Circular Economy means sustainable use

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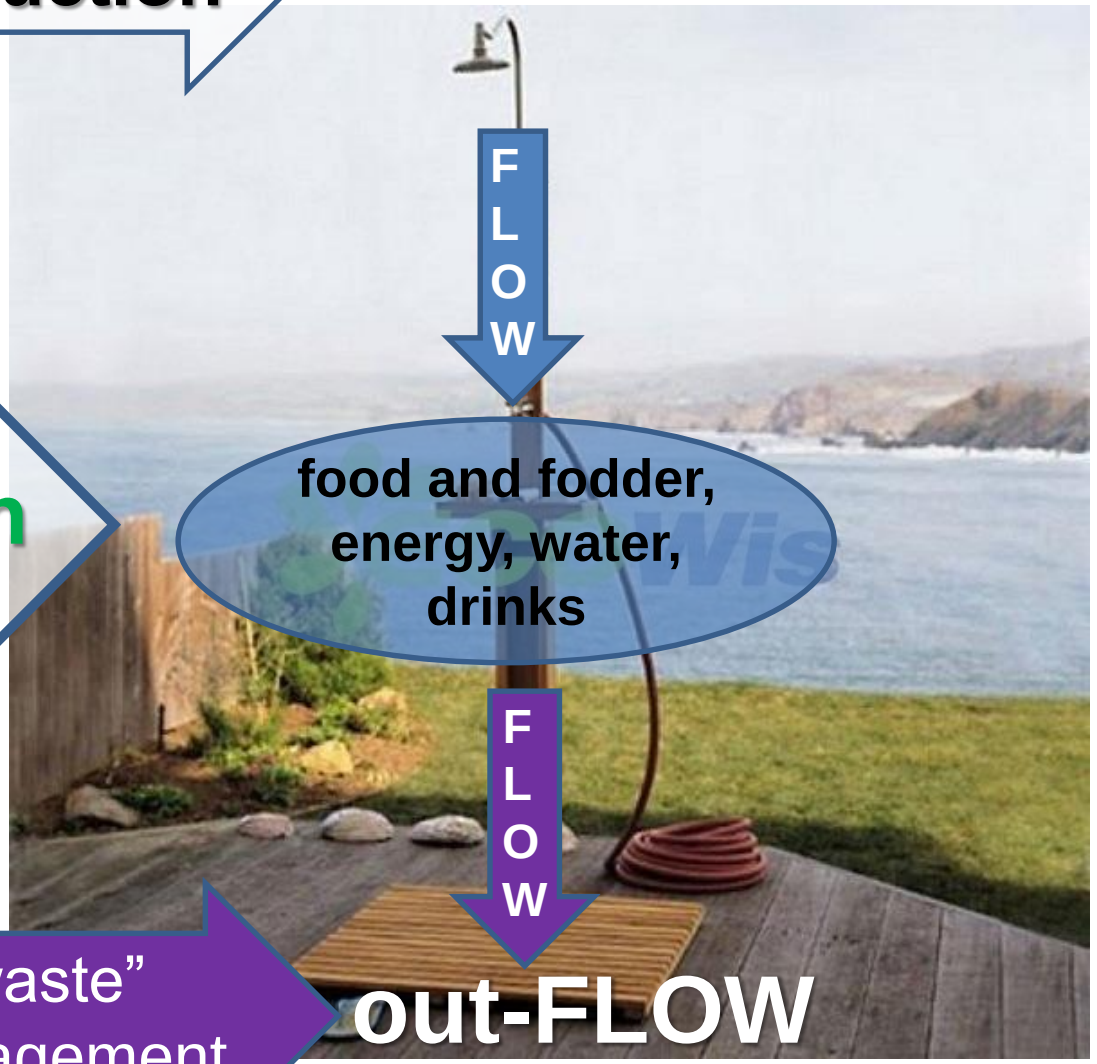
Shower economics – consumer goods

inflow measured (GDP)

Production

in-FLOW

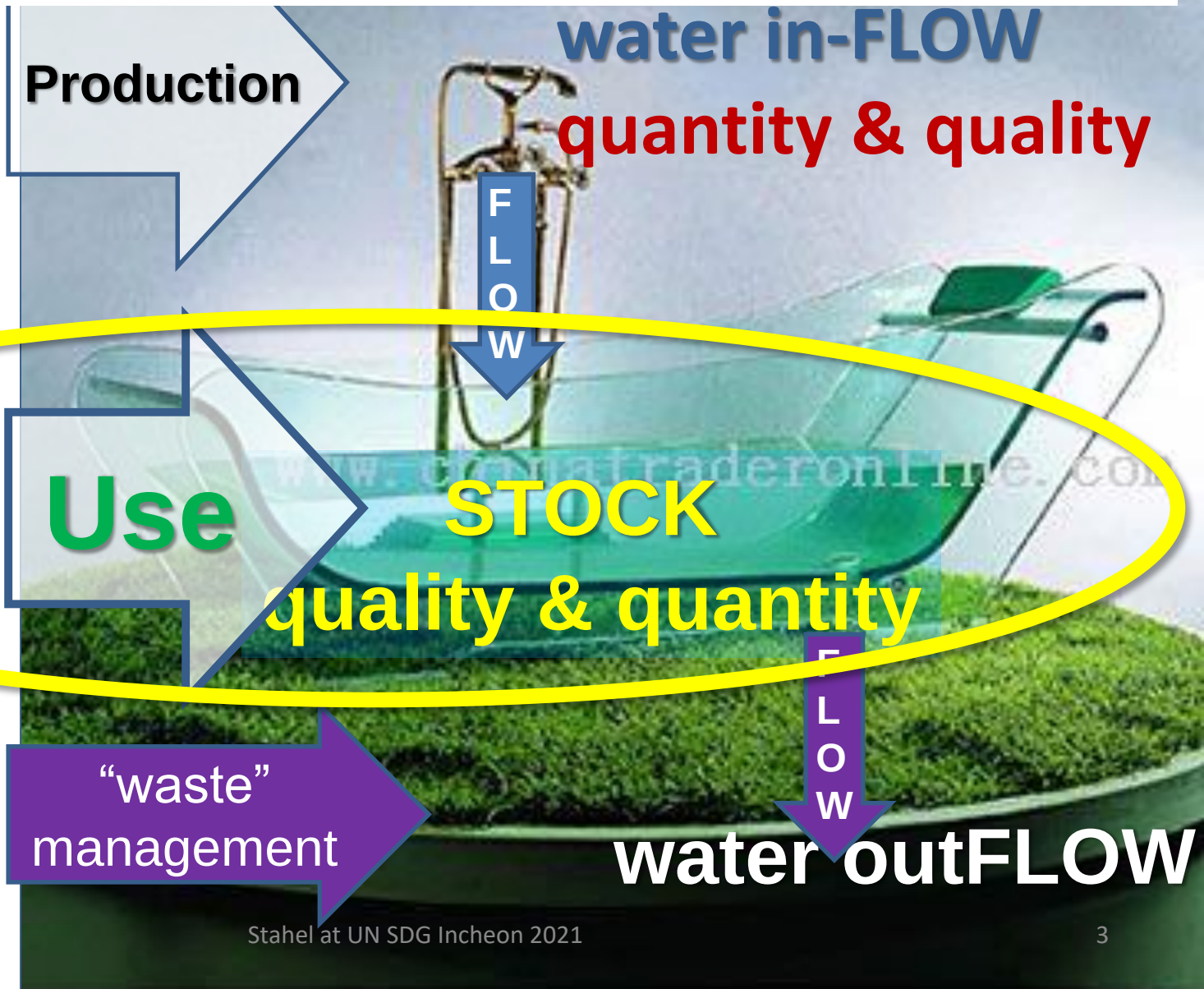


Consumption

outflow estimated

"waste" management

Bath-tub (**circular**) economics – durable goods



The origins of Circularity: 1 **Nature: water, wood, wool, leather, food, stones, minerals.**

3 **good husbandry** (poverty, scarcity): **use it up, wear it out, make it do or do without.**

2 **infrastructure: designed for durability**

husbandry: careful management, thrift, saving

Nature

Nature is circular by evolution. There is no waste in Nature, used resources become food for other organisms

Therefore: all waste is man-made.

Infrastructure

- functional design for durability,
- often in public ownership,
- operation and maintenance often neglected to “save money”,
- may become part of cultural heritage,
- are local and immobile.

Early man-made objects

- are made to last from natural materials like wood, wool, leather, stones, minerals,
- their use is governed by good husbandry and often poverty, scarcity: use it up, wear it out, make it do or do without.
- discarded objects are within Nature's circularity, but absorption capacity ?

The circular economy's **bio-cycles** need sustainable production and consumption

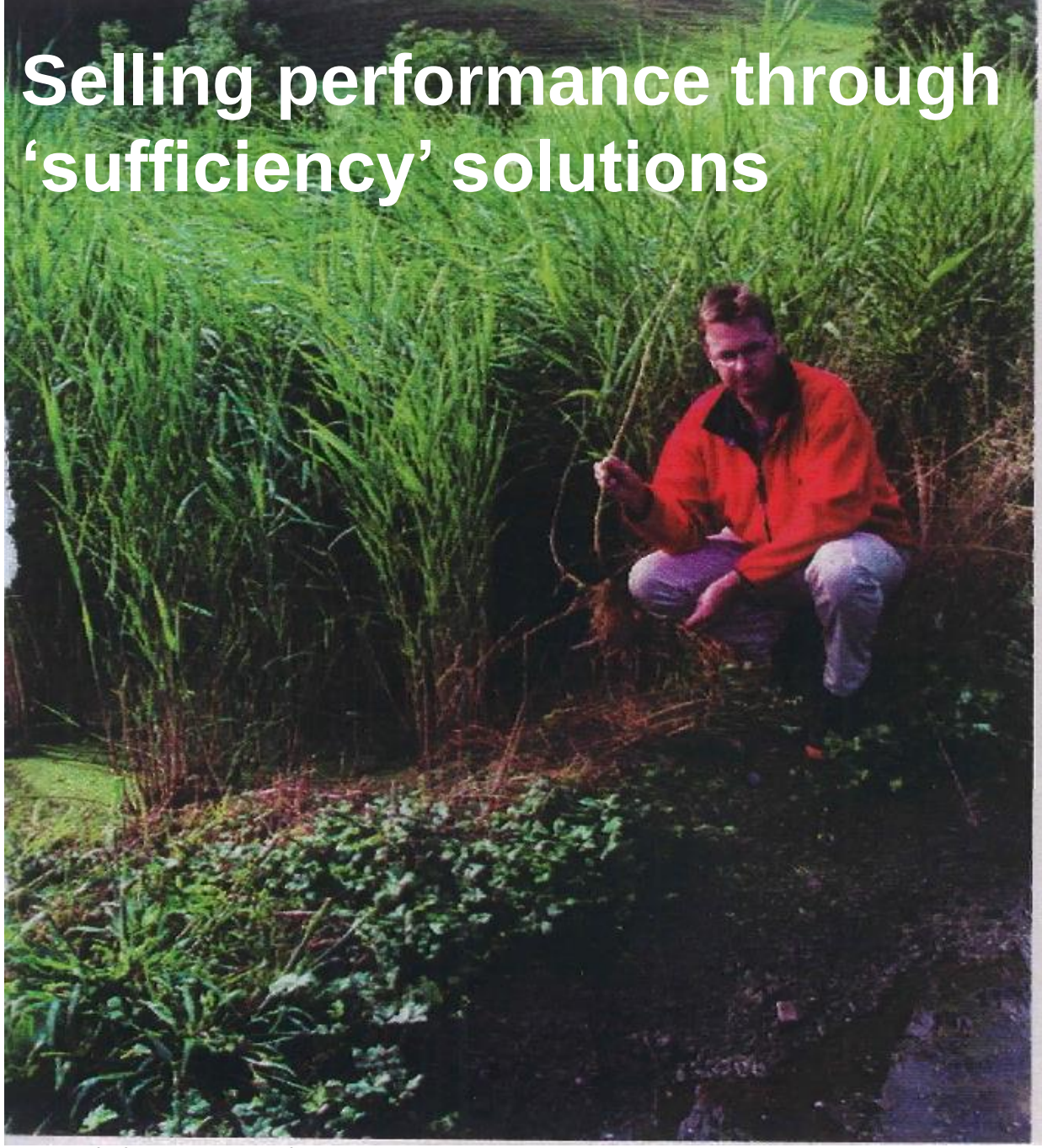
Shower economy of consumer goods is

- based on a sustainable use of natural resources (soil, water, biodiversity) and an efficient harvest management,
- on waste prevention in food, fodder, energy, water and drinks production and distribution,
- smart consumption-management to prevent water, food, energy wastes in storage & use.

Selling performance through ‘sufficiency’ solutions

appropriate for rural areas

‘organic’ waste water treatment plants are low-cost (no ‘bricks’ or pumps), create biotopes and flood basins, have no sludge (waste) issue – but need space (4 m^2/habitant).



Tata Steel

has developed a **mobile** ‘***canning line concept***’, which enables farmers to process and can their produce on the farm.

Rent-a-factory reduces food waste at the source and gives farmers an additional revenue.

Anthropogenic objects and materials

Qualitatively:

the Anthropocene unleashed scientific progress

- **physics**: the nuclear bomb & civil uses (health),
- **chemistry**: synthetic materials, plastic, agrochemicals, pharmaceuticals, hormones,
- **metallurgy**: multitude of metal alloys.

These new materials are unknown to Nature.

Thus all synthetic materials are man-made and impose a man-made producer responsibility at the end of their use.

Turning point of overall material output of human activities to that of natural biomass

Quantitatively:

- in 2020, the human-made mass, referred to as the anthropogenic mass, surpassed all global living biomass of about 1.1 teratonnes
- the anthropogenic mass has recently doubled roughly every 20 years,
- for each person on the globe, anthropogenic mass equal to more than the average persons bodyweight is now produced weekly
- additional new production is unsustainable!

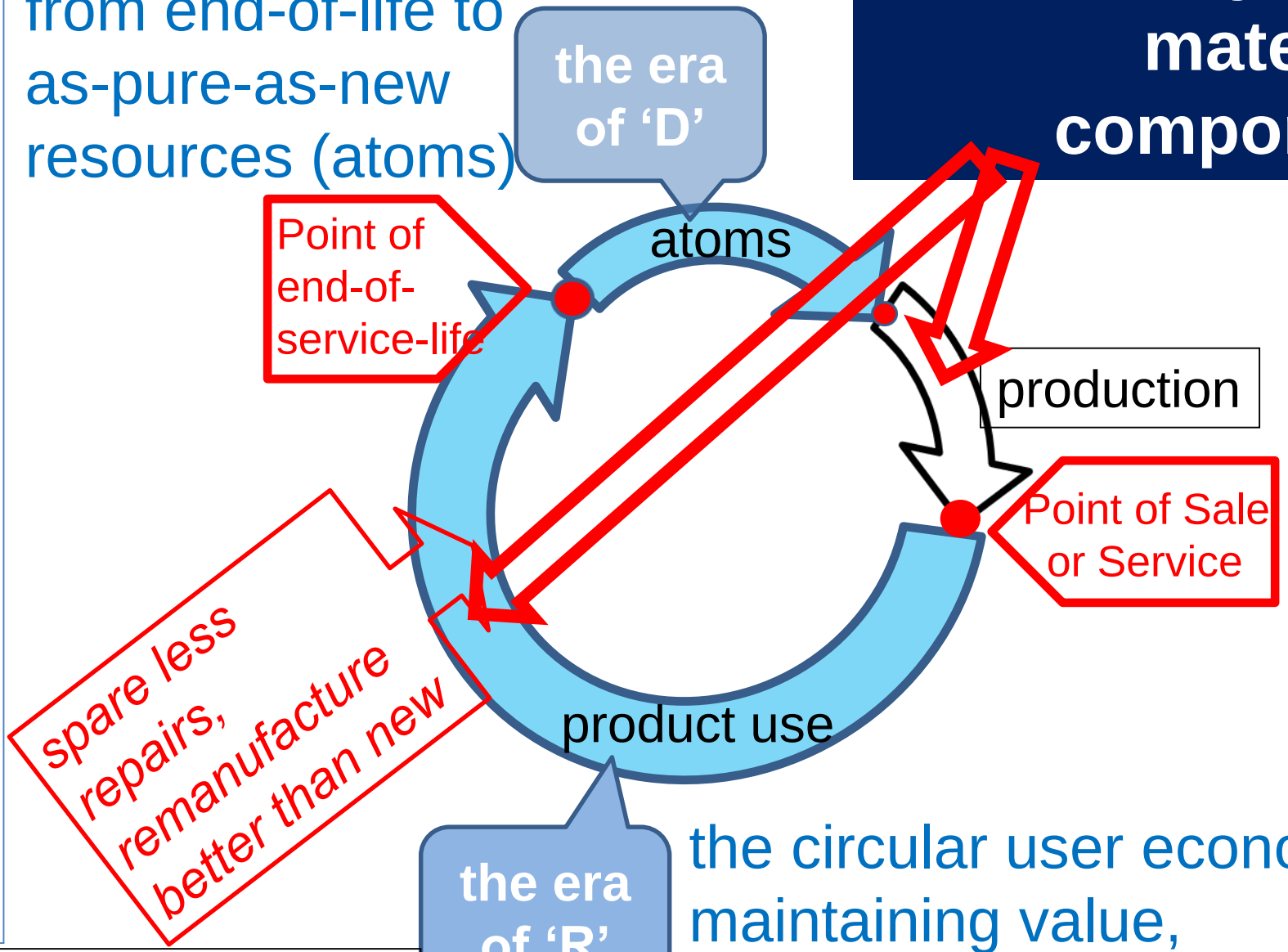
The solution? **The sustainable use of materials and objects** in the bath-tub Circular Economy, whose **tech-cycles** maintain quantity and quality of stocks of:

- **natural** capital (EU bioeconomy: arable land, water, forests, fish stock, biodiversity),
- **human** capital (labour, skills, expertise, wisdom),
- **cultural** capital (monuments, landscapes, music),
- **financial** capital (investments, wealth),
- **manufactured capital (materials, objects),**
- **immaterial** assets (embodied water, CO_2; liability).

A mature bath-tub circular economy

from end-of-life to as-pure-as-new resources (atoms)

novel systems materials, components



the circular user economy maintaining value, quality & quantity of stock

Source: Stahel, Walter R. (2019) Circular Economy – a user's guide, Routledge, London

A bath-tub Circular Economy is local, cultural and differs between regions

- developing countries must be able to create stocks of infrastructure and objects (*fill up the bath tub*),
- industrial countries must repair & upgrade qualitatively, not replace, the existing stocks,

All nations can develop circular sciences (circular energy, chemistry, metallurgy) and regional workshops to exploit local skill pools which create local jobs through virtuous loops.

understanding the underlying local issues – science and tradition

Brass containers polish off food-poisoning bugs

VILLAGERS in India should not swap the brass "mutka" pots traditionally used to collect and store water for more modern alternatives. True to rumour, water stored in mutkas for a day or two really is safer to drink.

After hearing anecdotal reports that water stored in mutkas is safer, Rob Reed and Puja Tandon at Northumbria University in Newcastle upon Tyne, UK, decided to investigate. When they added *E. coli* to water in various

containers, the bacteria were all dead within 48 hou
mutkas, but survived in earthenware or plastic cont
Joint research with Sanjay Chhibber of Panjab Unive
in Chandigarh, using water from contaminated sour
Indian villages, confirmed the finding.

When the researchers analysed the water, they f
that the bugs were killed by copper leaching into th
from the brass. "The levels are vanishingly low and s
a fraction of recommended copper intake," says Ree
Unfortunately, the bacteria die only after one or two
and most villagers do not leave water in mutkas tha
However, longer storage could now be encouraged.

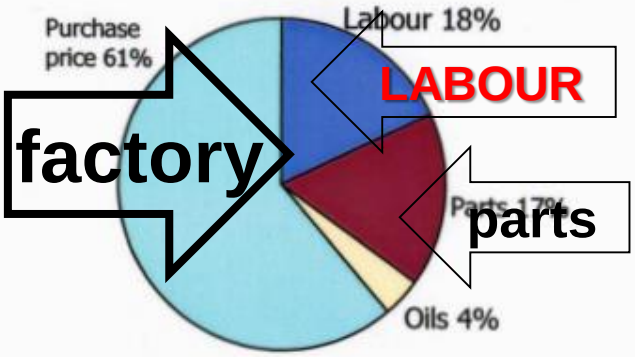
The Circular Economy is about using, not consuming, regional stocks

- sell objects and molecules as a service: e.g. UNIDO's chemical leasing initiative https://www.unido.org/our-focus-safeguarding-environment-resource-efficient-and-low-carbon-industrial-production/chemical-leasing
- extend the service-life of objects (e.g. reuse, repair, remanufacture, upgrade),
- exploit sufficiency to create ‘more from less’: e.g. green vineyards, waterless urinals, plus-energy buildings, ploughing at night.

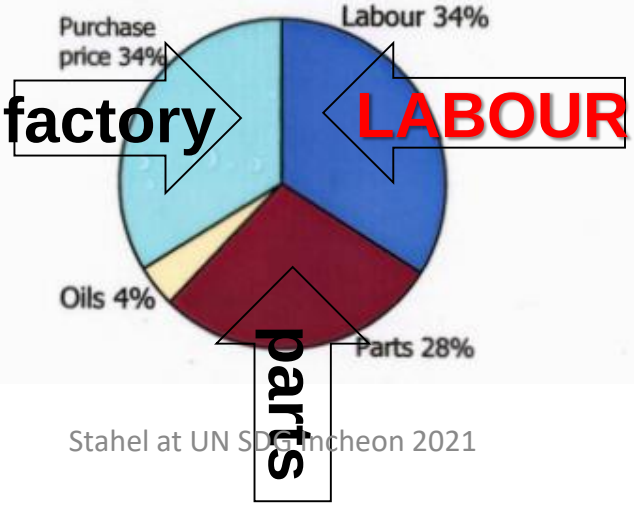
Societal benefits of the Circular Economy micro-eco:
product-life extension creates local jobs and **prevents waste (substituting manpower for energy)**

Figure 3
Analysis of the running costs of a 30 year old automobile: Toyota Corona Mk II 1969

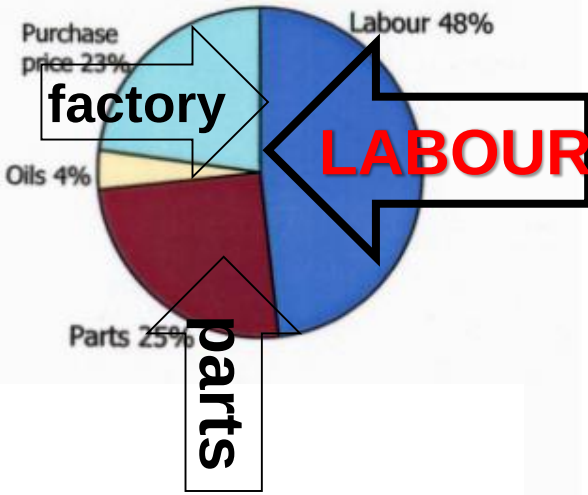
10 years



20 years



30 years



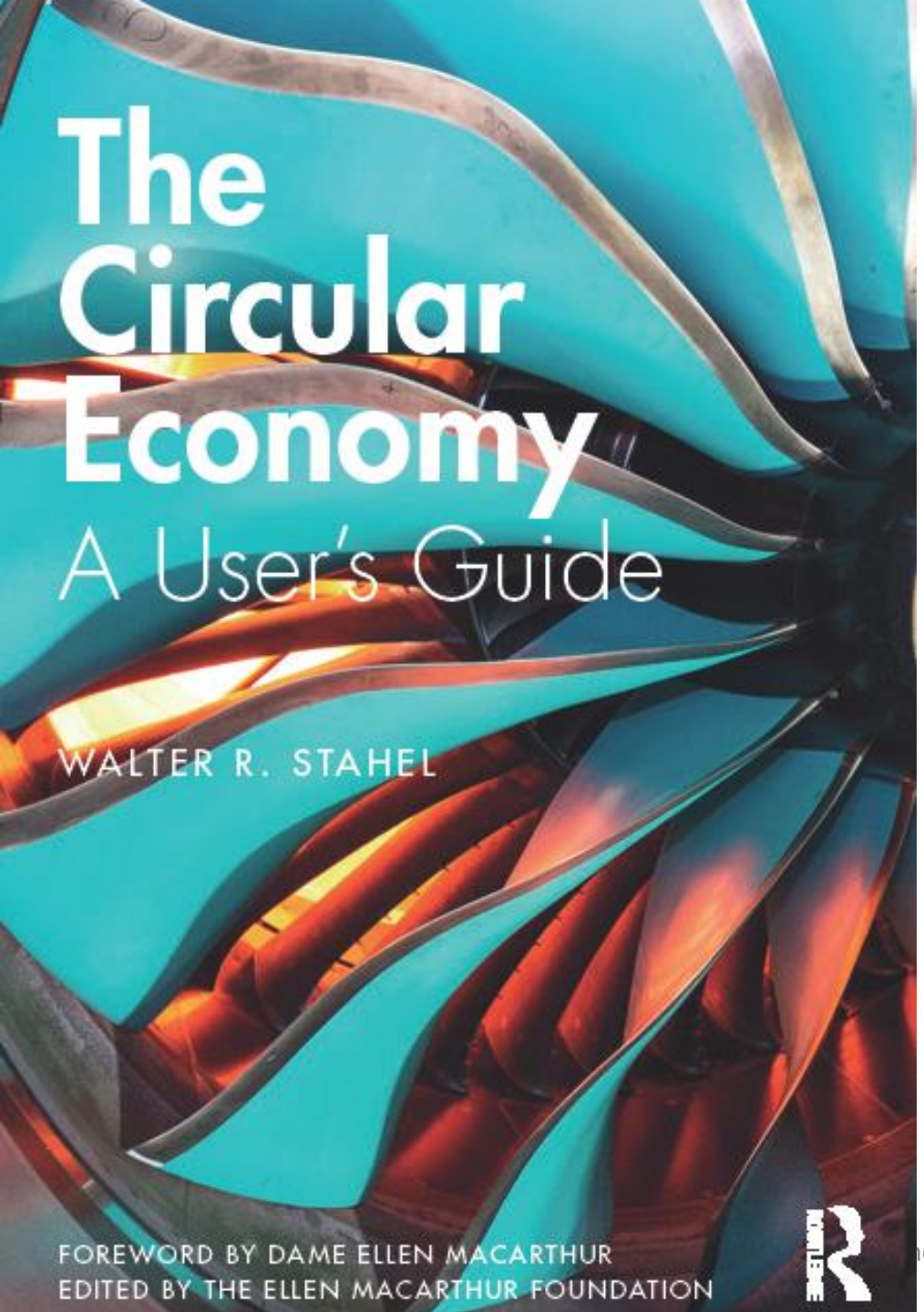
Policymakers' motivation & actions

Why? stocks create resilience, demand caring!

- abolish labour taxes on workers active in maintaining natural, human, cultural and manufactured (infrastructure, objects) assets,
- favour public procurement of systems performance, not products (e.g. Incheon bridge),
- promote vocational training for repair and maintenance workers, and the creation of local repair and reuse shops,
- promote "circular legislation", e.g. the right to repair, a full producer (take-back) liability .

Who takes decisions in the circular economy ?

policymakers and owner-users,



More details in this guide, by Walter R. Stahel, June 2019, Routledge

thank you for listening

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