

DEGROWTH
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Environmentally sound economies Subcategory: Technology / ICT

Can technologies help to reduce the physical and human degradation in transition towards a degrowth society?

Pasqua L'Abbate ^{a,b,*}, Maurizio Pallante ^b, Michele Dassisi ^a



^a Dpt. of Civil, Environmental, Building Engineering and Chemistry, Polytechnic of Bari, Italy.
^b Happy Degrowth Movement, Italy



INTRODUCTION - RESEARCH QUESTION

- The authors. Schumacher, Illich ,Prigogine, Odum, Pallante, N.Georgescu-Roegen, have been re-examined.
- « The Thermodynamics with the concepts of entropy, Emergy, Maximum Power Principle called the "fourth" of thermodynamics, and the tools: energy analysis and analysis of material and energy flows (life cycle assessment, SLCA, Ibrid LCA, I / O) were considered.
- « The absolute dematerialisation, is extremely important, (EC 2003) (OESD 2004) (Alier 2010) but in addition to energy and material flows, we should be able to calculate the relational flows, between individuals and individuals and individuals and nature.
- « This means that: it is necessary an interdisciplinary approach to the problem.
- « the study suggests to associate to the analysis of material and energy, other methods: the analysis of local systems with stakeholder interviews and a new relational indicator.
- « The analysis of local systems, with interviews and stakeholder involvement, is useful to adapt the technology to the territory, to the local needs while respecting the traditions, and to the "know how" of the population(Pallante 2005).
- « The relational index is a new indicator, in the construction phase. For now, it studies the relationships between mother and child in the first year of the child's life.
- « The technology has to be careful to its targets. It should help develop a lifestyle which assigns material things to their rightful place(Illich 1973).

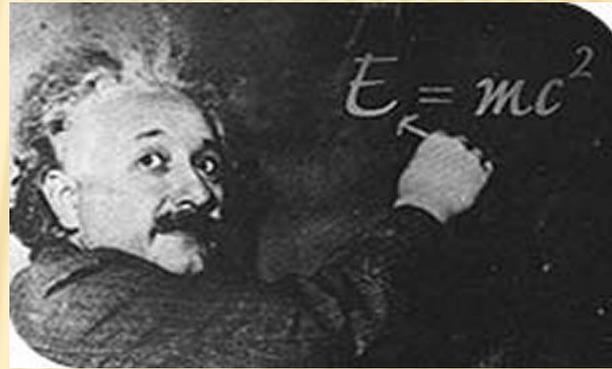
Bioeconomy (Georgescu Roegen 1976)

Hourglass Thermodynamics

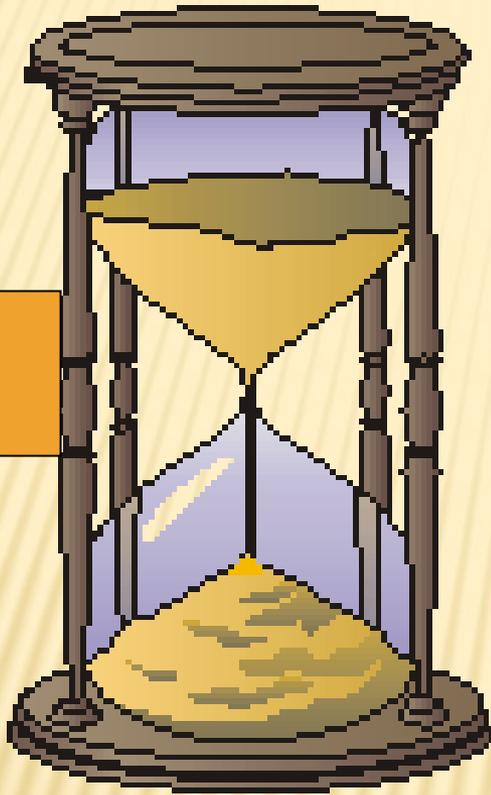
Closed system: The Earth

Sand: Resources, Materials and Energy

The real processes are irreversible,
time is unidirectional,
the hourglass can not be turned.



$$E = m$$

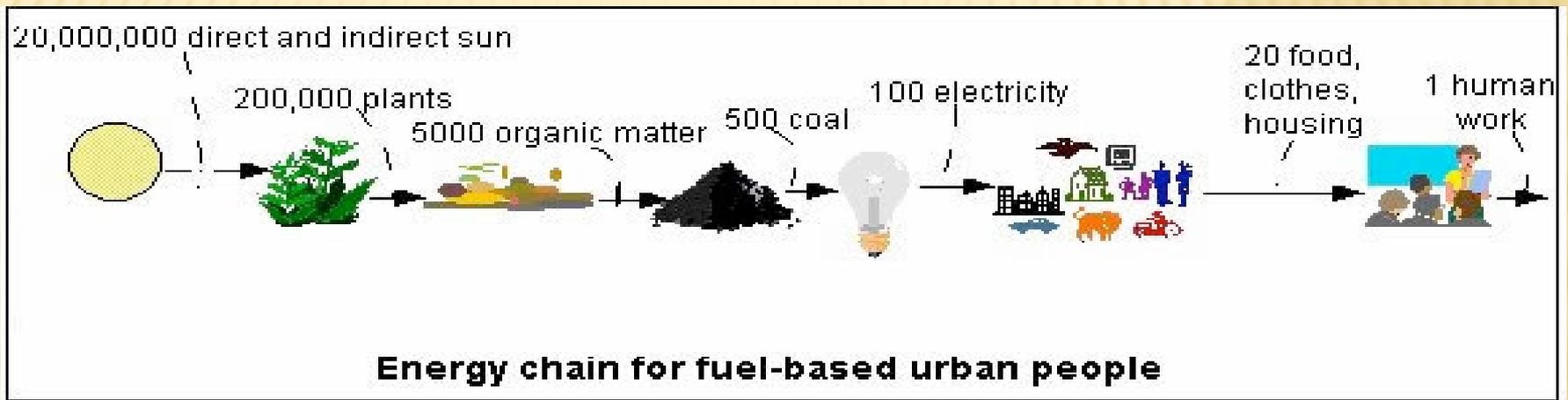


The Carnot Cycle

$$\eta = \frac{Q^+_a + Q^-_c}{Q^+_a} = \frac{|Q^+_a| - |Q^-_c|}{|Q^+_a|} = 1 - \frac{|Q^-_c|}{|Q^+_a|} = \frac{T_a - T_b}{T_b} = 1 - \frac{T_b}{T_a} < 1$$

$$\text{Return} = 1 - \frac{M_{\text{output}}}{M_{\text{Input}}} < 1$$

$$\text{Transformity (SEJ/J)} = \text{Emergia Input (seJ)} / \text{Exergia Output (J)}$$



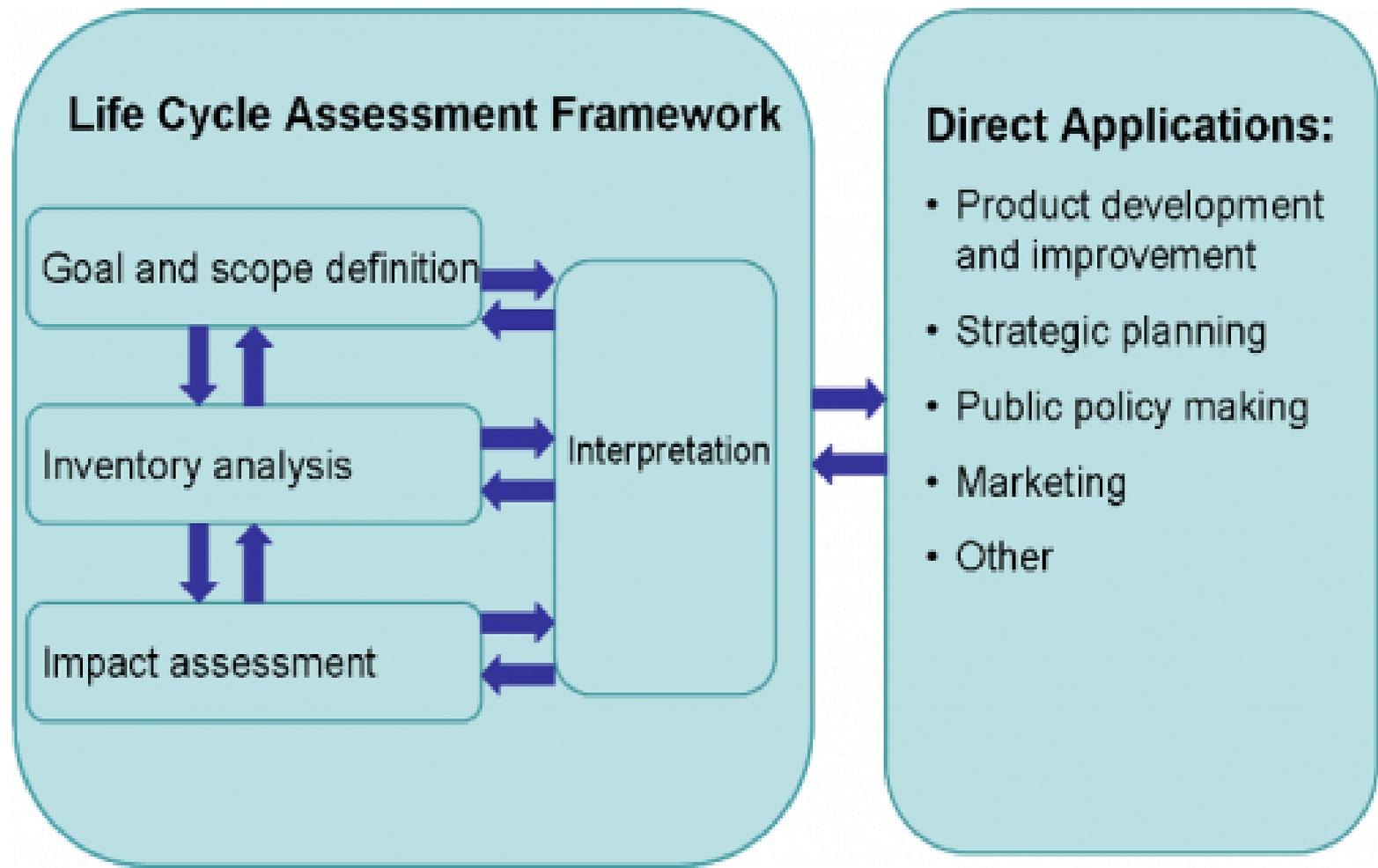
20 million joules of direct and indirect sunlight are used to produce each part of this energy chain, source Ortega, E. & Ulgiati, S. 2004.

	SUN	ELECTRICIT Y	FOOD/HOUS ING
ENERGY	20 E6 joules	100 joules	20 joules
EMERGY	20 E6 sej	20 E6 sej	20 E6 sej
TRANSFORMI TY	20 E6 sej/20 E6 J = 1sej/J	20 E6 sej/100 J = 20 E4 sej/J	20 E6 sej/20 J = 1 E6 sej/J

The Life Cycle Assessment - LCA

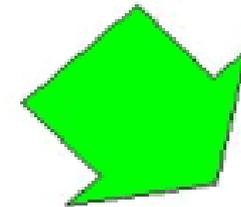
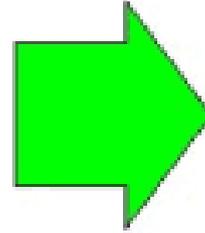
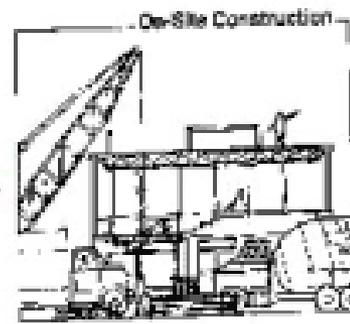
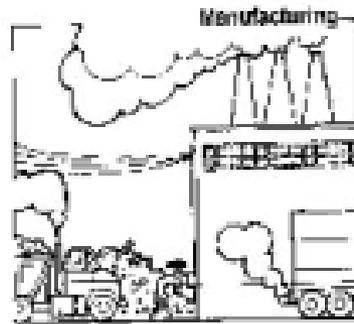
A systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle.

(ISO 14040.2 Draft: Life Cycle Assessment - Principles and Guidelines)



Manufacturing

On-Site Construction

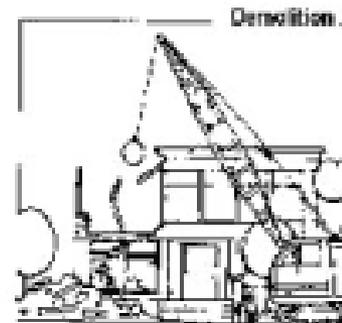
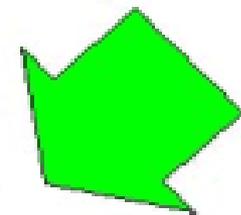


Life Cycle Assessment

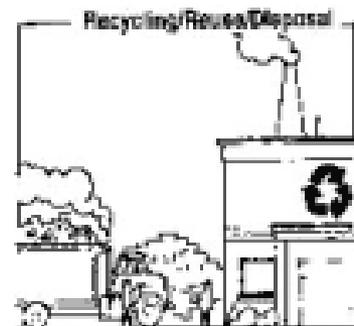
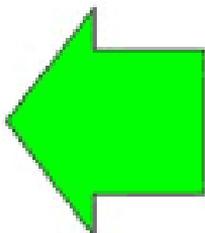
“Cradle to Grave” View of a Product



Operation/Maintenance



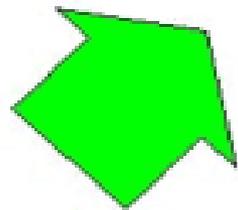
Demolition



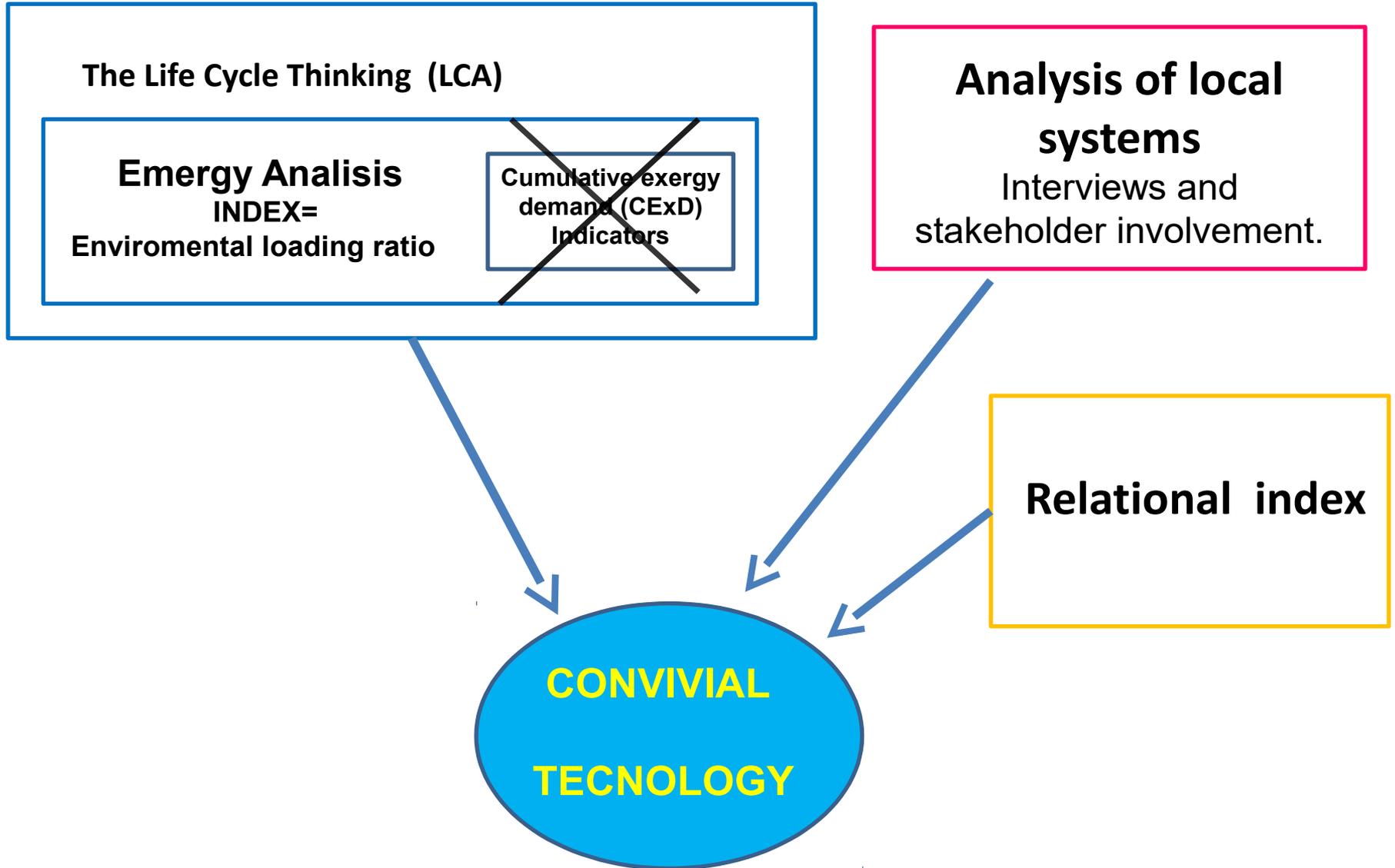
Recycling/Reuse/Disposal



Resource Extraction



Interdisciplinary Approach
What are the indicators to use?



ANALYSIS OF LOCAL SYSTEMS

- The technology has to be applied on a small scale. The large-scale application of new technologies may create a number of problems and dangers. (Low knowledge and margins of error)(Shumacher 1973)
- « It must be accessible and compatible with the needs of every culture and territory (return to the local, to the small)(Pallante 2011).
- « it must develop and use: imagination, creativity, skills, of everyone, and bring people together, with each other and with the environment.
- « It must make simple things, not complex. The complex technology is expensive it is for a few, instead cheap intermediate technology is useful to the majority of the population.
- « it must create instruments which integrate persons with the community, and not reserved to specialists who keeps it under its control. The population with the help of technology must remain free(Illich 1973).
- « Finally, the technology needs to improve productivity, which has to improve the quality of life and not to increase consumption.

RELATIONAL INDEX

Maximum Power Principle

“The civilization is always self-organizes into more complex systems, maximizing the energy available”(Odum 1996, 2000).

- Can the individuals take action against the Maximum Power Principle and deliberately reduce their power use?
 - « This seems to be impossible, according to evolutionary psychologists. We have a mechanism for removal of the limitations in our brains.
 - « We think it is necessary to find an indicator that helps us to work on individual.
 - « This index has to describe, how to develop empathy towards nature and towards humanity. The relational indicator, measures the energy that links human to human, a human being to his society and its environment. This new indicator, is under construction. our idea is to study the relationship between the mother and the baby in the first year of life, to understand precisely how the relation develop.

CONCLUSIONS

We have described in this paper the interdisciplinary approach that in our opinion should be used to build a "technology with a human face" as Schumpeter said or "convivial technology" as Illich said.

The model brings together environmental indicators obtained from the accounts of material and energy flows, and environmental impacts with the analysis of the local system, the involvement of stakeholders, and finally considering the MPP concept, a new indicator: the relational index.

SUGGESTED FOLLOW-UP

With M. Pallante, G. Mieli and others, within the center of interdisciplinary Bio-economy studies, we are working on developing a new relational indicator.

The LCA will be revised, within the Group of work D.I.R.E. ((Development and Improvement of LCA methodology: Research and Exchange of experiences) of the Italian LCA Network.

Emergy analysis and the analysis of the local systems will be developed within the Polytechnic of Bari.