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Life Cycle Thinking

16 December 2020, Bangkok

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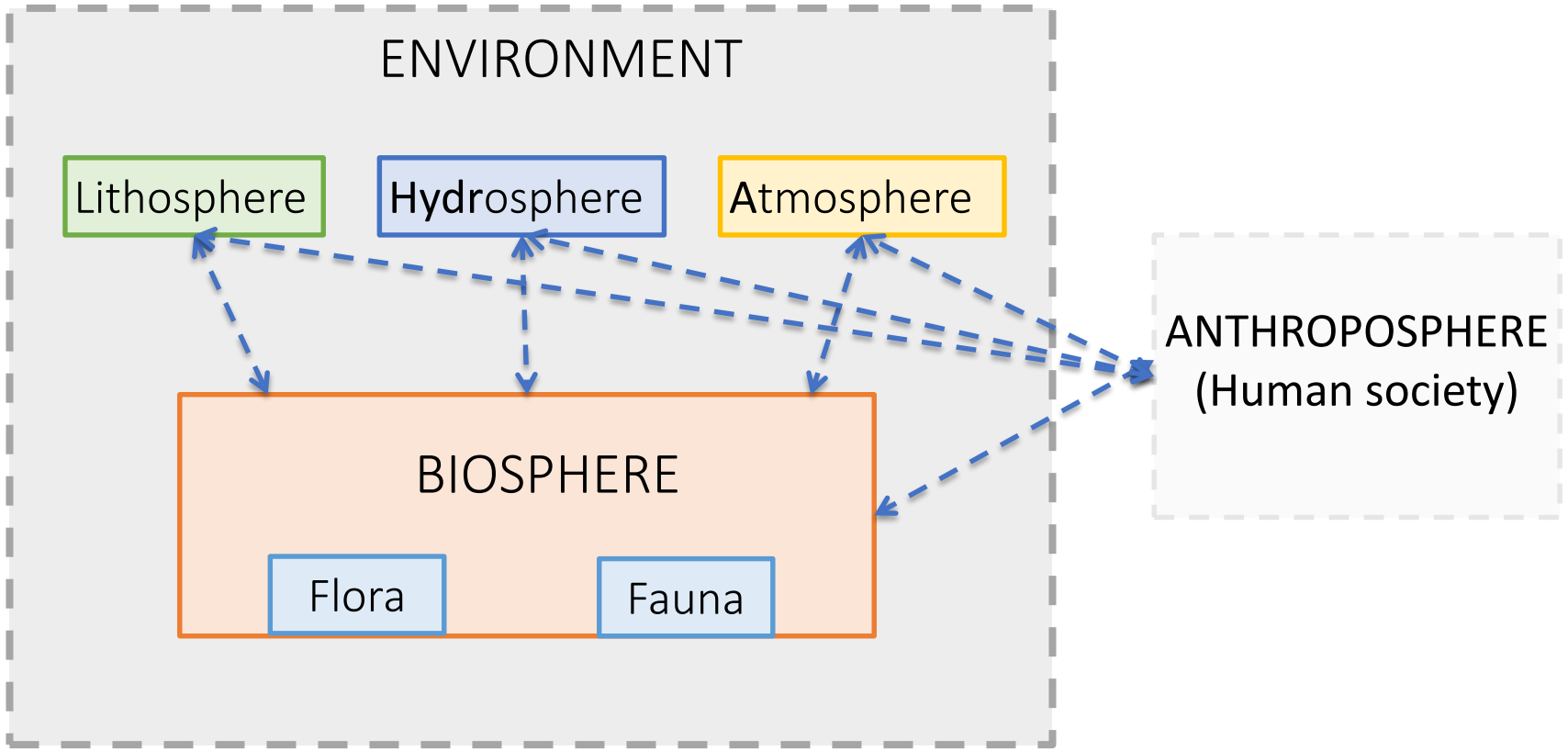
Today's Topics

1 Why life cycle thinking?

2 Life Cycle Assessment

3 Life Cycle Costing

What is “environment”?



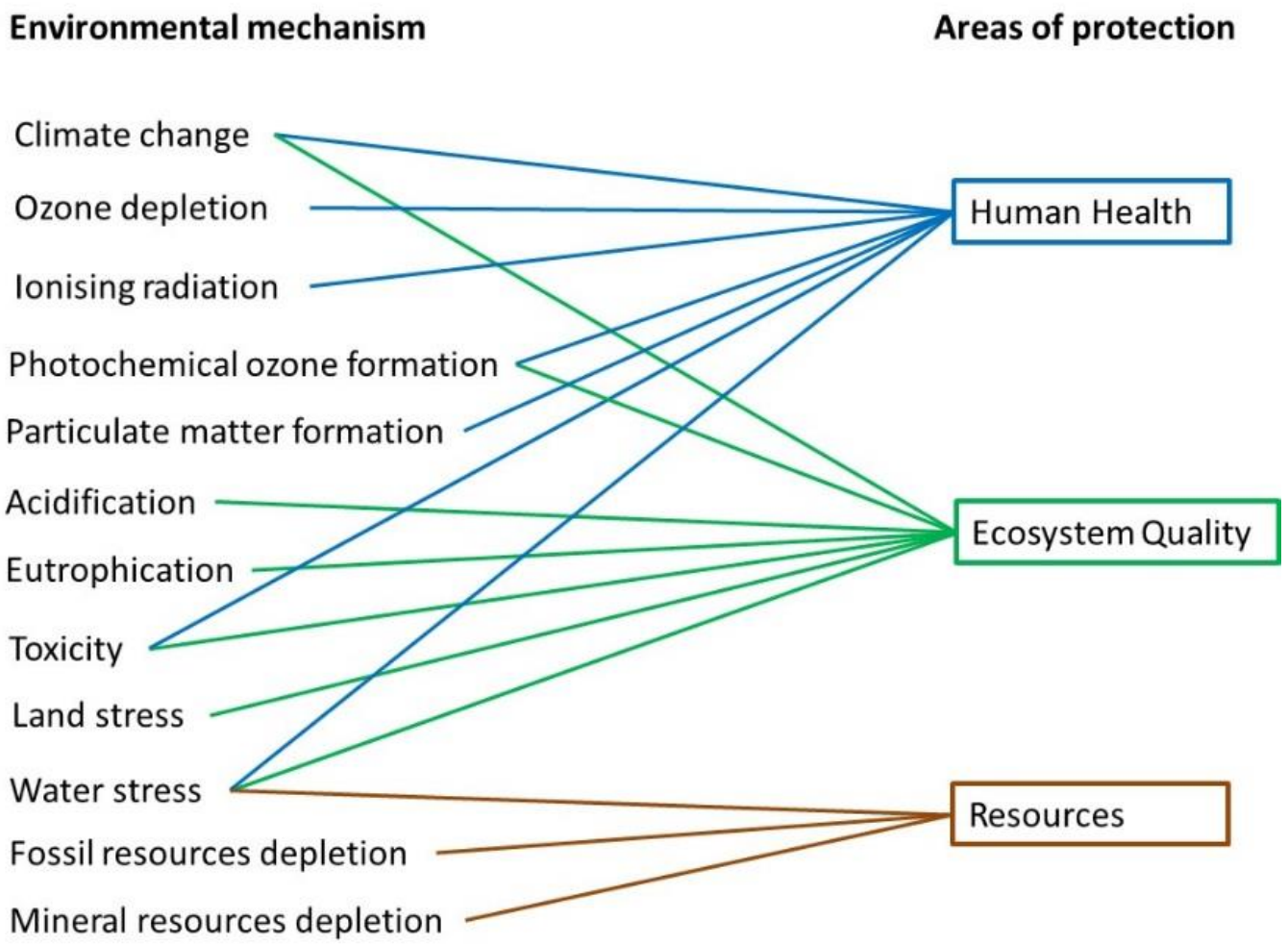
Everything around us is **environment**

We are part of the **environment**

We depend on the **environment**

Source: Venkatesh, 2015

What is of value to us?



What do we wish to protect?

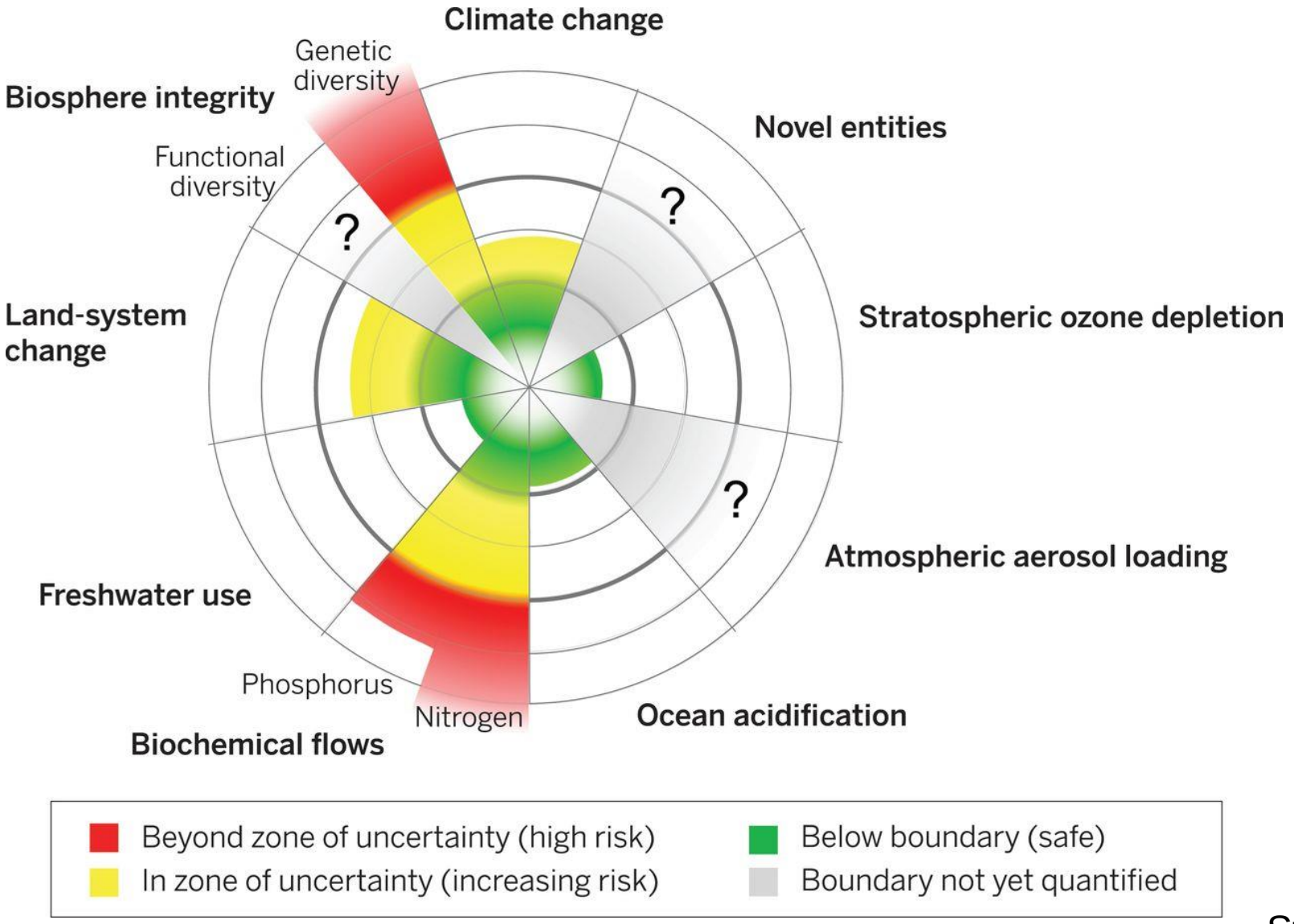
Human health

Ecosystems

Resources

Source: http://www.lc-impact.eu/downloads/documents/

Status of planetary boundaries



How are we doing?

Biodiversity – high risk

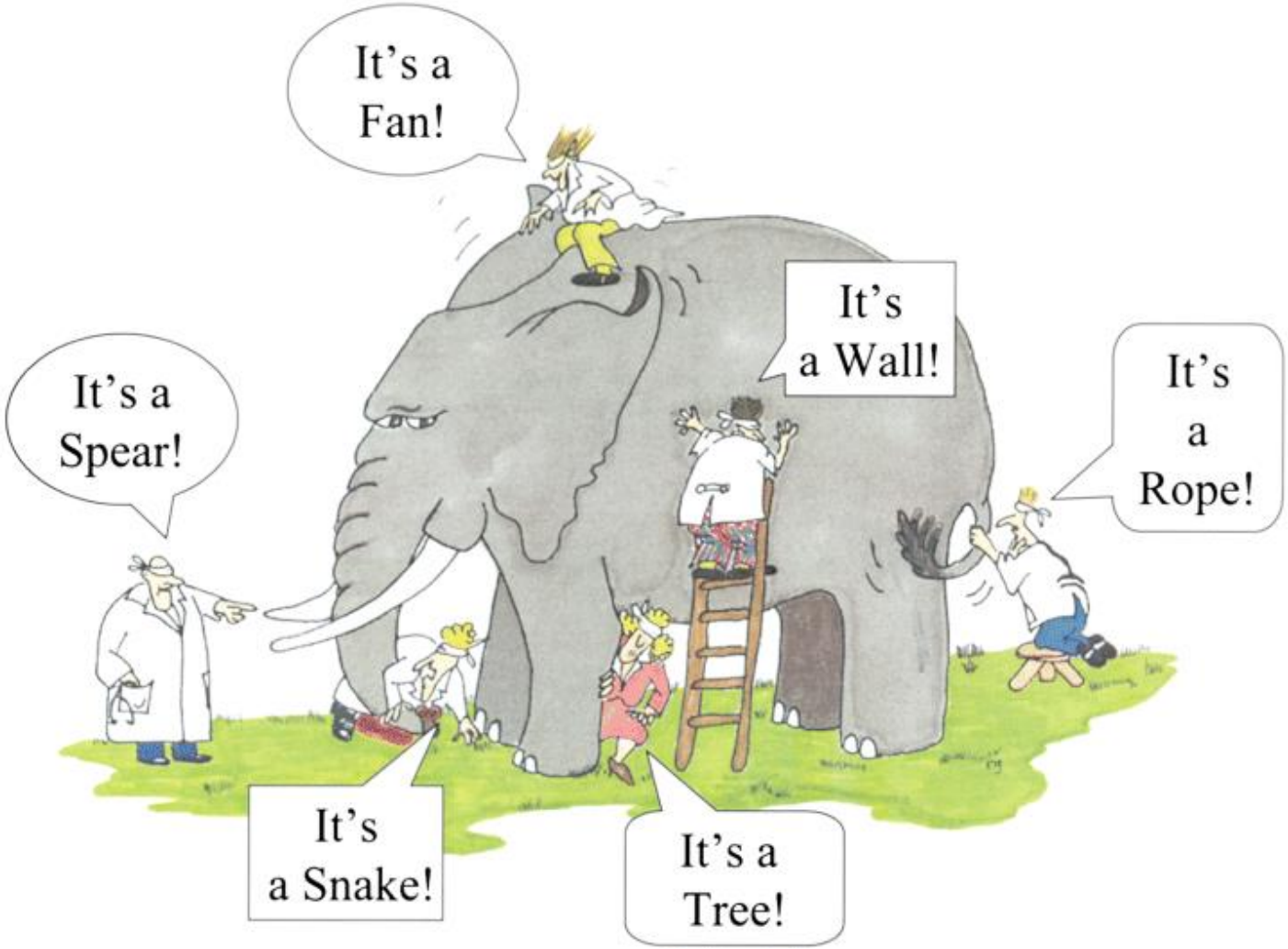
N & P – high rish

Climate change and land – increasing risk

Freshwater use???

Steffen et al. Science 2015;347:1259855

Six blindfolded persons and the elephant

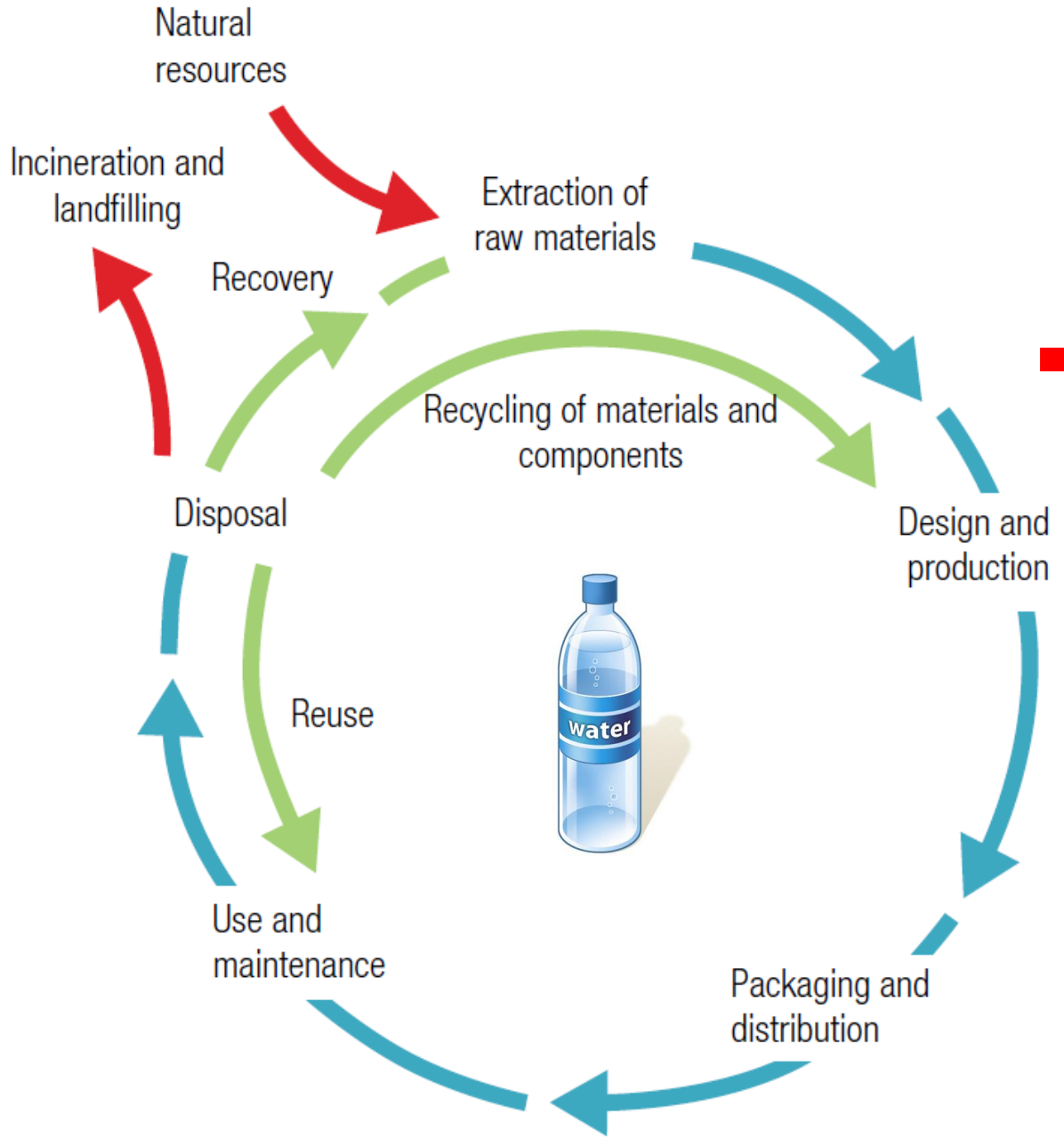


The elephant in the room

The whole picture

Addressing parts of the problem may not lead to addressing the problem in its entirety

Product life cycle



- **Emissions to air**
- **Emissions to water**
- **Use of resources**

Impacts on:
- **Human health**
- **Ecosystems**
- **Resources**

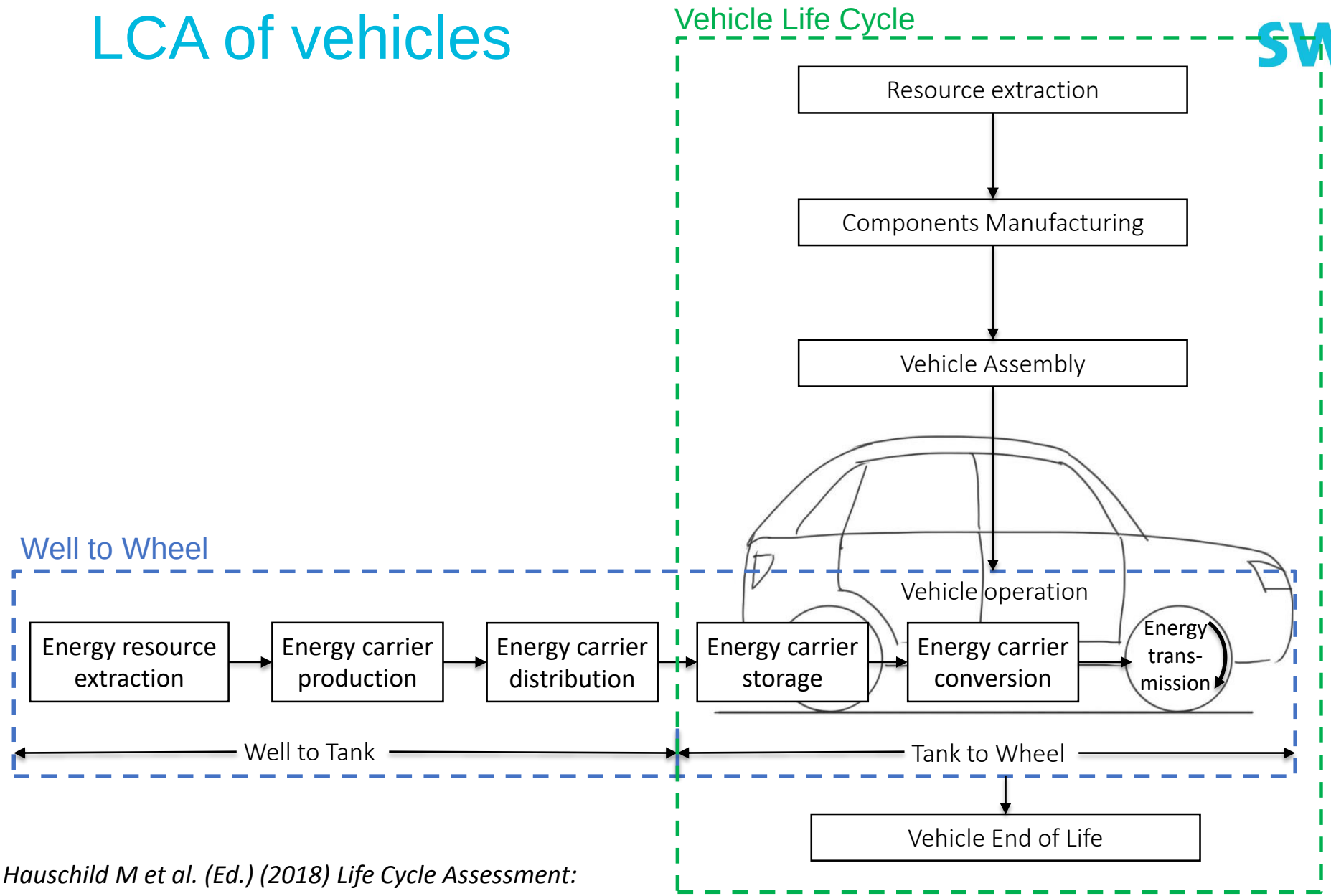
(Areas of protection)

Which one is better for the environment?

Electric car

Conventional car

LCA of vehicles



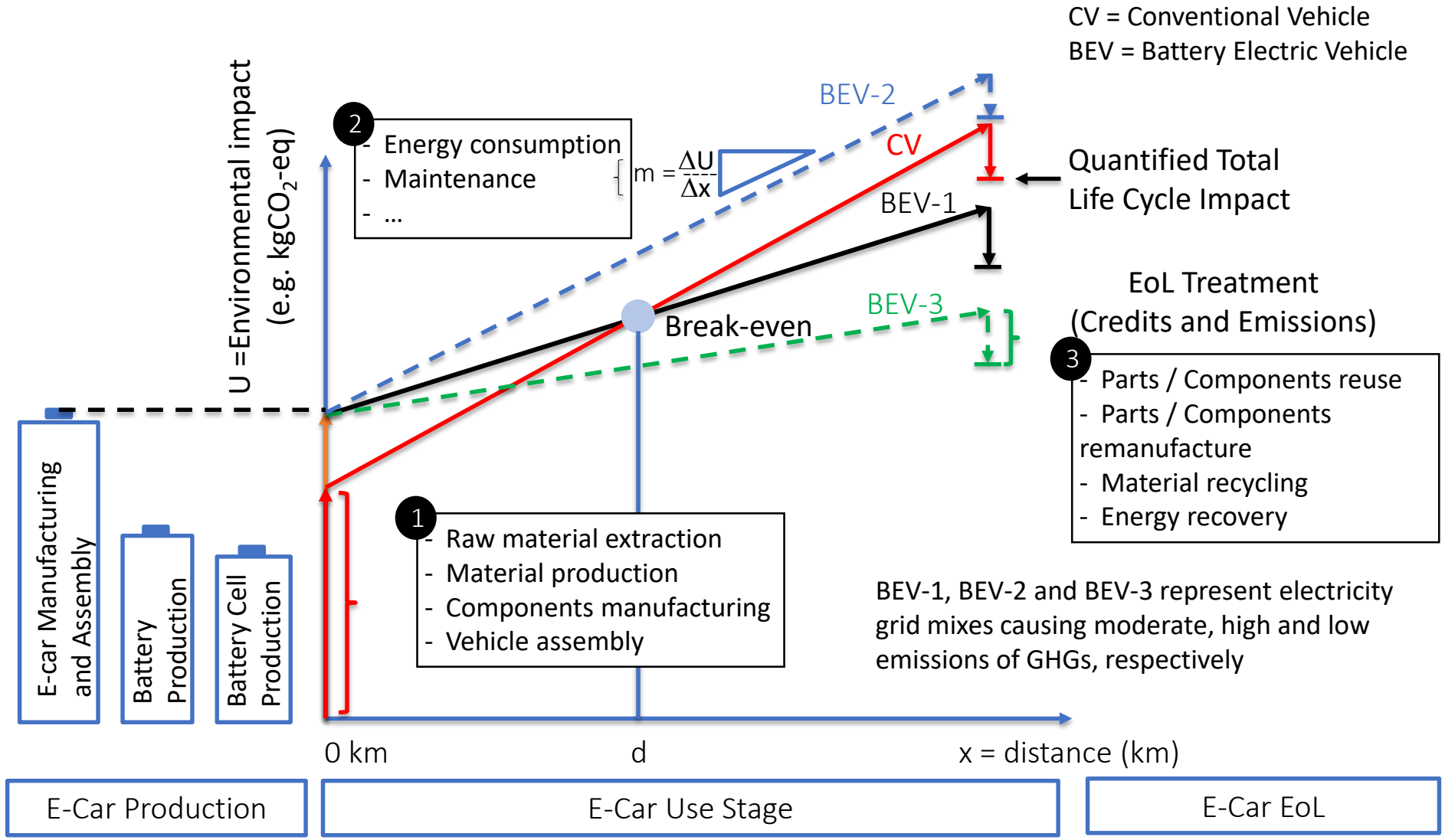
Two cycles

Vehicle cycle

Fuel cycle

Hauschild M et al. (Ed.) (2018) Life Cycle Assessment: Theory and Practice, Springer

LCA of vehicles

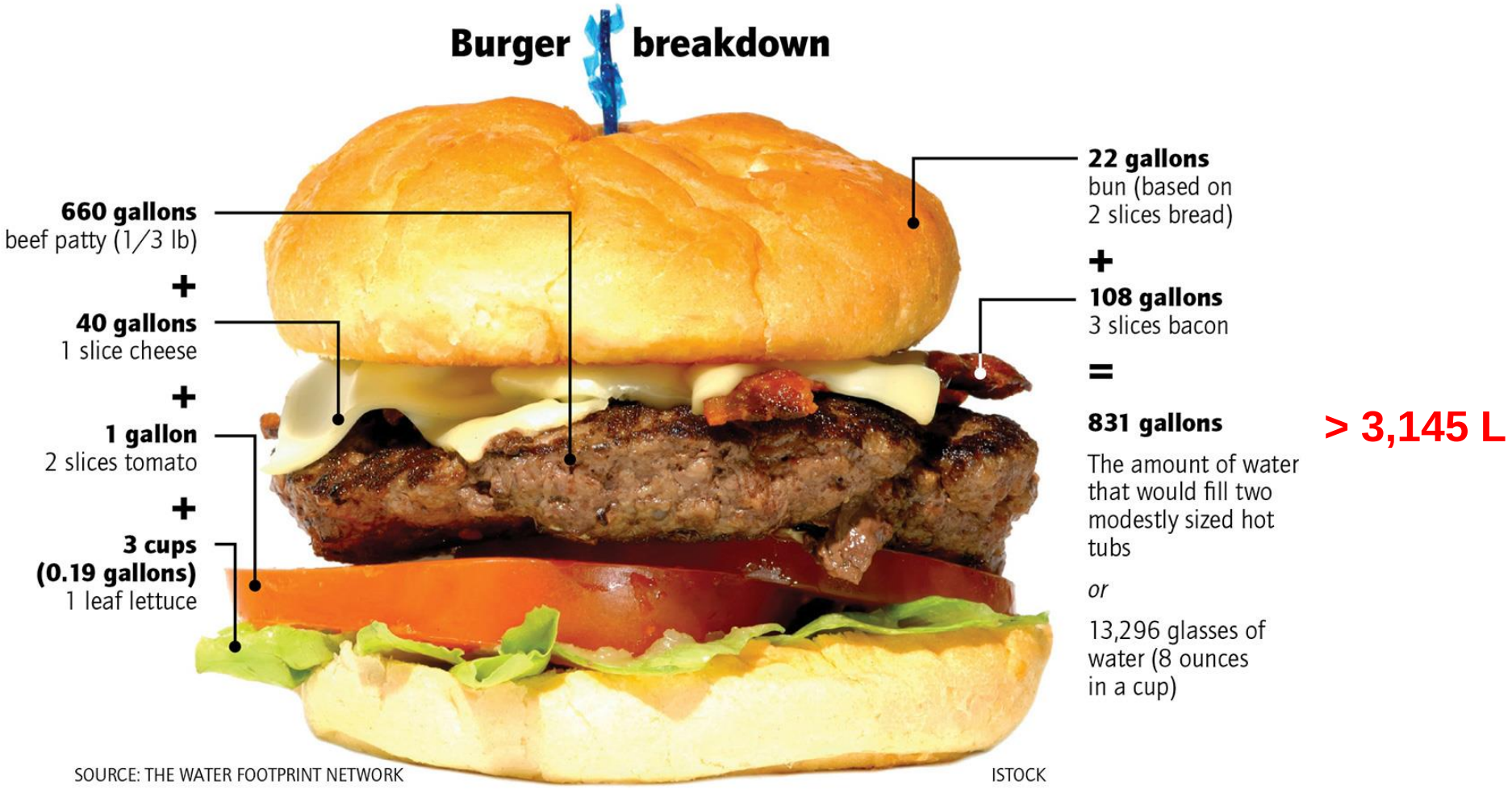


Hauschild M et al. (Ed.) (2018) Life Cycle Assessment: Theory and Practice, Springer

Carbon footprint of burger

> 75%

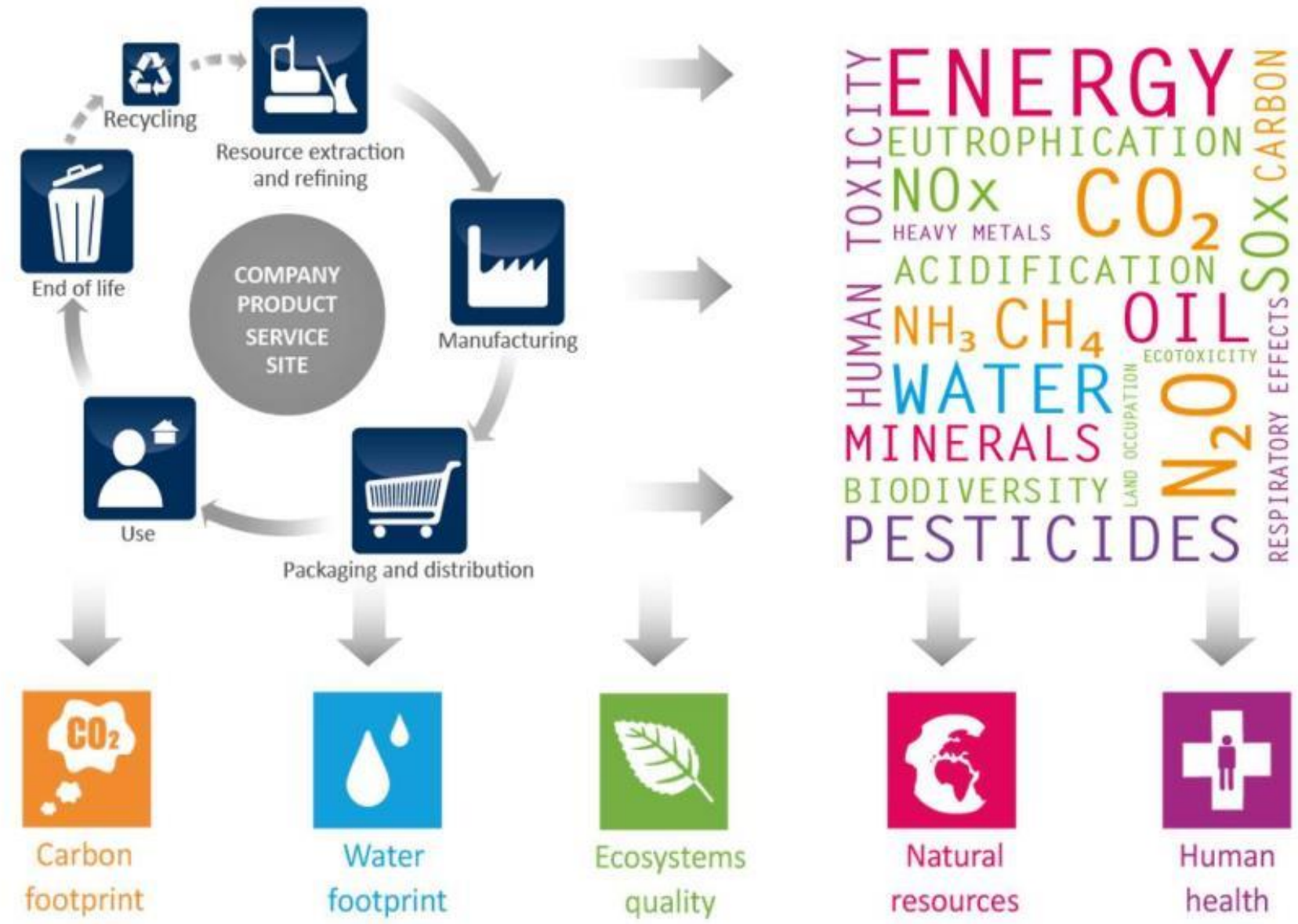
Water footprint of burger



> 3,145 L

Carbon and water footprint of coffee

Life Cycle Assessment



Advantages of LCA

Multiple life cycle stages

Multiple impact categories

Life Cycle Costing: Story of light bulbs

Incandescent
1 $

Fluorescent
2 $

Light Emitting Diode (LED)
8 $

Life Cycle Costing: Story of light bulbs

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	Incandescent	CFL	LED
Cost per bulb (upfront)	$1	$2	$8
Average lifespan	1,200 h	8,000 h	25,000 h
Power	60 W	14 W	10 W
Number of bulbs for 25,000 h	21	3	1
Total purchase price	$21	$6	$8
Total cost of electricity (@ $0.12/kWh)	$180	$42	$30
Life cycle costing	**$201**	**$48**	**$38**

EGAT No. 5 label

Information provided to consumer

Electricity used per year

Electricity price per year

Ecolabels, ecolabels everywhere … what do they mean?

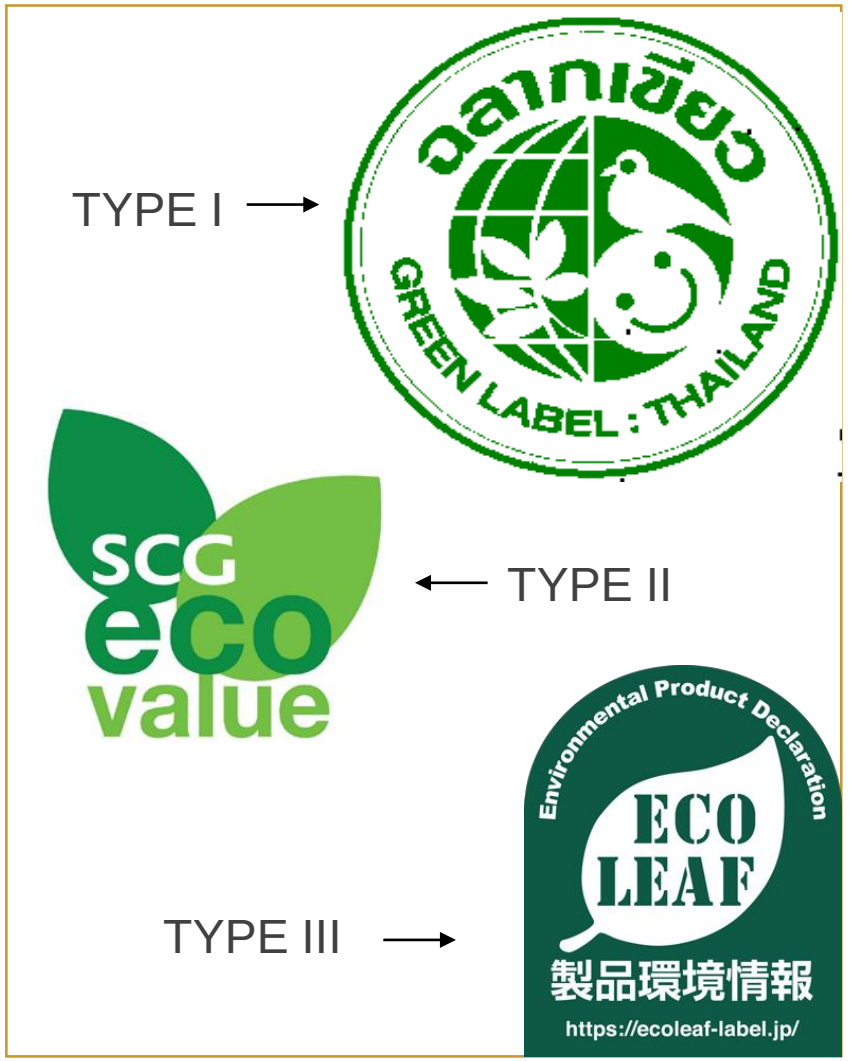
Ecolabels

The International Organization for Standardisation (ISO) has identified three broad types of voluntary labels

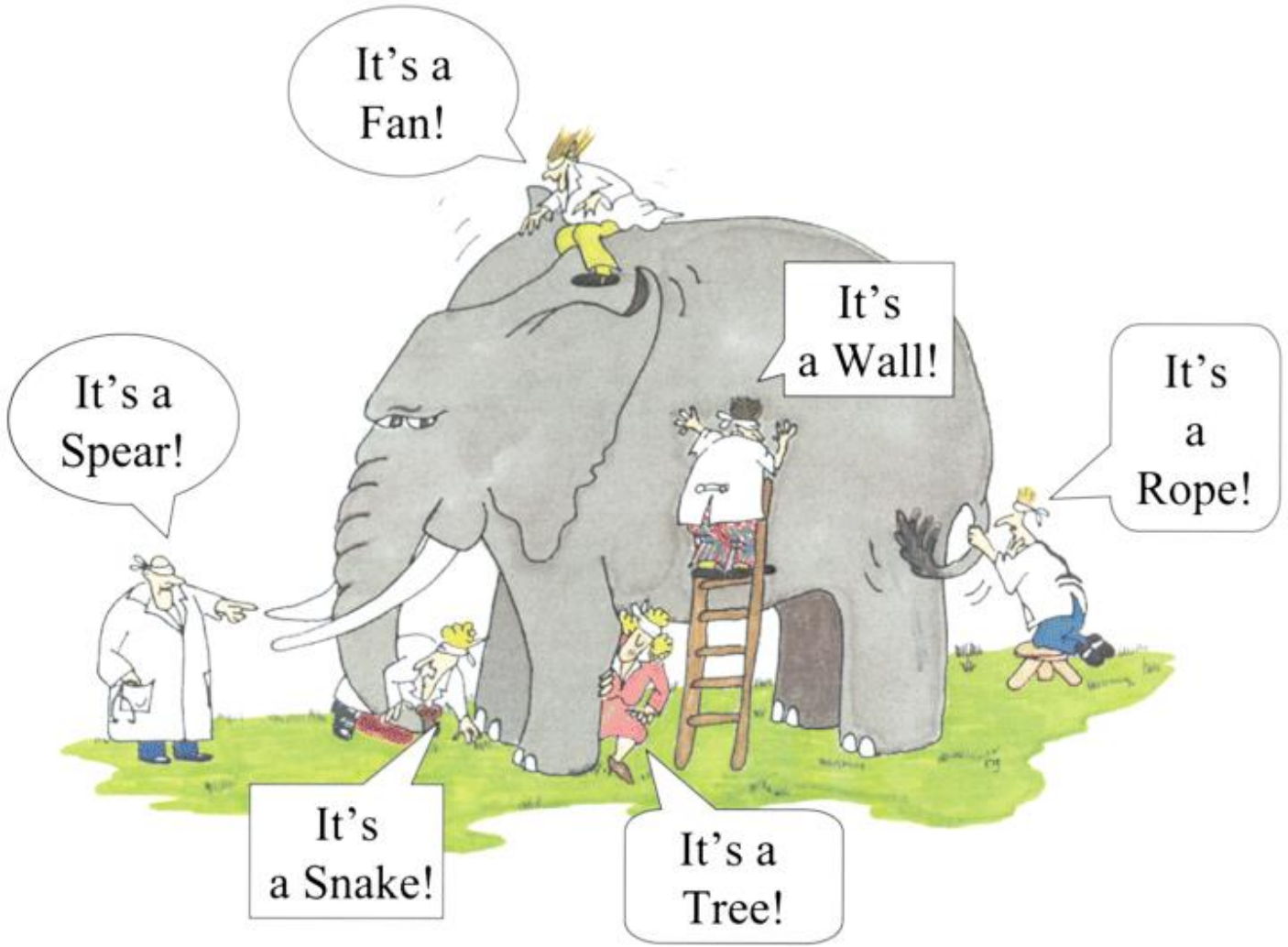
TYPE I: a voluntary, multiple-criteria based, third party program that awards a license that authorises the use of environmental labels on products indicating overall environmental preferability of a product within a particular product category **based on life cycle considerations**

TYPE II: informative environmental **self-declaration** claims

TYPE III: voluntary programs that provide quantified environmental data of a product, under pre-set categories of parameters set by a qualified third party and based on **life cycle assessment**, and verified by that or another qualified third party



Life Cycle Thinking



Always remember to see the elephant in the room

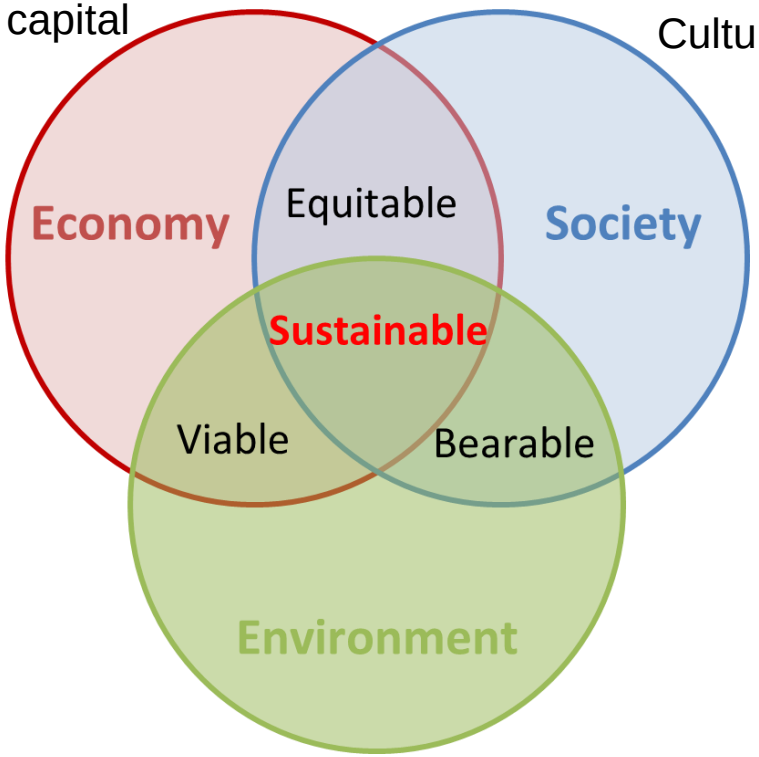
Optimizing sub-systems individually does not necessarily lead to optimization of the entire system

Avoid problem shifting:
- between life cycle stages
- between environmental problems
- between generations
- between countries
- between sustainability pillars

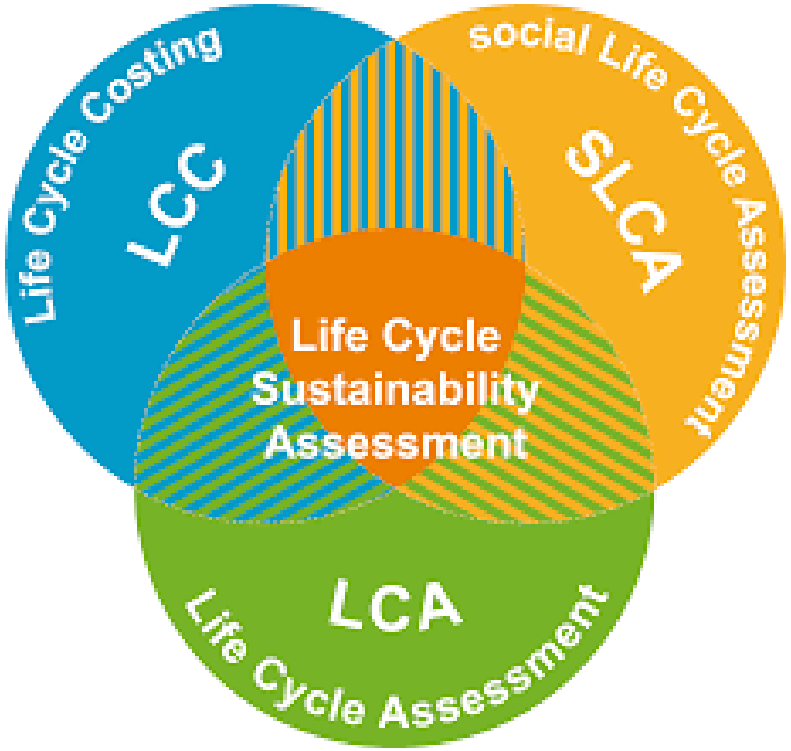
Life Cycle Sustainability Assessment Tools

Manufactured and Financial capital

Human and Cultural capital



Natural capital



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