The use of materials affects the environment

- Society uses many times the amount of materials compared to Nature's material cycles

- The less materials taken up from Nature for human economic use, the less emissions and waste is returned to the environment

Material Use Efficiency – a new way of examining environmental matters

- Use of materials as a new measure of stress on the environment
- From cleaning up waste to more efficient use of natural resources
- Greater efficiency does not require lowering living standards
- The product exists to provide a service
- Increasing Material Use Efficiency creates new business opportunities

Vähemmästä materiaalista enemmän palveluja.

Product Ecological Rucksack

= Natural resource input to the product other than its own weight during the product's life cycle

Product Material Input (MI) = Product's own weight + its Ecological Rucksack

Tuotteen ekologinen selkäreppu painaa usein paljon enemmän kuin itse tuote.

MI Factors

Total natural resources required (in kilograms) for one kg of raw material (kg/kg):

Glass	1-3
Wood	2-12
Paper and cardboard	3-15
Plastic/Rubber	5-20
Cotton	20-160
Metals	3,5-500 000
e.g. Steel	ca. 7
Aluminium	ca. 61
Copper	ca. 250
Gold	ca. 500 000

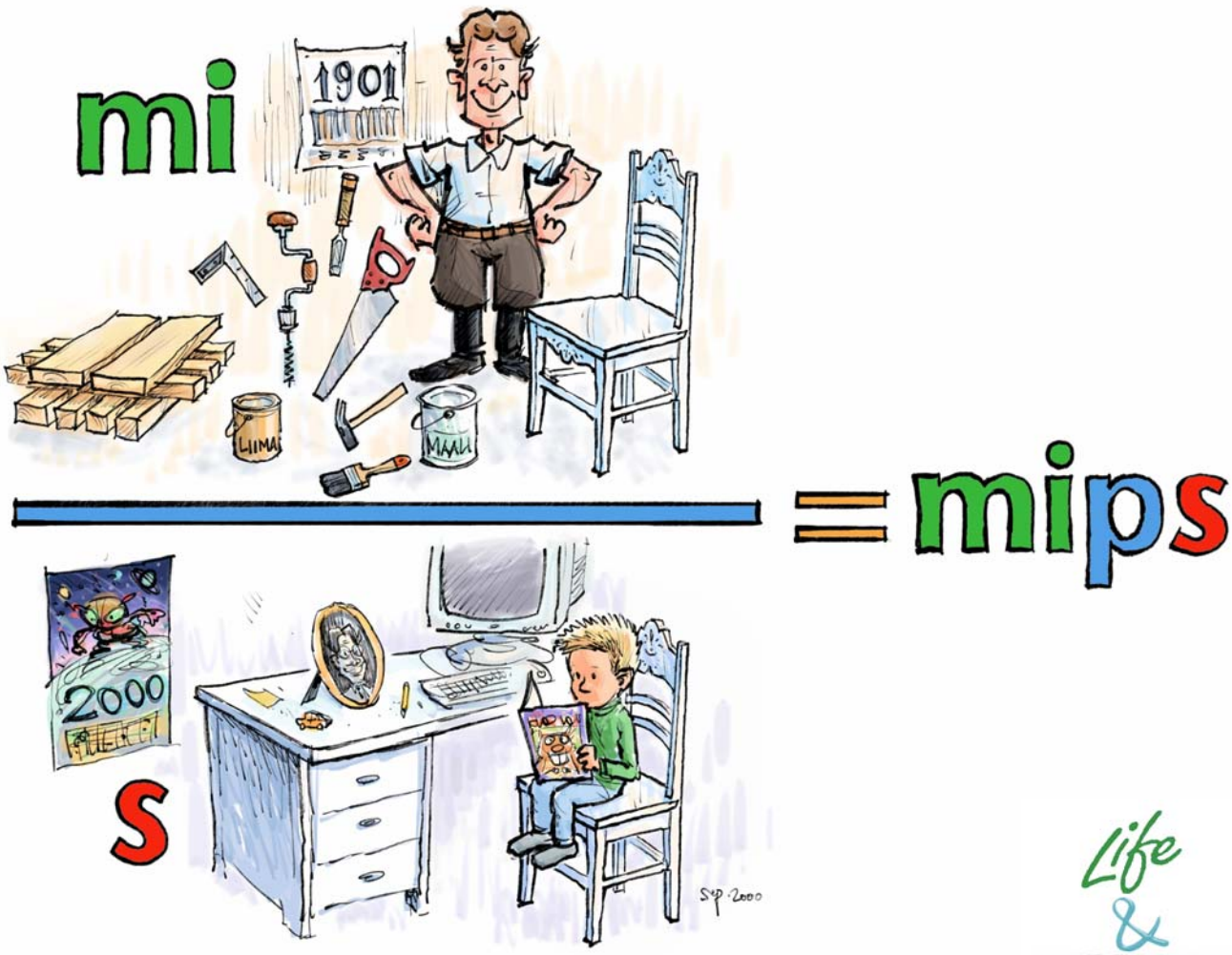
(source: Wuppertal Institute)

For instance, the production of a 4 gram golden ring requires circa 2 tons natural resources.

Material Input per Service Unit (MIPS)
a measure of efficient material use

$$= \frac{\text{material input (MI)}}{\text{Service life (S)}}$$

$$= \frac{\text{product's weight + its Ecological Rucksack}}{\text{total no. times product is used, i.e. its Service Life}}$$



Life & MATERIAL

Minimising a product's Material Input

- lower the MI factor in MIPS

- Using materials sparingly
- Using recycled materials
- Optimising packaging
- Lowering energy consumption
- Minimising transport
- Substituting materials, energy sources and transport for such with lower MI factor.

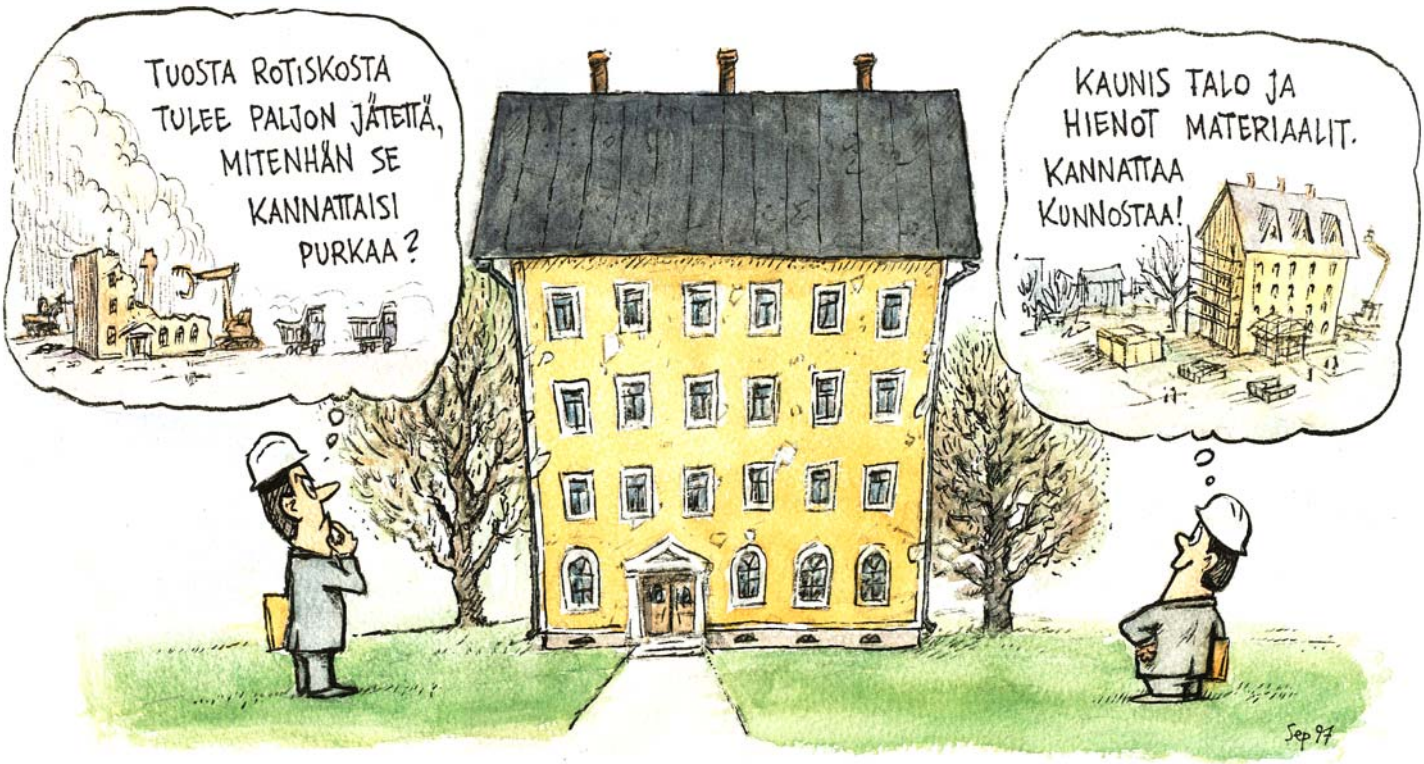
- Avoiding harmful substances

Increasing the product's useful lifespan

– increase S in MIPS

- Durability
- Timelessness
- Serviceability
- Repairability
- Improvability

- Täydennettävyys
- Käyttövarmuus
- Helppokäyttöisyys
- Uudelleenkäytettävyys



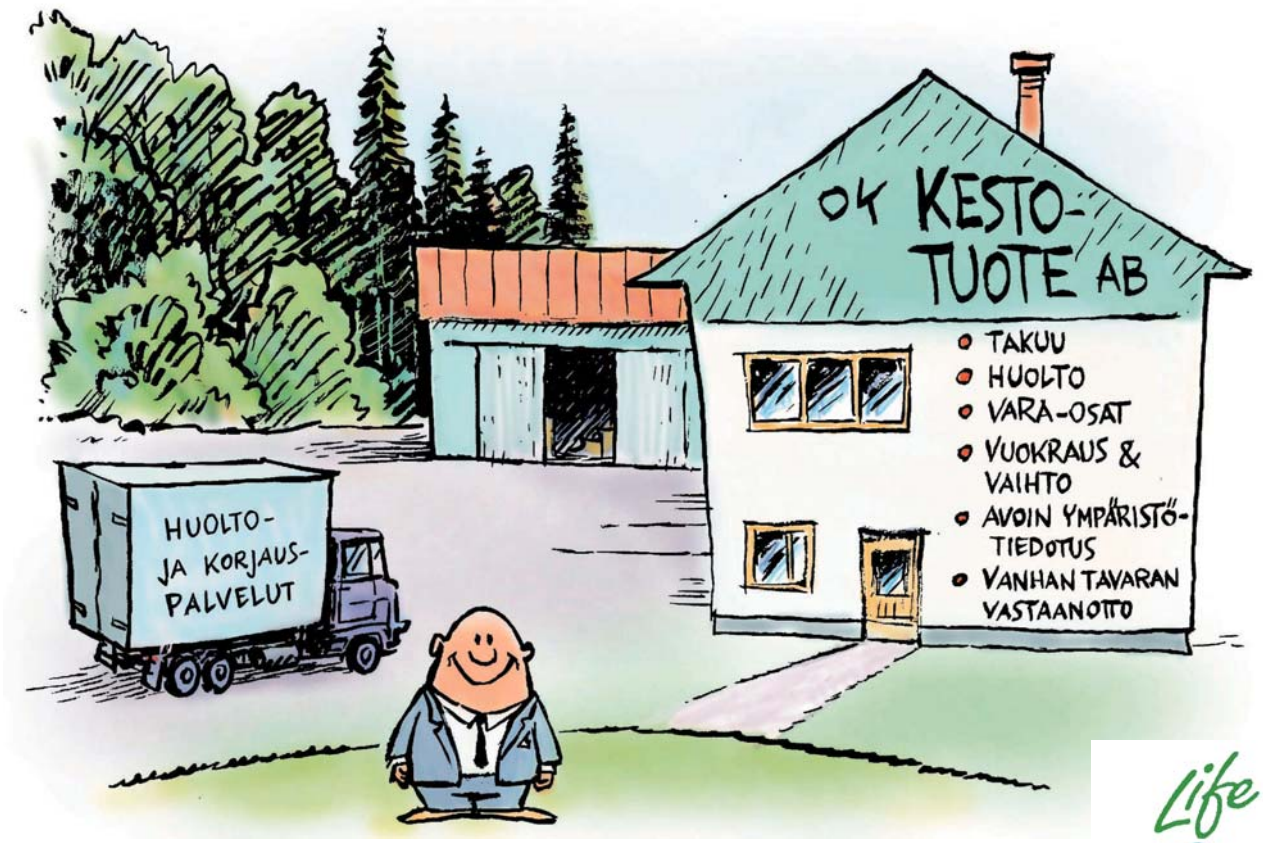
Improving reuse of the product and its materials

- increase S in MIPS

- Reuse (same or different application)
- Design for multiple use
- Standardisation
- Easy disassembly
- Simplicity of material choices and of structure
- Recycling

Sales and marketing solutions for increased material efficiency

- Use rights instead of product sale (loans, leasing, renting)
- Shared and part time use (e.g. public laundry, public transport)
- Offering a service instead of a product
- Offering an end result instead of a product
- Incentives to return the product (deposits, SAEs)
- Guarantees (very long)
- Improving availability



How does Efficient Materials Use benefit companies?

Developing environmental issues from a new angle

- improvement of corporate environmental image
- comprehensive approach to waste and material use
- a tool for developing the company's environment programme
- examination of the product's life span

Improved efficiency

- improved production efficiency
- financial savings

Opening new markets

- product innovations
- new business opportunities

Preparing for the future

- long term competitive edge
- increasingly demanding markets
- increasingly demanding legislature
- prices of natural resources will rise