

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The overall composition is clean and modern, with the text centered on a white background.

CIBO: Sustainability Discussion

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Agenda

- ▶ Why focus on sustainability?
- ▶ Defining “sustainable manufacturing”
 - ▶ NAM
 - ▶ Dept. of Commerce
 - ▶ NACFAM

Agenda

- ▶ Sustainable manufacturing - models and approaches
 - ▶ Institute for Sustainable Manufacturing Elements
 - ▶ Total Lifecycle
 - ▶ Product Design
 - ▶ Circular Economy
 - ▶ OECD Sustainable Manufacturing Indicators
- ▶ Hill Happenings
 - ▶ Senate NEWS Act
 - ▶ Energy Bill

Why Focus on Sustainability?

The background of the slide is white with abstract green geometric shapes on the right side. These shapes include overlapping triangles and polygons in various shades of green, from light lime to dark forest green. The shapes are layered, creating a sense of depth and movement. The overall aesthetic is clean, modern, and eco-friendly.

Why Focus on Sustainability?

- ▶ *The green marketplace is worth trillions.*
- ▶ *Retailers are demanding that suppliers respond to green consumers.*
- ▶ *A green reputation drives up your financial value.*
- ▶ *Stay ahead of regulations.*
- ▶ *A little investment in greening may lead to big savings.*
- ▶ *Young workers value sustainability and demand green. Workplaces.*
- ▶ *Sustainable manufacturing offers uniquely new kinds of employment opportunities.*

(OECD, 2011)

Defining “sustainable manufacturing”

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Defining “sustainable manufacturing”

▶ National Association of Manufacturers

*NAM member companies are committed to advancing sustainability efforts that positively impact manufacturing and industry’s contributions to **environmental protection, economic performance and the social well-being of the employees, communities, customers and consumers they serve.***

(NAM, 2016)

Three-dimensional aspects of sustainable manufacturing



Defining “sustainable manufacturing”

- ▶ **NAM’s Sustainable Manufacturing Principles**
 - ▶ Sound economic, social and environmental performance is an element of sustainable companies;
 - ▶ Encouraging research, development and deployment of innovative, cost-effective technologies and operational improvements that will enhance sustainable manufacturing activities;
 - ▶ Improving water efficiency;
 - ▶ Minimizing natural resource impacts by increasing efficiencies and conservation to optimize raw material input and to reduce waste output;

Defining “sustainable manufacturing”

▶ NAM’s Sustainable Manufacturing Principles

- ▶ Continuing to improve the environmental, health and safety profile of manufacturing and its workforce by improving performance processes and products;
- ▶ Recognizing action taken by companies who are leaders in implementing voluntary sustainability practices and procedures;
- ▶ Managing land use and natural resources to provide economic benefit while protecting biodiversity;
- ▶ Collaborating and interacting with supply chain members to responsibly manage total environmental impacts; and
- ▶ Building sustainable practices to support, attract, develop and retain a highly skilled, diverse workforce.

(NAM, 2016)

Defining “sustainable manufacturing”

▶ Department of Commerce

*The creation of manufactured products that use processes that minimize negative **environmental impacts**, **conserve energy** and natural resources, are **safe for employees**, communities, and consumers and are **economically sound***

(US Department of Commerce, 2009)

Defining “sustainable manufacturing”

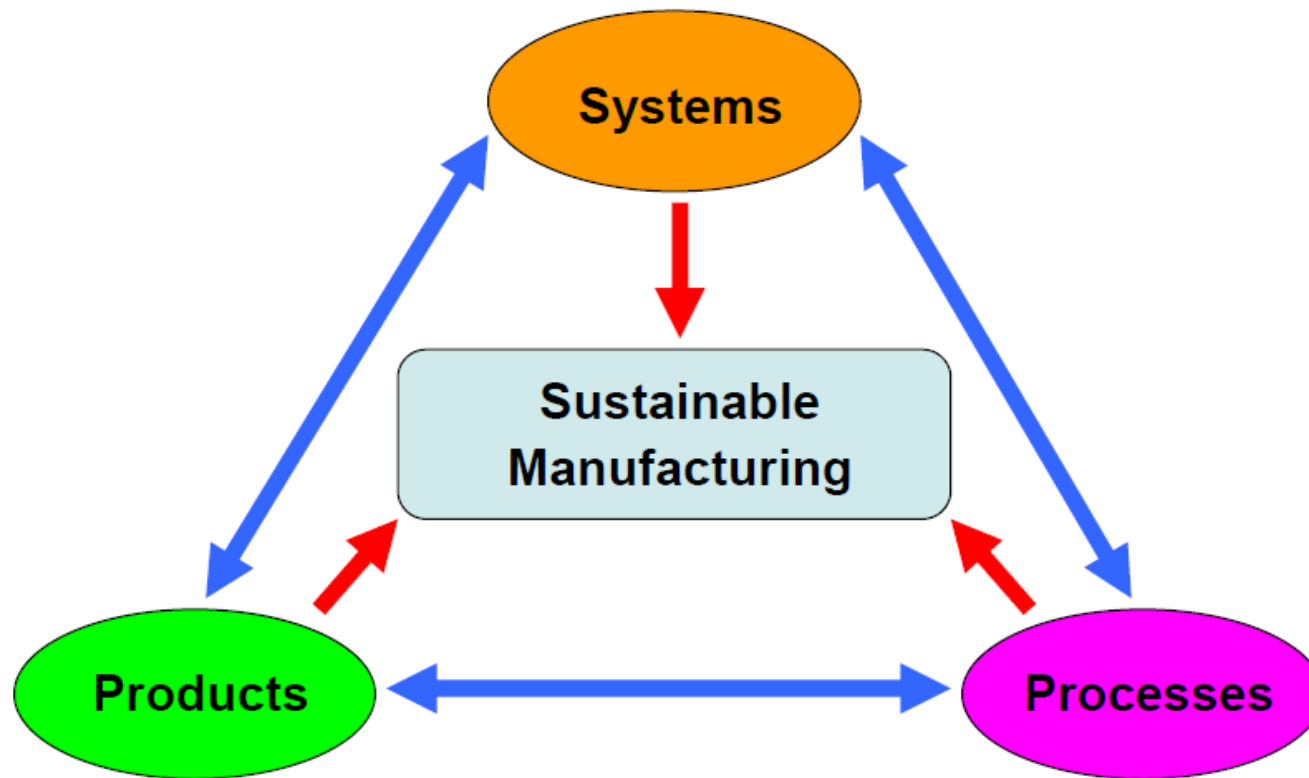
- ▶ **National Council for Advanced Manufacturing (NACFAM)**
- ▶ Sustainable manufacturing includes:
 - ▶ (1) manufacturing of “sustainable” products, and
 - ▶ *manufacturing of renewable energy, energy efficiency, green building, and other “green” & social equity-related products*
 - ▶ (2) sustainable manufacturing of all products.
 - ▶ *sustainable manufacturing of all products taking into account the full sustainability/total life-cycle issues related to the products manufactured*

(NACFAM, 2009)

Sustainable Manufacturing - Models and Approaches

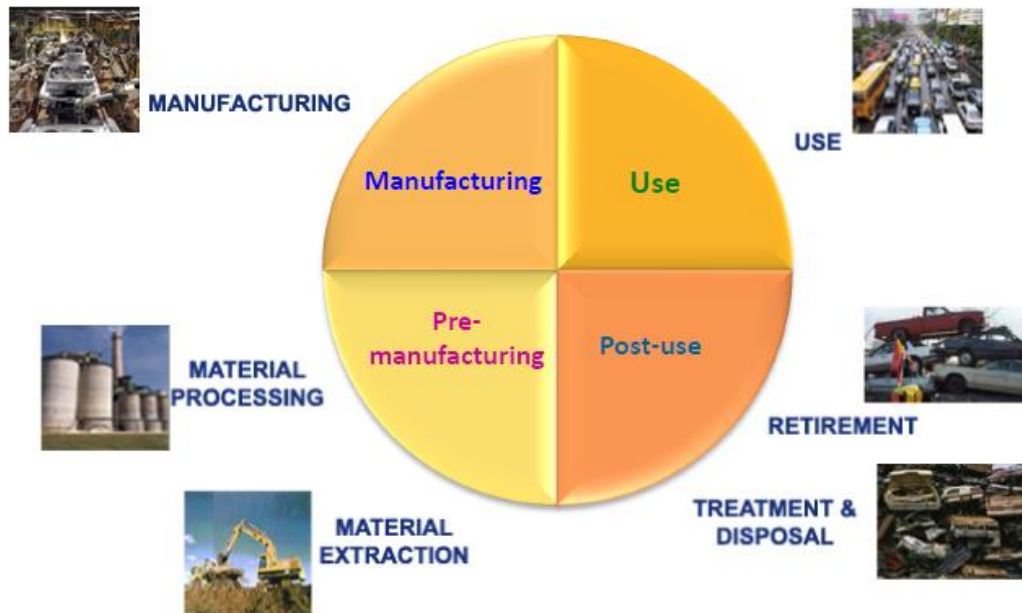


ISM's Integral Elements of Sustainable Manufacturing



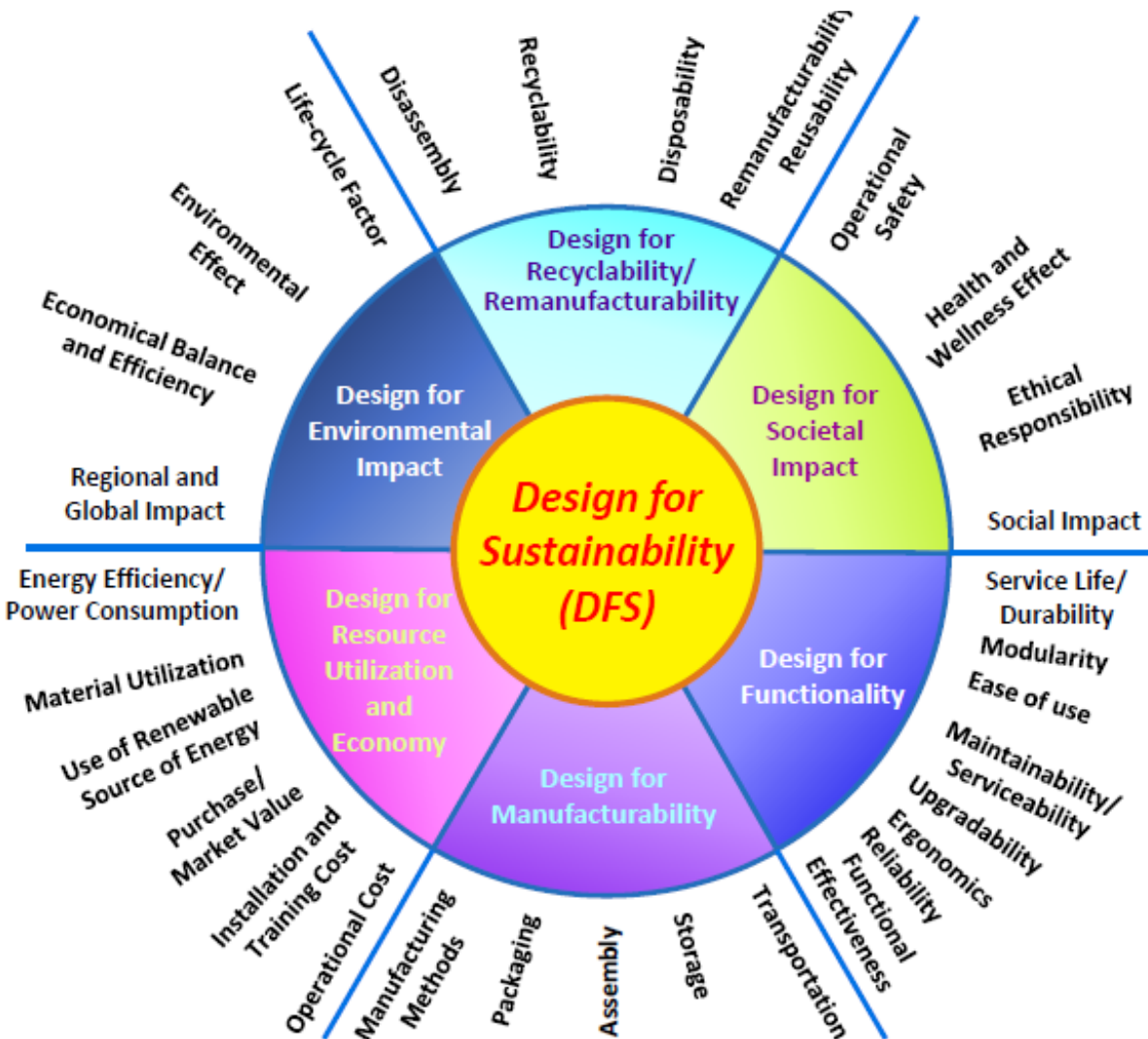
Total Lifecycle Approach

Emphasis on all four product life-cycle stages



(ISM, 2010)

Product Design for Sustainability



(ISM, 2010)

Circular Economy



A **circular economy** is an alternative to a traditional linear **economy** (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them while in use, then recover and regenerate products and materials at the end of each service life.

(Waste and Resources Action Programme, 2016)

Organization of Economic Cooperation and Development (OECD)



Inputs



Operations



Products

(OECD, 2011)

Hill Happenings



Nexus of Energy and Water for Sustainability (NEWS) Act of 2015 (S.1218)

- ▶ Targeted approach to sustainability - focused on one significant area of concern
- ▶ Identifies two key challenges with regard to water use in energy production, distribution, extraction, and refinement
 - ▶ (1) what can be done to ensure an adequate supply of water? and
 - ▶ (2) how can the amount of water used for energy and energy used for water be responsibly minimized?
- ▶ Similar provisions are in the current bi-partisan Senate energy bill

Sustainability Issues in the Current Energy Bill (S. 2012)

▶ *Section 1023. WaterSense.*

Section 1023 formally authorizes the existing voluntary WaterSense program which has as its primary purpose, the identification of water-efficient products, buildings, and landscapes that conserve water use, and conserve energy use to transport and treat water. The section directs the agency to promote the voluntary labeling of, among other things, plumbing products, water efficient buildings, and facilities.

▶ *Section 1201. Manufacturing energy efficiency.*

Section 1201 amends section 452 of EISA 2007 to add the 'Future of Industry Program' and 'Sustainable Manufacturing Initiative.' These programs direct Industrial Assessment Centers to coordinate with other Federal manufacturing programs, National Laboratories, and energy service and technology providers, and direct DOE's Office of EERE to provide onsite technical assessments to manufacturers seeking efficiency opportunities.

Sustainability Issues in the Current Energy Bill (S. 2012)

- ▶ *Section 1202. Leveraging existing Federal agency programs to assist small and medium manufacturers.*

Section 1202 directs the Secretary of Energy to expand the scope of technologies covered by the Industrial Assessment Centers of DOE to include smart manufacturing technologies and practices and equip the Centers' Directors with tools and training to provide technical assistance in smart manufacturing to manufactures.

- ▶ *Section 1203. Leveraging smart manufacturing infrastructure at National Laboratories.*

Section 1203 directs the Secretary of Energy to study and implement ways for small and medium manufacturers to access the high-performance computing facilities at National Laboratories.

Sustainability Issues in the Current Energy Bill (S. 2012)

- ▶ *Sec. 2311. Model guidance for combined heat and power systems and waste heat to power systems.*

Section 2311(b) directs the Secretary of the Department of Energy (DOE) in consultation with the Federal Energy Regulatory Commission (FERC) to within 180 days of implementation review existing rules and procedures for determining supplemental, backup, and standby power fees for combined heat and power (CHP) and waste heat to power (WHP) systems that allow for adequate cost recovery for utilities. Section 2311(c) directs the Secretary of the DOE in consultation with the FERC to within 18 months of implementation issue model guidance on interconnection procedures and associated fees that reflect current best practices to encourage the use of CHP and WHP, while also ensuring the safety and reliability of distribution and transmission networks.

Sustainability Issues in the Current Energy Bill (S. 2012)

- ▶ *Section 3403. Establishment of coal technology program.*
 - ▶ Section 3403 replaces the existing EPACT 2005 coal programs, and establishes a new coal technology program, which includes programs for research and development, large-scale pilot projects, demonstration projects, and co-fired biomass-coal projects. The program objectives are reliable, low-cost power, conversion efficiencies, carbon capture and storage, reduction of emissions, water discharge management, evaluation of geological carbon dioxide storage, and conversion of coal to other products and commodities. The section authorizes \$632 million annually from 2017 - 2020, and \$582 million in 2021. The Secretary shall report on progress towards the objectives to Congress every two years.