AVAILABILITY OF SUBSTITUTES OF RAW MATERIAL

20MS2007 – Business Plan

RAW MATERIALS - **AVAILABILITY**

- Raw materials are **the inputs used in the production process to create finished products that are ready to sell to consumers**.
- This makes raw materials a vital piece of the global economy and international trade.
- Having natural resources that can serve as raw materials can boost exports and help a country grow its GDP.

MATERIAL SUBSTITUTION IS **AN EVOLUTIONARY PROCESS**

- Material substitution is **an evolutionary process that requires material research, market knowledge and time**.
- And as with all types of change processes, you may meet forces that resist change, such as tradition, or people.
- In other words, your fact-based arguments may not be enough.

SUBSTITUTING MATERIALS-THREE METHODS

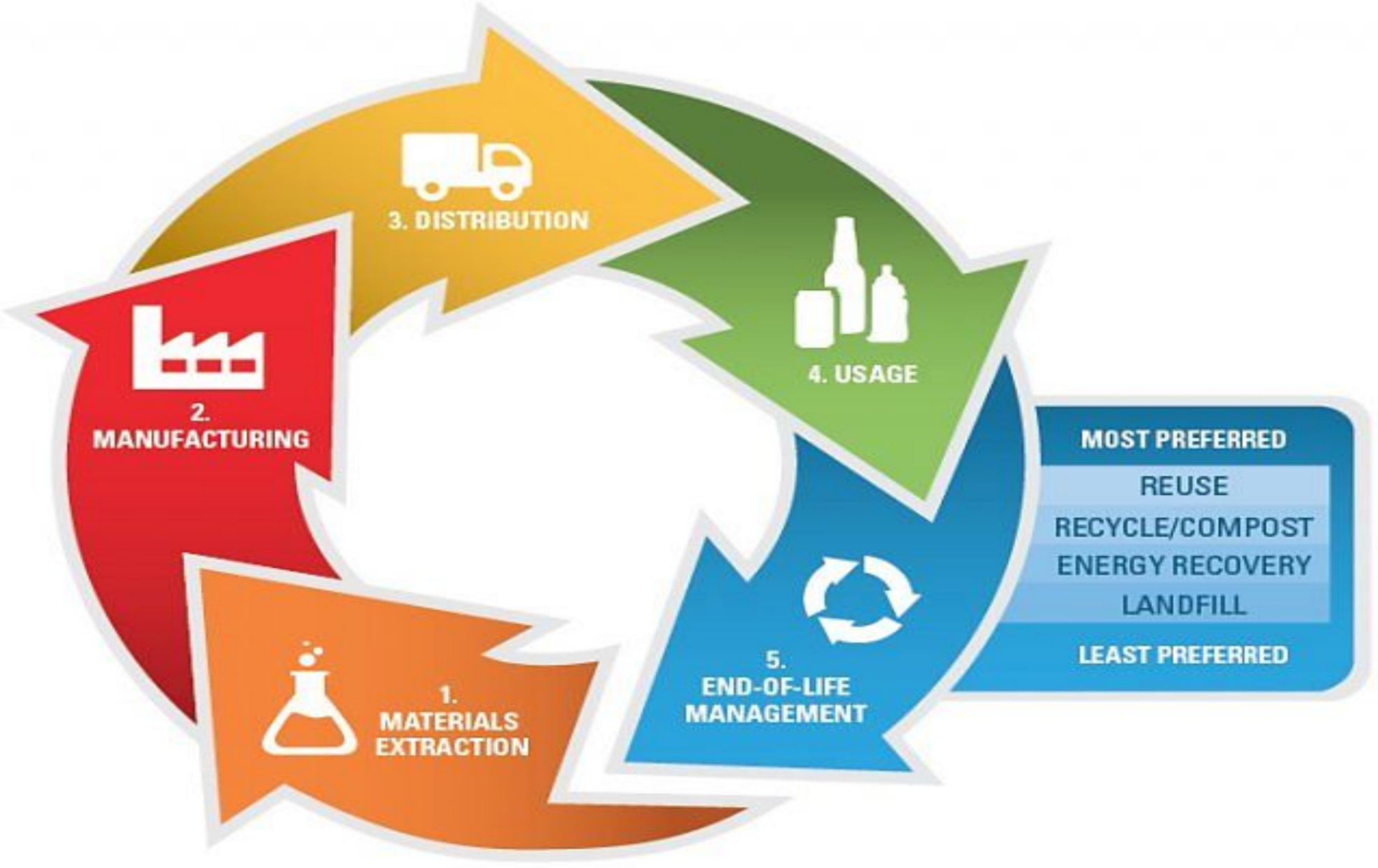
- There are three methods for substituting materials during the production process:
  - By date, when one material is substituted for another after a specific date
  - During master planning, when a material in a formula is substituted with a different material, because it's out of stock
  - During production, when a material is unexpectedly out of stock and is substituted with a different material

AEROSPACE APPLICATIONS - **CFRP**

- Carbon-fibre reinforced polymers (CFRP), combine high specific stiffness with design flexibility and therefore have particularly high weight-reduction potential.

- In aerospace applications the use of CFRP-materials can result in lifetime reductions of 14-20%

SUSTAINABLE MATERIALS MANAGEMENT (SMM)



SUSTAINABLE MATERIALS MANAGEMENT **(SMM)**

- Sustainable materials management (SMM) is a systematic approach to using and reusing materials more productively over their entire life cycles.
- Use materials in the most productive way with an emphasis on using less.
- Reduce toxic chemicals and environmental impacts throughout the material life cycle.
- Assure we have sufficient resources to meet today's needs and those of the future.

MATERIAL SUBSTITUTION

- Material substitution is an ongoing process and materials used for a given product should be reviewed regularly through a materials audit process
- In substituting a new material for an established one, the characteristics of the new material should be well understood and that advantages outweigh the drawbacks of adopting it
- Risk, cost of conversion and equipment needed, as well as the environmental impact, need to be carefully evaluated.

RAW MATERIALS SUBSTITUTION

- Concept of raw materials substitution implies effective and efficient use of raw materials (to minimize losses along the process system) as well as using different raw materials that will not generate waste during processing.
- This concept also further implies re-using materials or using recycled materials

SUBSTITUTION PROCESS

- In an NGL (Natural Gas Liquid) process system, this means:
  - (i) changing the source of raw gas feed and substituting the feed with a feed that will produce less waste in the process system;
  - (ii) changing chemicals for other chemical reactions in the process by substituting them with different chemicals that will not generate waste and that are more environmentally friendly and safe to process or use.

MATERIAL SUBSTITUTION IN CEMENT INDUSTRY

- 60% of the industry's emissions are 'process emissions' caused by decarbonation of limestone during the production process.
- Limestone needed to make clinker can be partially substituted by a range of alternative calcium containing materials, including waste and industrial by-products, which are already increasingly being used.
- Many of the alternative materials are ashes provided by the combustion of alternative fuels.
- Further research into the use of alternative raw materials and ensuring access to these materials should be supported.

ECOMATERIALS

- Ecomaterials emerged as a new field in international research on hi-tech new materials in the early 1990s.
- The development of ecomaterials is of great importance to the reduction, substitution, and recycling of raw materials.
- Ecomaterials are those materials with good performance or good functions that can be used in harmony with the environment.

ECOMATERIALS

- They consume fewer resources and less energy, cause less pollution to the ecology and the environment, have a high rate of reproduction, and are in accord with the ecological environment throughout their whole life cycle, from materials manufacture, use, and discarding to recycling.