

why

To help you understand some of the technologies that will be used to develop transport systems in the future. Part 3 will help you think about the way we use materials now and in the future

read
about this

In nature there are no waste products. A plant grows from seed, taking nutrients and water from the ground and carbon dioxide from the atmosphere. During its life it will produce seeds from which other plants can grow. If it dies before it is eaten, it returns to the soil, where a wide variety of micro-organisms use it for food. If it is eaten by an animal, the materials of the plant become parts of the animal.

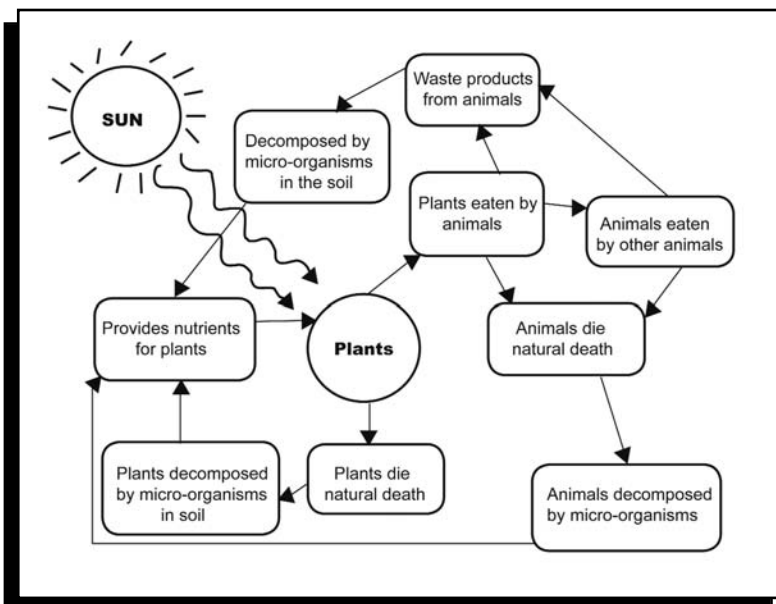
The animal may be eaten by other animals or die a natural death. Either way, materials that made up the animal will eventually be returned to the soil and provide food for micro-organisms. The flow of material is a closed loop. The outputs always become inputs.

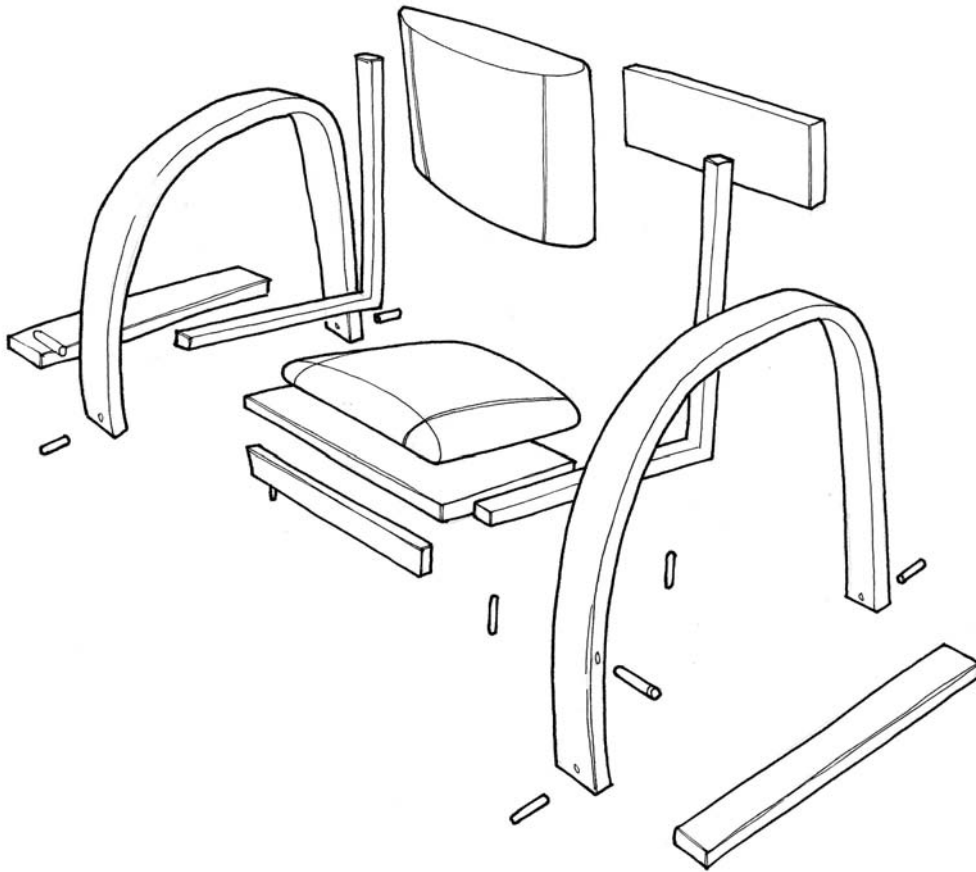
At the moment, the industrial use of materials is very different from that shown in the diagram above, but in the future, if we are to live in a sustainable way, industry will have to change the way it manufactures goods. Industrial production will have to behave much more like nature.

Scientists and technologists use the term 'industrial ecology' to describe the way different industries might 'feed' off one another in the same way as biologists use the term 'ecology' to describe the relationship between plants and animals in nature. You have probably learned about this when studying food chains and food webs in your science lessons.

- This will require manufacturing enterprises to be connected.
- This will enable materials to be continuously circulated.
- This will need to happen on both the small and large scales.
- This is quite different from individual manufacturers recycling their materials.
- Manufacturing will be organised into webs to make minimum use of 'new' materials.

A closed-loop system



**think**
and note

- Above is an exploded view of a chair. You can see that it is made of specially shaped pieces of wood, foam padding and textile covers. The factory that manufactures the chairs buys in planks of wood, large blocks of foam and rolls of textile. Some of the workers in the factory use machines to cut these materials to the correct shape and size. Then other workers take these pieces of material and assemble them into the finished chair.

- What waste materials will be formed when manufacturing these chairs?
- What might these materials be used for?
- What changes would need to be made to the factory for this to happen?

discuss
and note

- Compare your notes with those of your classmates.
- Combine the information in your notes.
- Decide which three suggestions are the most realistic.

write
about this

○ Write a sentence describing each of your suggestions for closed-loop manufacturing. Explain clearly what would be necessary for each suggestion to work.

present
findings

○ Decide on the suggestion that your group thinks is the most realistic and develop a diagram, with notes, that describes it, shows why it is important and what is necessary for it to work. You can use the diagram of material flow from the project website. You can present this to the rest of the class on a flip chart or using an overhead projector or electronic white board.

talk
at home

○ Discuss with those at home what happens to the waste material produced where they work. Explain to them the difference between this and what you have learned about closed-loop use of materials.