REENTRY VERSUS CO2 SUSTAINABILITY MEASURE

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1 SUMMARY

In this paper, we analyse and criticise some limits and possibilities of the now mainstream CO2 paradigm towards sustainability development, especially with the widespread *demonisation* of CO2. This de-neutralising property is leading to a directive development that might even be counterproductive concerning sustainable development goals. We argue why and when this is the case and propose possible alternatives to this mainstream and too linear misconception from this perspective. From a cybernetic standpoint, this gives us possibly a better means to control such a system or lets us at least think over better and more adequate alternatives. The result of the considerations shows that we need not only nonlinearity measures but also to proceed in diverse and manifold types of behaviour, action, and measures, to get an adequate picture of the sustainable process in question, as the global increasingly material and cybernetic interconnectedness, is producing new and more complex intrinsical ecological control regimes. Main elements of a new sustainability measure contain dichotomies: (1) central/decentral, (2) use of material/information/energy usage/source emergentically generated out of a physically reachable distance, and (3) the reentry condition related to flow/storage.
Key-words: Sustainability, CO2 Measure, Reentry, Energy, Lifecycle

2 INTRODUCTION

Climatic change is one major challenge in a society that has to be counteracted for a sustainable world. According to Luhmann [1, p. 404], we today use morality, as a, as we would say, "soft measure", to argue for ecological problems, as they are difficult to tackle economically and politically. Hence we need "hard measures" to cybernetically control sustainability. Nobel prize winner Giorgio Parisi et al. [2] have shown with a basic climate model the possibility and importance of temperature jumps that can trigger ice or warm time as a stochastic resonance phenomenon. This model is based on the global energy balance that is today shifted towards higher temperatures because of an increasing CO2 amount in the atmosphere. For this reason, CO2 is one important stressed factor that is now quite common in political and socio-economic considerations to decarbonise society or humankind. This "demonisation" of CO2 is focusing on the reduction of CO2, which might be even counterproductive, e.g. when it is argued to use "atomic" energy as "green" energy, as it is neutral concerning CO2 production. Another part is the often discussed CO2 emission trade in industrial countries to counteract CO2 emission as a control tool. Although CO2 has many advantages in measuring and even controlling the global temperature rise, this measure has significant limits to be used as a global control instrument for climatic change.

3 SUSTAINABILITY MEASURE

Sustainability is a main term, especially concerning ecology, which is one main problem today, as the system environment distinction is increasingly interwoven, which means that the human impact on nature makes global interconnectedness more evident. The CO2 measure refers only to one circular path, that of CO2, which means that it is a sustainability measure that is related to the earth's climate temperature increase (cf., e.g. [2]). According to Fig. 1, we suggest using different terminology that is a) based on different sustainability measures, with respect to basic *media* like energy, information and mass, altogether with respect to flow and to distance, that can be

measured in the distance (projections), with respect to room, time, room-time or number, which we then denote as reentry level or with respect to orgiton and holon theory as hierarchy and self-reoccurrence level. The same as a) can then refer to a *depth* of surface interpenetration level. This depth can also be interpreted as a scan level of the flow process or a second-order reentry phenomenon, which means that it is a more abstract reentry measure.

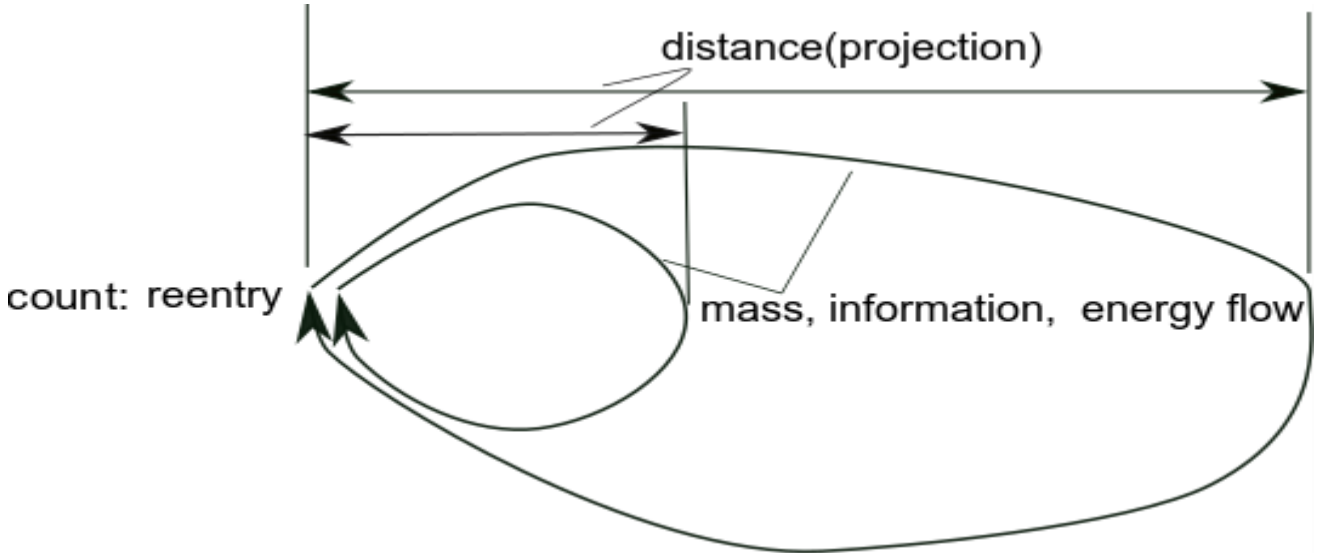

Fig. 1: Reentry Measure

3.1 Simulation Application

In the paper, there will be shown some examples in the production simulation program Witness how this methodology can lead to a sustainability measure that depicts, so to speak, the eco-efficiency in an integral methodology.

3.2 Methodological Attachment Points - Application to the Post Growth Economy

In the following, we sketch some connections and synergies from our quantitative approach to that of the Post Growth Economy more qualitatively. Modern economic sustainability trends are currently primary oriented on the *increase of efficiency*. It means that e.g. industrial consumption of resources seek to produce more outputs, e.g. through technical innovations. However, this can lead to prices' reduction of consumed goods and energy, which can lead to the so-called "rebound" effect – "unrealised potential energy savings" [3, 4]. In the worst-case scenarios, the energy efficiency can lead even to "backfire" - increased energy and resource consumption due to optimised resources efficiency [4-6]. Nico Paech introduced a new subdiscipline of the economy as an alternative to modern efficiency strategies. It is called "Postwachstumsökonomie" (Post-Growth-Economy) and is based on the critical consideration of sustainable developments and economic growth [7]. In [8], Paech introduced the main principles of the Post-Growth-Economy, which are based on the abolishment of economic growth dependency reasons, such as immoderate expectations of profits, external power supply through global division of work, modern monetary system. As an alternative, he proposed a focus on regional markets, shortened value-added-chains and balance between self-and extern supply [8]. This can be related to our *flow/storage* terminology. These theses can hence decouple the consumer, e.g. from price or social standards dependencies. From a systematic theoretical point of view, it can also be regarded as a *market decentralisation*.

3.3 Limitations

The main problem of this sustainability approach is that it models a, with regard to a time-space point relative measure and hence has its advantage in its only historically invariant measure, like that of current "peers". Further limitations are that it may not be clear which material shall be regarded for the process, which energy and information flow, as well as that of the proper consistency of those variables. The main advantage of this measure

is that there can be given a clear distinction between fossil and renewable energy sources in principle, and hence there is a much better argumentation possible concerning sustainability, as it orients on the flow process, the distances and the respective storage process. With this distinction, the fossil resources are penalised regarding energy extractions, as they are, in this respect, highly irreversible.

3.4 Future works and Outlook

The outlook and future work will be to further generalise the systemic terminology with regard to ecology, more practical applications and simulations to which the world of researchers in this field is invited to contribute according to their individual background for the good and preservation of mankind.

Conference Topic

Coupling of Energy Sectors, Solutions for Energy Efficiency, Life Cycle Assessment, IT Technologies, System Modeling and Artificial Intelligence

4 REFERENCES

[1] N. Luhmann, *Die Gesellschaft der Gesellschaft*. Suhrkamp Verlag, Frankfurt/Main, 1997.

[2] R. Benzi, G. Parisi, A. Sutera, and A. Vulpiano, "Stochastic Resonance in Climatic Change," *Tellus,* vol. 34, pp. 10-16, 1982.

[3] H. D. Saunders, "The Khazzoom-Brookes Postulate and Neoclassical Growth," *The Energy Journal,* vol. 13, no. 4, pp. 131-148, 1992. [Online]. Available: http://www.jstor.org/stable/41322471.

[4] M. Malpede and E. Verdolini, "Rebound effects in Europe," presented at the Italian Association of Environmental and Resource Economists (2016), 2016.

[5] L. A. Greening, D. L. Greene, and C. Difiglio, "Energy efficiency and consumption — the rebound effect — a survey," *Energy Policy,* vol. 28, no. 6-7, pp. 389-401, 2000, doi: 10.1016/s0301-4215(00)00021-5.

[6] K. Gillingham, D. Rapson, and G. Wagner, "The Rebound Effect and Energy Efficiency Policy," Fondazione Eni Enrico Mattei (FEEM), 2014. Accessed: 2021/11/07/. [Online]. Available: http://www.jstor.org/stable/resrep01115

[7] N. Paech. "Postwachstumsökonomik." Springer Gabler Verlag. https://wirtschaftslexikon.gabler.de/definition/postwachstumsoekonomik-53487 (accessed 2021-11-07).

[8] N. Paech, "Die Postwachstumsökonomie – ein Vademecum," *Zeitschrift für Sozialökonomie,* vol. 46, no. 161, pp. 28-31, 2009.