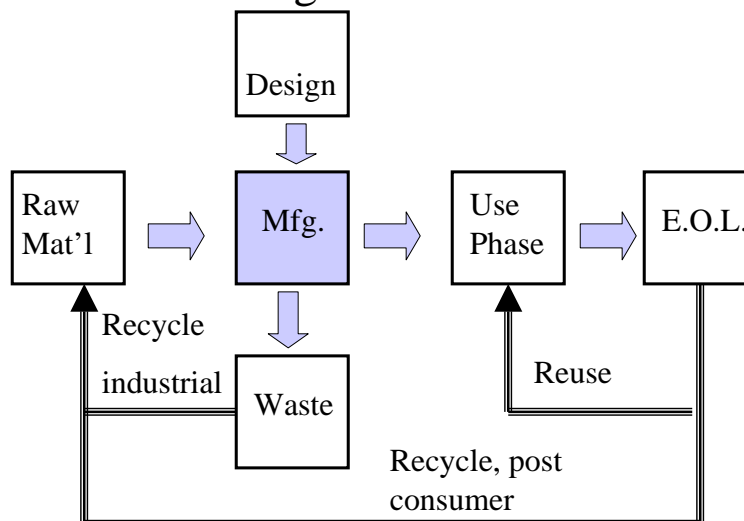
1. EBM enables economic progress while minimizing pollution and waste, and conserving resources.
2. EBM protects the environment for the next generation.

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Manufacturing and the Product Life Cycle

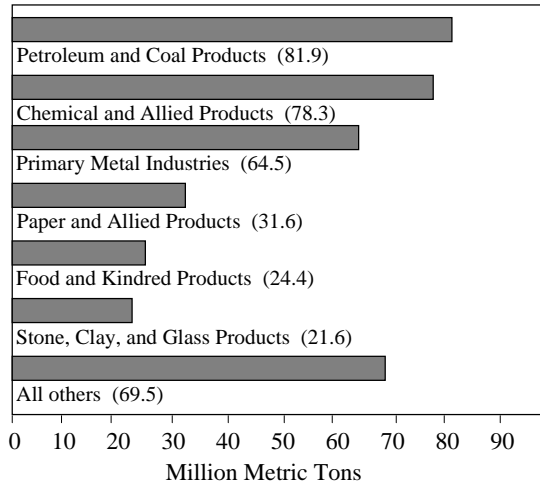


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Total Energy-Related Carbon Emissions for Selected Manufacturing Industries, 1994



Manufacturing accounts for about 80% of all industrial energy consumption, and 80% of energy related carbon emissions

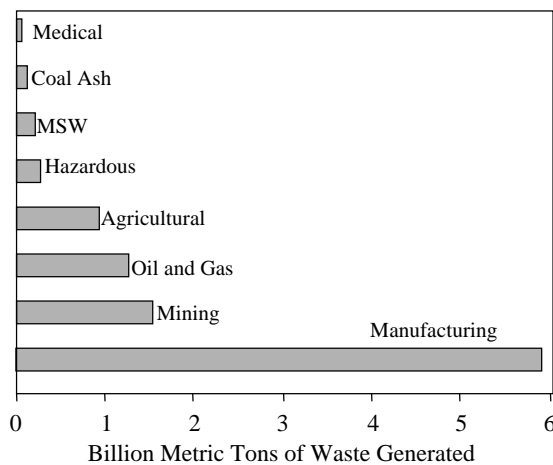
Source: Energy Information Administration, 1994

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Major Waste Types by Weight in the United States (1985)



Note: A large fraction of the total weight in the industrial categories is water. Dry weight of industrial wastes can be as low as 10% of the total.

Source: US Congress, OTA-BP-82

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Panel Mission

- Advance understanding of EBM
- Establish baseline and document best practices;
 - Policy, practice, and motivation
 - infrastructure and technology,
 - methodologies and metrics,
 - goals and assessments
 - research
- Identify research opportunities
- Promote international cooperation

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Focus Areas

- Metal Processing
- Polymer Processing
 - thermoplastics and thermosets,
 - composites
- Applications
 - automobiles
 - electronics

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Sites Visited: Japan

| | |
|---------------------------|-----------------------------------|
| Fuji Xerox | New Earth Conference & Exhibition |
| Hitachi PERL | NRIM |
| Horiba, Ltd. | PVC Industrial Association |
| Kubota | Sony Corporation |
| MITI/Mechanical Eng. Lab. | Toyo Seikan Kaisha |
| MITI/AIST/NIMC | Toyota Motor Corporation |
| Nagoya University | University of Tokyo |
| NEC Corporation | Institute for Industrial Science |
| Nippon Steel Corporation | |
| NIRE | |

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Sites Visited: Europe

Belgium, Denmark, Netherlands, Germany, Sweden, Switzerland

| | |
|---------------------------------------|--|
| Corus Holland | ICAST |
| DaimlerChrysler | IVF |
| Denmark Tech. U. | MIREC |
| EC Environmental Directorate | Siemens |
| EC Research and Technical Development | TU Aachen |
| Excello | TU Berlin |
| Fraunhofer, Aachen | TU Delft (Ministry of Environment, Lucent Tech., Phillips) |
| Fraunhofer, Berlin | Univ. of Stuttgart |
| Fraunhofer, Stuttgart | Volvo |

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Sites Visited: U. S.

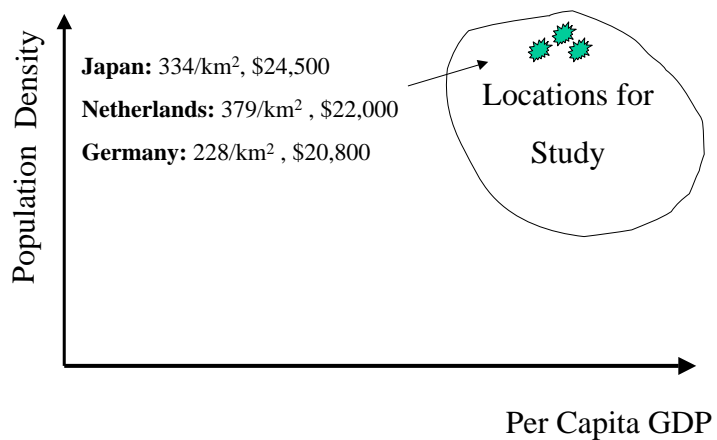
| | |
|------------------------|------------------|
| Applied Materials | GM |
| Caterpillar | IBM |
| CERP | Interface |
| Chaparral Steel/Cement | Johnson Controls |
| DaimlerChrysler | MBA Polymers |
| DRI | Metrics Workshop |
| DuPont | Micro Metallics |
| Federal Mogul | NCMS |
| Ford | |

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Per Capita GDP and Population Density



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AGENDA: Morning

- 8:15 Registration
- 9:00 Opening Remarks (L. Martin-Vega, Acting Assistant Director for Engineering, NSF)
- 9:05 Introduction to WTEC (R.D. Shelton, ITRI/WTEC)
- 9:15 NSF Perspective (D. Durham, NSF)
- 9:20 DOE Perspective (Ken Friedman, DOE)
- 9:25 Introduction - Background (T. Gutowski, Panel Chair)
- 9:45 Introduction - Geographic (C. Murphy, Vice Chair)
- 10:05 Strategic Vision (D. Allen)
- 10:30 Break
- 10:50 Systems Level Issues I (B. Bras)
- 11:15 Systems Level Issue II (D. Thurston)
- 11:40 Discussion (all)
- 12:00 Break for Lunch

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AGENDA: Afternoon

- 1:00 Metals (T. Piwonka)
- 1:25 Automotive (J. Sutherland)
- 1:50 Polymers (T. Gutowski)
- 2:15 Electronics (C. Murphy)
- 2:40 Break
- 3:00 Cross Cutting Applications I (D. Bauer)
- 3:25 Cross Cutting Applications II (P. Sheng)
- 3:50 Research (E. Wolff)
- 4:15 Discussion (all)
- 5:00 Adjourn

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