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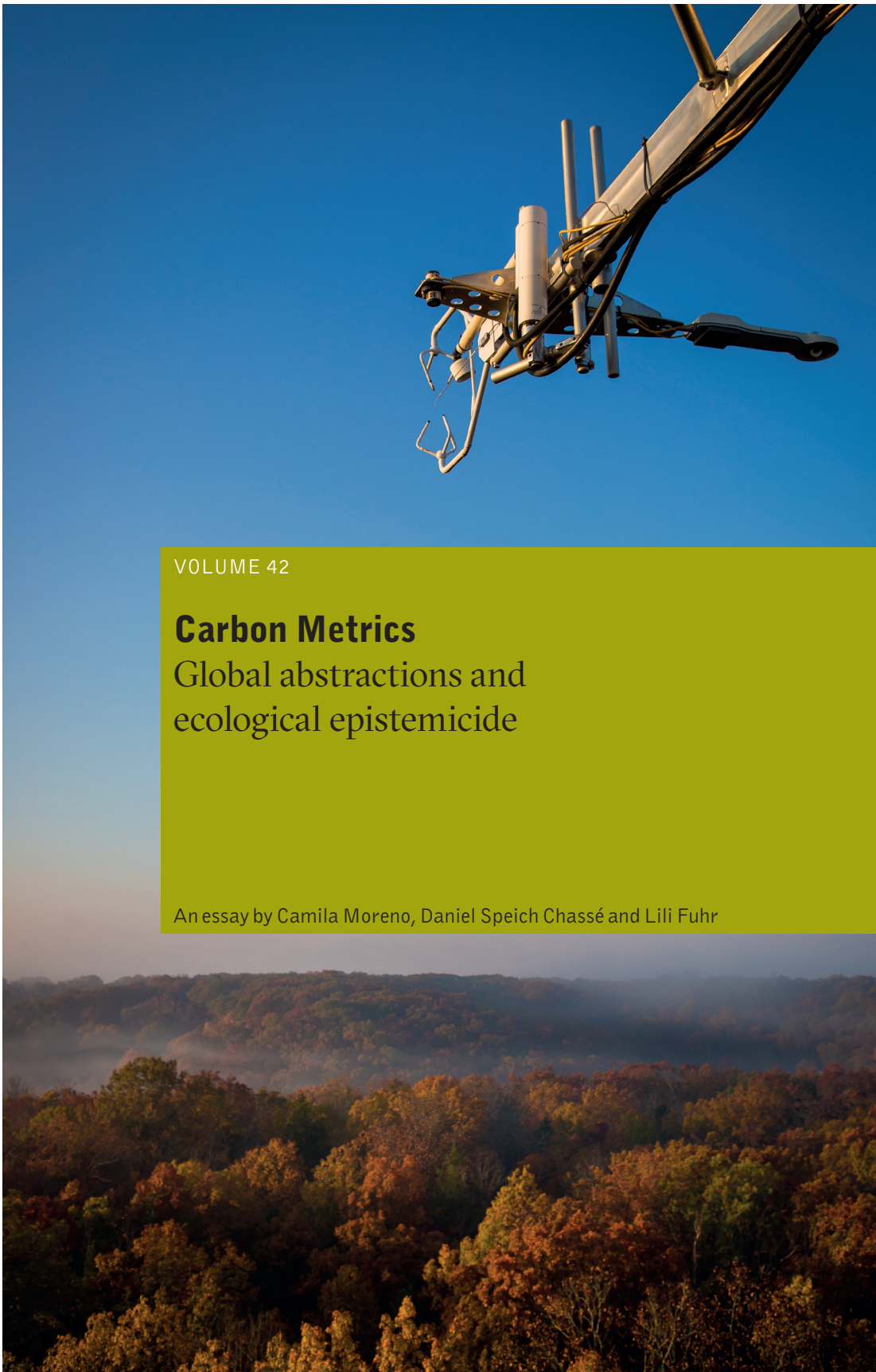

VOLUME 42

Carbon Metrics

Global abstractions and ecological epistemicide

An essay by Camila Moreno, Daniel Speich Chassé and Lili Fuhr

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With an introductory preface by Wolfgang Sachs

Edited by the Heinrich Böll Foundation

The authors

Camila Moreno is a researcher at the Federal Rural University of Rio de Janeiro and follows climate negotiations since 2008. Her main study subject has been the interfaces between reasoning on climate change and the greening of capitalism. Her forthcoming book *Carbon Metrics and the New Colonial Equations* will be launched in Brazil mid 2016. Contact: cc_moreno@yahoo.com

Daniel Speich Chassé is professor for history at the University of Lucerne. He studies the evolution of knowledge systems in the modern world since 1800. He focusses on the governance of the environment and the economy. His most recent monograph inquires into the global working of the economic abstraction of a GDP.

Lili Fuhr heads the Ecology and Sustainable Development Department at the Heinrich-Böll-Stiftung in Berlin. Her work focusses on international climate and resource politics. Contact: fuhr@boell.de

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Carbon Metrics – Global abstractions and ecological epistemicide
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T +49 30 28534-0 **F** +49 30 28534-109 **E** buchversand@boell.de **W** www.boell.de

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PREFACE

This publication is a warning call. But warning of what? That we are being misguided by the dominant discourse on halting catastrophic climate change. That some solutions could actually exacerbate the disaster. That the style of thinking advocated for managing it could result in a less hospitable world. The heat is on, and we are in danger of leaping out of the frying pan into the fire.

Usually climate negotiations are publicly pilloried for creating confusion around the problem and delaying action. But the time has also come to inquire into their unintended effects on our thinking. So the authors of this essay have little interest in a first-order critique of the kind that has already and amply been set forth by numerous commentaries and conference observers. Instead, they are concerned with a second-order critique, because they ask: What do strategies for managing climate change do to us and to our relationship with nature and society? Some strategies may be more effective than others, but what consequences do they have for our worldview and our self-conception? This line of questioning is reflective; it asks about the world we are creating when we undertake particular reforms. And this is not done nearly enough in environmental policy, or global domestic policy, which has been its real status for some long time.

Tinkering with climate policy goes on all over the world. At the Earth Summit held in Rio de Janeiro in 1992, it was announced that a silver bullet had been found: climate policy means reducing CO_2 emissions; in other words, tackling the output side. Accordingly, in the ensuing period, cars and household appliances, power plants and entire industries were made more efficient. Yet even back then, other approaches would have been worth a try. The input side could have been tackled, for example, by limiting fossil fuel prospecting and extraction rights or regulating mining and oil companies. A history of environmental policy as the history of forgotten alternatives has not yet been written. And that story would give a prominent place to a second wrong turn in global climate policy: the fungibility of emissions arising from the burning of fossil fuels against emissions coming from land, plants and animals, i.e. biological processes. Only this fungibility creates the perception of paddy fields and cows as emission sources and tropical forests and bogs as emissions sinks – expressed in units of calculation known as CO_2 equivalents. Decisions like these came along camouflaged as science, but have enormous political consequences. And a third misstep: trading in emissions certificates. «More flexibility» was the watchword of the 1997 Kyoto Protocol, which is used by the industrialized nations to this day to dodge some of their absolute domestic reduction commitments by contributing to relative emissions reduction beyond their borders. Not only did this water down global climate change mitigation

but definitively steered it into the complexity trap. At the same time, it paved the way for a stealthy reinterpretation of reality: the carbon-centred worldview.

Against this backdrop, the authors draw our attention to a key concept that has migrated from the natural sciences into policy jargon and common parlance alike. A few years ago «carbon» would still have required some explanation; today everybody talks about it. No climate negotiations without «carbon accounting», no green consumer without a «carbon footprint», no climate impact without «carbon offsetting». This year, «decarbonization» even found its way through the hallowed portals of the G7 Summit at Elmau Castle. Undoubtedly the actors are acting out of concern for the climate, but they are not in the habit of holding themselves accountable for the implications when eco-radical reforms suddenly turn into global policy proposals. The present text offers a tentative answer to this. What are the implications, if «carbon» becomes the accounting unit of society? What are the implications for dealing with the crisis of nature? Does it foster or hinder a turnaround in policy and mentality?

Scepticism is appropriate, and not without good reason. For modern societies have learned certain lessons about figures. An illustrative example is GDP: The calculation of economic output in terms of gross domestic product was certainly innovation at the time of the Second World War, but in the following decades it turned into a statistical custom with a trophy-like quality, and ultimately a frustration from which there is almost no escape. GDP hogs the limelight like an all-powerful autocrat, bathing the money economy in its glare and consigning the non-economic values to darkness. Thus, GDP epitomizes the monstrous distortion of our economic system. Is there a risk of a similar trajectory – from innovation via custom to frustration – if «carbon» is made the negative measure of prosperity for all societies?

Quantification can be illuminating but it can also act as a blindfold. Like car headlamps on full beam: within the light cone, the view of the road is crystal clear, but outside it the blackness of the night is all the more striking. Seeing the world in carbon units has a similar headlamp effect. If we go over to calculating and comparing all nations and economic activities in carbon units, we become blind to other requirements in ecology and society. Blinded by numbers, we fail to see the diversity of nature, culture and lifestyles – outright «epistemicide»! What is more, when carbon units are bundled and sold on so-called carbon markets, norms like respect for nature, social cooperation and an individual sense of honour fall by the wayside.

The authors invite their readers to grasp a well-intentioned trend in climate policy and brush it against the nap. In the process they demolish the famous maxim that we can only manage what we can quantify numerically. That is the ideal pursued by conventional economics – under the added assumption that what is not countable does not exist. The danger is that «carbon accounting» is just one more round in the history of quantification, which is luring us rather more deeply into the «iron prison» (Max Weber) of the modern age.

Berlin, October 2015

Wolfgang Sachs

INTRODUCTION

There is no doubt about the fact that the environmental crisis is real, urgent, and of global reach and significance. We live in a time in which climate change is framed as the largest and most urgent threat. Yet, surprisingly, this threat is seen almost exclusively as a problem of too much CO_2 emissions to the atmosphere. Is global warming the result of the «greatest market failure the world has seen» (Lord Nicholas Stern)? Is climate change more important and more urgent than the loss of biodiversity, the degradation of arable soils, or the depletion of fresh water? Can any of these phenomena even be considered in isolation from each other?

How exactly do we apprehend, talk about and communicate «humanity's greatest challenge» (Ban Ki-moon)?[1] This paper argues that the way we describe and frame a problem very much predetermines the kinds of solutions and answers that we can consider. To be very clear: human-induced climate change is happening and happening fast. But exactly because of the urgency of the crisis we would like to invite our readers to take a step back and reconsider how we frame the problem in the first place. Our argument is that while framing the problem in a specific, carbon-centric mode creates knowledge and possibilities for global communication and political action, it also excludes and even destroys knowledge at the same time. We elaborate on the metrics of carbon, which creates a new global abstraction – and we ask for the cost of this form of communication. In this respect we talk of the risk of an ecological «epistemicide».

Climate change results from the burning of fossil fuels. Fossil fuels are embedded in every realm of the material world as most people know it. Fossil fuels feed the everyday flows of energy and matter around the globe that make the economy and middle-class lifestyles what they are, in a truly all-embracing sense. This ranges from food over synthetic clothing to the materials used to build houses and make the objects that are omnipresent in daily life.

Try for a moment to abstract all plastic items from your life: from your toothbrush to your computer/cellphone case. Try, for instance, to abstract in a supermarket the advent of plastic for the packaging industry and, thus, the possibility for the existence and circulation of what we recognize and have naturalized as commodities – such as bottled water. We live in a carbon society and around the word «carbon» we have been shaping content and meaning that is central to political discourse and action in the 21st century.

1 «Climate change is the single greatest threat to a sustainable future». http://www.un.org/sg/statements/index.asp?nid=7592

Petroleum is transmuted into a myriad of raw materials and products through the petro-chemical industry, as is gas on a smaller scale. Oil, as a crude fuel (be it gasoline, diesel, bunker fuel or other forms), feeds with gas and coal the fossil energy base-load on which our globalized economy depends. Fossil energy is the central engine that has historically been the material basis for the emergence of modern society since the industrial revolution. When oil emerged and gained global scale from the late nineteenth century on, the infrastructures and networks to extract, transport, refine and burn carbon energy have materialized a geopolitical order.[2] The current possibilities and limits for political action and democracy are tied up with the growing recognition that our de facto political system and political power are not primarily shaped by attitudes and ideas – instead we need to recognize how deeply we are embedded in the «socio-technical worlds» that characterize the age of oil.[3]

In order to challenge how deeply power is entrenched into what we ultimately refer to, sometimes superficially, when we talk about «carbon», let's think it through in an example that illustrates quite dramatically how dependent we are on fossil inputs and their web of power, from cradle to grave: the global agro-food system, by which we mean the production of grain and meat, but also fiber and, on a growing scale, biomass for agrofuels (biodiesel for your car, pellets for home heating, etc.) and industrial feedstocks. It was shaped over the last 50 years through the Green Revolution and is maybe the strongest example of concentrated corporate power we all rely on. This system was responsible for making the world food production and supply intrinsically – and dangerously – reliant on fossil inputs: to produce fertilizers and chemicals, to run on heavy mechanization, processing and long-distance transportation, refrigeration and storage. To free the agro-food system from its fossil fuel dependence cannot be done without a radical transformation – and re-localization – of production systems and trade, with impacts on recovering soils and resilient agro-biodiversity. Such a shift will challenge the established or «given» diets (like the ones based on the meat industry). It will have repercussions upon the availability of non-seasonal year round products, fast-food culture, food prices, jobs, a fair balance between rural and urban populations, local markets, land issues, insurances, public policies, etc. An agro-ecological revolution in terms of practices and knowledge is needed to overcome the oil-addicted paradigm and mindset of agrochemical agriculture. And this is just a glimpse of what is at stake when we are talking about really «phasing out fossil fuels».

So how come the current discourse focuses on «carbon» and not on fossil fuels when framing climate change? Is «decarbonization» of the economy a consistent and reliable pathway out of the climate crisis? We wish to elaborate an answer to this question which highlights the political dimensions. It is important to keep in mind that the products of just ninety private companies, state-owned enterprises and government-run industries (including the biggest producers of coal, oil, gas and cement) are responsible for two thirds of global emissions to the atmosphere since the beginning

2 Yergin, Daniel (2008): The Prize: the epic quest for oil, money & power. Free Press, New York.

3 Mitchell, Timothy (2011): Carbon Democracy. Political power in the age of oil. Verso, London/New York.

of industrialization.[4] We argue in this paper that translating a multi-dimensional and complex ecological and social crisis such as climate change into tons of carbon dioxide equivalents (that we can measure, count, own, put a price to, and trade) not only narrows our vision of what would be truly transformative actions, but allows the actors and interests running the current system to remain unchallenged.

In constructing a political answer to the above question, we chose an epistemological and historical critique of the way in which global environmental crises are subject to knowledge regimes where our thinking must fit into the hegemonic framing of the economic reason. Or to put it more clearly: we suggest studying quantification. Indeed, quantification has become the chief mode of political communication and is strongly linked to the subjection of all possible social issues to an economic logic. Quantification offers a kind of currency in international exchange and allows for a redistribution of responsibility in governing Planet Earth. Carbon counting is closely connected to global communication, action and responsibility. It is merely the most recent example of the ubiquitous quantitative mode of communication. One of its very important predecessors was the counting/accounting of economic potential and performance through the abstraction of a Gross Domestic Product (GDP). Our argument thus includes a historical primer on the evolution of national accounting over the last seventy years.

The post-1945 era saw the turning of political issues into a quantitative mode. The carbon metric bears witness to this move, which has a broader history. International organizations made global issues quantitative as of the founding of the United Nations. The invention of the Gross Domestic Product (GDP) allowed measuring the economic productivity of any social group. The shorthand of a growth rate of GDP per capita made past performances commensurable with current situations and brought separate localities into one shared perspective. This global abstraction radically simplified political communication across the globe at the moment of imperial decline, when a quickly growing number of allegedly independent new states came to replace the imperial systems of domination. Almost overnight the world map was populated with many different countries at different levels of economic development and power relations seemed utterly complicated and manifold. Equally today: green growth strategies try to take a short cut to solving the environmental crises by relying on one single measurable unit. Carbon metrics are a scale for environmental injustice; they are thought to offer a universal lens to see the world and the problems we face (as we live in a CO_2 society) and anchor a consistent indicator for environmental degradation; and they are thought to offer a policy tool to change the world.

The familiarity between counting economic potentials and carbon metrics is not accidental. As we will recall in this paper, experts at the centers of global expertise (such as the World Bank) explicitly connect the issues, comparing natural capital accounting – carbon included – to the earlier policy move, when GDP was invented. Today, through a carbon metrics lens, the world consists of geographically very diverse mitigation potentials measured in tons of CO_2 equivalents. These units can

4 www.carbonmajors.org

be «accounted» under an opportunity costs rationale. The trade-offs under this world view may perfidiously pave the way for new resource grabs in the Global South, offering, for example, through offsets or the «net zero» sum, an easy way out for those with a lot to lose if we were to actually address the root causes of the problem and, instead, challenge the status quo of power distribution and historical responsibility.

In fact, counting has a history that counts. The shared historical logic in the production of global abstractions is what we would like to explore in this paper. The assumed objectivity of counting environmental and economic global issues (be it carbon or GDP) can not be detached from the risk of over-simplifying complex issues, thus making opaque – or even invisible – major issues of power.

1. Calories and temperature

We count calories. Every industrialized bite we eat, sip or drink, or even the food we give to our pets, has «nutritional information» printed on its label or packaging: the main element of this is the calorie content, expressing the «nutritional energy» of what we are feeding into our bodies. We can read it and make sense of it because we have «calorie literacy». We are generally well informed and have somehow internalized the basic calorie content of many things: a can of coke, a hamburger, a small portion of French fries, one cup of rice, a chocolate bar, a banana, an apple, one table spoon of jam, a slice of bread, a glass of beer and many other options, depending on your personal dietary concerns. We don't ask anymore how/when/why we have acquired this skill, although all generations before us – considering when this phenomenon took global scale about 20 or 30 years ago – never had this kind of information to make sense of their daily lives and what they were eating.

Of course in science the notion of calorie existed long before. But at some point, as the influence and presence of industrialized food grew, «calorie literacy» became an essential item of the repertoire of the modern and urbanized citizen. Today we have online «calorie calculators» and all sorts of Apps that support and guide your «calorie accountancy». Counting calories can become an obsession and even hinders truly healthy eating habits. We find it very natural to reduce what we should eat in terms of nutrition to some recommended «daily calorie intake». If we are under a diet that restricts calories, we can spend, for example, our entire daily «calorie budget» on chocolate or sausage and still consider ourselves on a diet, in caloric terms. But are we well nourished?

Calories simplify complex things.[5] They abstract and reduce the nutritional energy provided by a certain food from its whole nutritional content. Have you ever heard about «empty calories», food such as solid fats and/or added sugars supplying energy but little or no other nutrition?

Over the years we have learned to read the labels for other «data» on nutritional value beyond its expression in «calories»: we want to know how many calories are from proteins, total fats (and what percentage is saturated fat or transfat), or carbohydrates. The level of detail can become yet more complex, including dietary fibers, sodium content, added vitamins, etc. We use this info to make informed choices that affect our own health and well being, and for others if we are caring for someone like children or the elderly. There are scientifically established global parameters that recommend an ideal calorie intake per day and they differ with respect to age and sex. We

5 Cullather, Nick: The Foreign Policy of the Calorie, in: *American Historical Review* 112 (2007) 2, pp. 337-364.

access and measure hunger and undernourishment in calorie levels, despite knowing that diets include many other relevant aspects, like culturally appropriate food, which cannot be addressed solely in terms of numerical nutritional facts. Calorie intake can serve as an indicator of a successful policy or action – or to point out and prove its failure. Although nutrition is a complex issue, at the end of the day, if you are on the brink of starvation or on a diet in order to lose weight, *the calories are what count*.

We can count calories and make sense of it in our brains and in our world because we have acknowledged the notion of «calorie» as a global abstraction, a basic unit, a parameter universally agreed upon, that serves to measure and express «nutrition» in a scientifically and quantifiable, thus objective, manner. One calorie expresses a unit of «nutritional energy» defined as «the approximate amount of energy needed to raise the temperature of one kilogram of water by one degree Celsius».[6]

The centigrade – renamed in 1948 «Celsius», after the Swedish astronomer Anders Celsius (1701-1744) – is the main scale with which we measure temperature. Fahrenheit and Kelvin are other existing thermometric scales, but they do not refer to decimals. Calories and centigrade are built upon a previous convention invented at some place and time in history: the metric system.

We don't dispute the fact that we can all think and communicate in terms of Celsius degrees (C°). In fact, it is because we have the metric system (and the centigrade scale within it), that we can communicate global warming as an objective, measurable, temperature change that features at the core of the 21st century global agenda. This example shows why and how global abstractions need to be assessed in epistemological (i.e. cognitive) and political terms as well as with regard to their respective historical contexts.

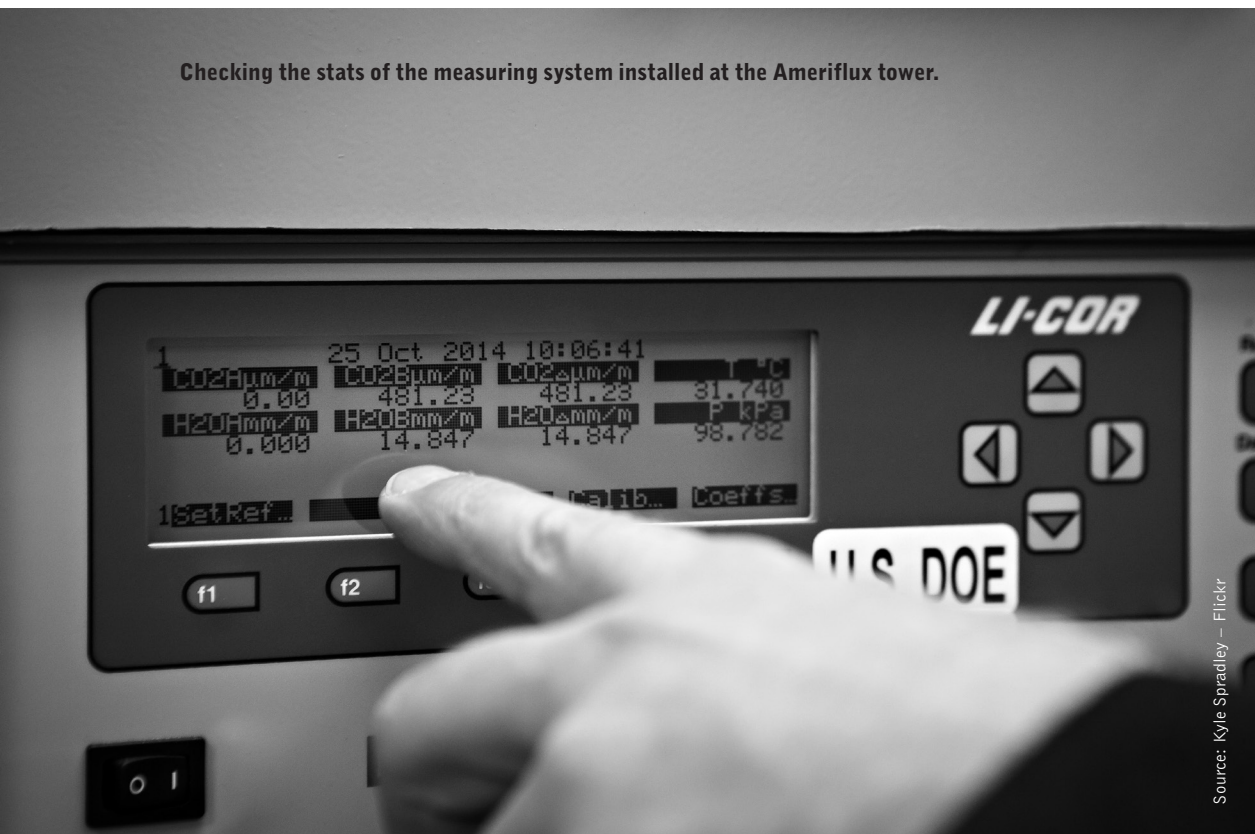
That we can frame a problem of such magnitude and complexity – climate change – in numeric and accountable terms is a consequence of a very specific frame of mind (or «mentalité», as the French call it), which is in itself the result of a historical process. Since its invention and dissemination/imposition around the world, the metric system was key in standardizing the way we think. It was also a major change in how counting – and accounting – was wired into our minds and everyday practices in social life to a point that today the very meaning and sense of «reasoning» have, to a large extent, turned into the equivalents of mere «calculating». This refers to the circumstance that nowadays, commonsense reasoning, or the ability to make inferences about properties and events in the everyday world, is being constantly dragged into – and reduced to – a cost-benefit analysis. With its origins in economic theories devised in the 19th century, the concept of *Homo oeconomicus* portrays human rational choice as judgments guided to maximize utility and economic profit, made by self-interested actors. This debate goes beyond the scope of the argument presented here and entails a multilayered and long-term socio-cultural process. However, the calculation of consequences and its pervasive effects on the widespread utilitarian approach to ethics is an important dimension of the equation we want to highlight here.

6 http://www.merriam-webster.com/dictionary/calorie

The apprehension of reality in calculable units lies at the core of the way in which we think today. It is the reason why we can frame – and reduce – key political issues of our times in terms of a calculation of costs and benefits, and, for example, talk about climate change in terms of the «price of inaction» (and the opportunities and profits of action), or translate a major ecological crisis into the management of carbon units.

There are actors and economic interests that profit from this kind of mindset. In the case of calories it is big food and retail companies wanting to sell their junk food who are not interested in being held accountable for the damages their products are causing. In the case of carbon the answer might not seem that obvious. What we would like to bring to the public debate is the key role played by the carbon metrics agenda: it implies a monumental shift in how we as a society are pre-determining and mediating our access to, understanding of and action within the global environmental crisis. It also pushes vested interests in the name of climate change while securing their profits.

Checking the stats of the measuring system installed at the Ameriflux tower.



Source: Kyle Spradley – Flickr

2. Carbon accounting

As we once started to count calories, we are now learning to count carbon. «Carbon» as a unit of reference and intelligibility is embedded in many levels of our daily life, social contexts and interactions. We refer to «carbon» at this point of our argument without getting more specific, because the simplicity of the notion is what makes it so powerful. Our further reasoning aims at demonstrating the complexity of the issue.

Today consumers can calculate their own «carbon footprint» through a series of online tools.[7] The environmental impact of your lifestyle in terms of carbon is measured according to the type of house you live in (its size and with how many people you share it), how much heating you use (and the fuel that powers it, whether it is gas, diesel, wood pellets, etc.), whether your electricity comes from renewable sources, the kind of transport you take, if you fly, how much meat you eat, etc. As previously with calories, we can now read the carbon content info on the label of our food that comes from the grocery shop. Products sold under the brand name *Casino*, a French supermarket group, come with a «carbon index», a proclaimed innovative labeling that «allows a supplementary parameter for the shopper/consumer to become an «actor» of his/her consumer act».[8]

This is related to the idea that besides *accounting* for carbon, *neutralizing* through *offsettin*g carbon is rapidly being incorporated into a wide array of everyday actions, gaining social meaning and becoming naturalized as part of a new form of calculus, entrenched in the daily choices of the conscious consumer, all over the world. It is possible to buy a plane ticket online and pay in the same transaction, with the same credit card, to «neutralize» the «carbon footprint» of your travel. Think for example of CO_2ZERO by KLM, a program that says it offers «the easiest, most effective and least costly way to fly CO_2 neutral».[9] While music bands release «carbon neutral» albums (as Coldplay or Pink Floyd do), fashion shows can be «neutralized» as much as mega events such as the World Cups and the Olympic games. A decade ago, the 2006 Winter Olympics in Turin and the 2006 World Cup in Germany inaugurated the format of carbon neutrality for large sporting events. The effectiveness of this «neutrality» has been repeatedly contested and its impacts reported. This is becoming especially central with the growing acceptance of ideas such as «zero net emissions» within «decarbonization» plans. This point will be treated in a section further down the argument. [10]

7 http://www.carbonfootprint.com/calculator.aspx

8 http://www.produits-casino.fr/developpement-durable/dd_indice-carbone-demarche.html

9 http://www.klm.com/travel/br_en/prepare_for_travel/fly_CO_2_neutral/together/termsconditions.htm

10 http://www.telegraph.co.uk/news/worldnews/asia/india/1517031/How-Coldplays-green-hopes-died-in-the-arid-soil-of-India.html

As with calories, there are hundreds of examples of how carbon awareness is already becoming deeply rooted in our lives – and is here to stay. Most of those reading this text have at least basic «carbon literacy» and are increasingly acquiring «carbon accounting» skills. As reality can gradually be expressed, or reduced, in terms of «carbon» (content, intensity, equivalency, etc.) «carbon metrics» becomes a key reference to understand this new and fundamental dimension of how we perceive, measure, value, judge – and act upon – the world around us.

Over the last two decades at least, carbon dioxide (CO_2), or the *über* simplified term «carbon», has been growing in relevance as a fundamental category through which we apprehend the world we live in. «Carbon» has become a central element because it captures and communicates the *Zeitgeist* of our times: the obsession with climate change and the threats it poses to the continuity of life on Earth.

Anthropogenic or human-induced climate change is equated with the intensification of the greenhouse effect through the release into the atmosphere of carbon dioxide (CO_2) resulting from burning fossil fuels: coal, oil and gas. The greenhouse effect is a naturally occurring phenomenon: the trapping of heat in the atmosphere which regulates Planet Earth's temperature. In this process, greenhouse gases (GHGs) such as water vapor (H_2O), ozone (O_3) or CO_2 absorb and emit infrared radiation. However, since the Industrial Revolution, human activities have interfered in this process through the increased release of (mainly) CO_2 emissions from fossil fuels, leading to an increase in the parts per million (ppm) concentration of CO_2 in the atmosphere. The increase in CO_2 ppm is correlated to the rise in global average temperatures.

Under the negotiations of the United Nations Framework Convention on Climate Change (UNFCCC) adopted at the Earth Summit in Rio de Janeiro in 1992, countries seek to limit the increase of the global average temperature to no more than 2˚C in relation to pre-industrial levels – this is what is considered by current scientific knowledge to be a safe level of warming to avoid catastrophic consequences of climate change. Since it was adopted over two decades ago, countries are still negotiating to fully implement the UNFCCC. The Paris Agreement signed in December 2015 made some steps in that regard (we will come to the problems associated with that later). Under the Convention, one important step was the adoption of the legally binding Kyoto Protocol, which came into force in 2005, and set emission reduction targets and commitment periods for countries listed in Annex I to the Protocol (i.e. developed countries). The Kyoto Protocol regulates the following greenhouses gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6) and three groups of fluorinated gases (chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs) and perfluorocarbons or fluorocarbons (PFCs)). Emissions of any of those gases can be expressed in terms of a CO_2 equivalent, of which the basic unit of reference is one metric ton of CO_2.

However, not all «emissions» are the same. They can be pulsating (sporadic) or sustained over time. Furthermore, each greenhouse gas has different properties, radiative forcing effects, and, as they can persist for long times in the atmosphere and emissions are cumulative over time, holds uncertainties. Each gas has distinct values according to its Global Warming Potential (GWP) or Global Temperature change

Potential (GTP). While these metrics both serve to «weight» emissions, they also differ fundamentally as they contain distinct limitations and implicit value-related judgements. A chosen time horizon greatly influences the results: short time horizons include the warming due to short-lived emissions, whereas longer time horizons exclude those effects. GWP is one type of simplified index based upon radiative properties that can be used to estimate the potential future impacts of emissions of different gases upon the climate system in a relative sense, based on a number of factors, including the radiative efficiency (infrared-absorbing ability) of each gas relative to that of carbon dioxide, as well as the decay rate of each gas (the amount removed from the atmosphere over a given number of years) relative to that of carbon dioxide.[11] But it is not directly related to a temperature target. The GTP metrics, on the other hand, tries to calculate climate response. It includes the estimate of the temperature change in year Y in response to the radiative forcing of certain GHG emissions. This serves to evaluate the «climate efficacy» of policies and actions, as well as to monitor, verify and attribute quantifiable responsibility.

The Intergovernmental Panel on Climate Change (IPCC) is the body responsible for scientifically informing climate policy negotiations. In its assessments over the years it has been progressively reviewing and changing the GWP of each of the GHGs as the warming potential is defined in relation to a reference gas – CO_2 – which is in itself a moving target. It changes constantly in aerial concentration, atmospheric permanence, the level of radiative efficiency, climate sensitivity and other dimensions.

The choice of a metric can be made in terms of its scientific performance, as for assessing complex interactions of those different gases in the atmosphere. Or the choice of a metric can aim at its benefits for policy making, for example in terms of quantifying impacts of emissions. A common metric such as the «CO_2 equivalent» allows us to put emissions of all greenhouses gases on a commensurable scale. Ideally, the same equivalent CO_2 emissions would produce the same climate effect, regardless of which gases contribute to that equivalent CO_2 and irrespective of the geo-social circumstances of its emission. In this sense, the common metric provides a sort of «exchange rate» that allows the climate effect of emissions of gas X to be compared with emissions of gas Y (in this case, CO_2).

While the metric *per se* does not define policies or goals, the choice of the metrics depends on the policy that it aims to fulfill. For example, in order to consider carbon markets as an effective policy tool, a basic premise is the fungibility of all emissions to carbon. So it makes sense, from a physical science basis, to trade carbon credits (i.e. units of one metric ton of CO_2 equivalent). This exchange gets more complex when fossil (dead) carbon emissions are allowed to be offset by living, biological carbon (for example from living trees), or when it is assumed that such a thing as «net zero» emissions resulting from an offsetting equation can have a real positive effect upon the atmosphere. This assumption permeates much of the pathways and proposals around «decarbonization», a point to which we will return later.

11 http://www.eia.gov/tools/glossary/index.cfm?id=G

Indeed, carbon serves to simplify very complex things. Yet in the face of ecological disruption, as with human-induced climate change, a fundamental assumption is that the carbon metric is central to lead our way towards a safer future path. Climate negotiations and a potentially global agreement rely entirely on the cornerstone of carbon metrics.

Undoubtedly, the environmental crisis we face is real and deeply serious. But it is also multidimensional and highly complex in the way it influences the interdependent interactions that constitute the delicate and intricate web of planetary life. In a manner analogous to calories in nutrition, «carbon» can simplify in an extreme mode very complex things. However, in the real world, environmental challenges include biodiversity and agrobiodiversity loss, genetic erosion, genetic contamination due to the increasing release of GMOs, monocultures, invasive species, deforestation, soil erosion, loss of soil fertility, soil and water depletion, contamination of underground water with pesticides and heavy metals, persistent organic pollutants (POPs), electromagnetic pollution, nuclear contamination, residues, air pollution by particulate matter, soil impermeabilization related to widespread urbanization and many other socio-environmental issues such as the loss of traditional and indigenous knowledge. *All add together and operate in synergy to foster the greater picture of global climate change.*

Is it assumed that all these multidimensional aspects of the man-made environmental challenge facing us not only correlate, but can also be tackled and solved by simply addressing the concentration of carbon dioxide (CO_2) in parts per million in the atmosphere? Can a stable temperature in a scenario with so many variables be sufficient in order to restore the equilibrium and resilience of the ecosystem and the intricate balance of all natural cycles on Earth? The most convincing answer to this question is no. As it is with calories in respect to our private diet, if we only counted carbon, *as if only carbon were to count*, our ecological system would scarcely be well nourished and balanced. Can proposals that promote further expansion of monocultures, industrial agriculture and GMOs, or even nuclear energy, really be considered «climate smart» simply because they result in a reduction (or even «net» reduction) of carbon in the atmosphere?

In spite of these ecosystem complexities, carbon has emerged and settled as a privileged metric for sustainability and the stick to measure and guide us through the challenges ahead. What may be the unintended consequences of prioritizing carbon in addressing climate change? Within the carbonocentric frame, what is being left out and what consequences this may lead to in the future? Is «carbon» really the best way to frame the problem in the first place?

The Paris Climate Change Conference in December 2015 had to meet very high expectations. Building momentum towards this landmark there has even been a contribution of Pope Francisco's Encyclical, *Laudato Si. On care for our common home*, speaking to all faiths but aimed to show the leadership of the Roman Catholic Church – with estimated followers between 1.1 and 1.3 billion worldwide – on the ecological

and social justice concerns in times of climate change.[12] The Pope clearly voiced opposition to «the buying and selling of carbon credits» because in his view it leads to a «new form of speculation which will not help reduce the emission of polluting gases worldwide».[13] The Pope has been criticized for making this point, because carbon trade stands as the economist's favored path to change.[14]

Although intangible in daily life – one cannot see, hear, touch, or smell it – carbon has become a global commodity and is traded in the form of carbon credits in regulated or voluntary marketplaces like the European Union Emission Trading Scheme (EU-ETS), China's Pilot Climate Trading Scheme, the Chicago Climate Exchange (CCX) and others. While we see carbon as a new metric making its way into all dimensions of social life, we observe the emergence of a new commodity in the form of «carbon rights». This new form of property rights to sell and benefit from reducing emissions is a crucial issue in the context of having markets play a key role in climate action. Creating new commodities has always been a turning point in human history.

The emergence of tradable carbon emission rights must be seen against this historical background. It can be compared to the process that once transformed communally held land titles into private properties. This earlier process, which did not happen overnight, ignited a major political transformation in European history during the 19th century, as described in the writings by Karl Marx.[15] According to Marx primitive accumulation through the enclosure of formally communal lands into private holding of land titles «plays in Political Economy about the same part as original sin in theology».[16] As Karl Polanyi has argued, the historical emergence of land and fungible units of human labour as «fictitious commodities» were at the basis of capitalism's global expansion.[17]

Might the turning of a CO_2 emission into a tradable private property right, a commodity, have a comparable impact on world history? The emergence of carbon as a new form of individual property right and the trading of carbon rights signals a long term move with major social and economic implications, raising important questions that remain marginal if not completely absent from the on-going climate debate.

In Europe the emergence and expansion of individual property rights (as referred to by Marx) proceeded through transforming a previous regime of communal

12 http://w2.vatican.va/content/francesco/en/encyclicals/documents/papafrancesco_20150524_enciclica-laudato-si.html.

13 «The strategy of buying and selling ‹carbon credits' can lead to a new form of speculation which would not help reduce the emission of polluting gases worldwide. This system seems to provide a quick and easy solution under the guise of a certain commitment to the environment, but in no way does it allow for the radical change which present circumstances require. Rather, it may simply become a ploy which permits maintaining the excessive consumption of some countries and sectors.» Laudato Si, p. 171.

14 http://www.nytimes.com/2015/06/19/world/europe/pope-targets-carbon-credits-economists-favored-path-to-change.html.

15 Marx, Karl (1867): Das Kapital, I, chapter 26.

16 https://www.marxists.org/archive/marx/works/1867-c1/ch26.htm.

17 Polanyi, Karl (2001 [1944]): The Great Transformation. The Political and Economic Origins of Our Time, 2nd ed. Beacon Press, Boston.

ownership of the land and forests into private property (of a few); this was done at the cost of enclosing the commons – a process marked by opposition, resistance and violence. The creation of carbon rights through privatization and commodification is pointing in a similar direction.[18]

In fact, the common ground and central idea of the current mainstream environmental discourse is the economic point of having a «carbon price».[19] Around that basic premise you can have carbon budgets, carbon targets, carbon markets and carbon rights as a marketable commodity. Another approach uses a carbon tax to fuse citizens to states through environmental concerns. Carbon metrics are not only a matter of discourse and political debates. They are being matched on the ground by the rule of law. In fact, the legal context has central importance in shaping and managing environmental regimes. *A Global Climate Change Legislation Study* (Globe 2015) found that in 99 countries, which represented 93 per cent of the world's CO_2 emissions, there were 804 climate change laws and policies, half of which were passed by the legislative branch and half by executive organs through the definition of policies and issuance of decrees. Over 75 percent of global emissions stemming from the combined economic activity of 45 countries are today covered by legal carbon reduction targets (with the EU counting as a block).[20] Environmental science, biochemistry, economic logic and legal practice have fused.

18 Bogojević, Sanja (2013): Emissions Trading Schemes: Markets, States and Law. Hart Publishing , Oxford.

19 http://www.ft.com/intl/cms/s/2/10cb1a60-9277-11e4-a1fd-00144feabdc0.html#axzz3TXv5ByAu

20 http://www.lse.ac.uk/GranthamInstitute/publication/2015-global-climate-legislation-study/

3. Economic growth accounting

As we count calories and carbon, we once learned to count economic growth. This happened after 1945, when Europe was in disarray due to the devastation caused by World War Two. At the same time the European empires started to lose their grip on most of the world and new sovereign countries like India or Indonesia emerged. In the course of these events the reconstruction of whole national economies captured global political imagination in a way that is comparable to today's focus on carbon. Counting economic potentials was as important then as counting CO_2 emissions is nowadays.

Carbon is a proxy for very complicated processes that result in global warming. Counting carbon simplifies this challenge and gives politicians the illusion that they can do something against environmental degradation. In the case of carbon, quantification offers a kind of currency in international exchange and allows for a redistribution of responsibility in governing Planet Earth. Carbon counting is closely connected to global communication, action and responsibility. The same is true for the Gross Domestic Product (GDP) and the politics of economic growth accounting that were invented roughly seventy years ago.[21] As we will highlight in the following section, leading officers of the World Bank today reflect upon the similarities between the counting of economic potentials and the current move towards accounting and quantification in environmental policy. It is thus helpful to cast a glance at the history of the GDP.

The immediate phase post-1945 produced several innovations. First were novel institutions of global politics such as the United Nations founded in San Francisco in 1945. The idea was to give the anti-fascist War alliance a future outlook. The United States called upon all of humanity to potentially organize itself into one «parliament of man».[22] This ideal vision seemed to offer a way to solve the most pressing global problems in a shared endeavor that was supposedly free from national power politics. The idea was that humanity's capacity for reason should prevail. Of course, the emerging supranational and intergovernmental organizations never worked in a power-free way. But those organizations did become the most prominent place for deliberating shared global responsibility and for defining action on all issues that transcended the territory of one single sovereign nation state – as environmental problems most often do. It seems almost natural that today the threat of global warming is debated at very

21 Speich, Daniel (2011): The use of global abstractions. National income accounting in the period of imperial decline, in: *Journal of Global History* 6, 1, pp. 7-28.

22 Kennedy, Paul (2007): The Parliament of Man. The United Nations and the quest for world government. London.

large meetings in an international negotiating framework like the COP. But for a very long time in human history such an approach would have been rather improbable.

The second innovation post-1945 was bringing experts into politics. They have remained there ever since. On the supranational and intergovernmental level scientific and technical experts were assumed to transform the reconciliation of divergent national interests into the unambiguous terms of technocracy. This move promised a science-based «one best way» for solving all problems.[23] Before the rise of international organizations, global political debate was the realm of smart diplomats who were trained in diplomatic protocol, in legal studies and international law. After World War Two, technical experts, for example in agriculture, health or education, started to accompany the national diplomatic delegations at international meetings. At the first United Nations conference on the environment that was held in Stockholm in 1972 (which gave rise to the United Nations Environment Programme UNEP), the motely crew of natural scientists joined in. But the single most important group of experts in international politics post-1945 was the economists. The experts ignored the rules of diplomatic protocol. They simply adhered to their findings. They were considered important solely because of their expertise in their respective fields.

Scientific experts in agriculture, health, education, the natural sciences, and economics have since been working hard for a global public purpose. Never in history have so many technical reports on so many different topics been written as in the decades following World War Two, but few of them were ever read. Ministers, heads of state, and diplomats saw no need to get into the details of the experts' reports. They simply used the summaries as arguments in their political deliberations. Bringing experts into global politics did not make international debates more objective – despite the fact that it was exactly for this promise of more objectivity that they were welcomed to the sphere of political communication in the first place. What happened was that politicians and their diplomatic representatives could now not only build upon military threats or economic strength or other traditional tools in the great game of international power politics – but they could also draw upon expert advice when trying to push other politicians or other states in a certain direction.

A third innovation was turning all political questions into economic issues. This move is very closely connected to the British economist John Maynard Keynes, who heavily influenced domestic British politics in the 1930s and 1940s. Keynes left his mark on international political communication during a conference at Bretton Woods in 1944 that gave rise to the International Bank for Reconstruction and Development (World Bank), to the International Monetary Fund (IMF) and to a still-born World Trade Organization. Keynes' main message was that governments could improve the living conditions of their subjects locally and globally through adjusting government spending and government revenues.[24] His interventionist vision was criticized by many liberal theorists like Friedrich von Hayek or Milton Friedman who assigned

23 Fischer, Frank (1990): Technocracy and the Politics of Expertise. London.

24 Skidelsky, Robert (2000): John Maynard Keynes. Volume Three: Fighting for Britain 1937-1946. London.

Coal-fired power plant releasing its fumes.

Source: Erich Ferdinand – Flickr

more importance to the individual action of economic agents. But it is from Keynes that we have inherited the conviction that «the economy» can solve all possible human problems, including environmental issues. Remember Bill Clinton's presidential campaign in 1992 when he simply stated, «it's the economy, stupid!»[25] We can learn from Clinton that we are stupid if we don't appreciate the academic work of economists – be they Keynesian state-interventionists or applying some neoliberal mixture of Milton Friedman and Friedrich von Hayek. Among the social science disciplines, economics has successfully ventured into an «economic imperialism». Its methodology is conquering all neighboring disciplines and currently also colonizes all concerns about the environment.[26]

The fourth innovation post-1945 was the shift of political issues into a quantitative mode. The numeric of carbon bears witness to this move, which has a broader history. International organizations made global issues quantitative as of the founding of the United Nations. Most prominent was the invention of the Gross Domestic Product (GDP) that allowed measuring the economic productivity of any social group. The inventors of the UN were initially confronted with 44 different countries. Numbers enabled them to handle this multitude. One problem was how to distribute the

25 Breslau, Daniel (2003): Economics Invents the Economy. Mathematics, Statistics, and Models in the Work of Irving Fisher and Wesley Mitchell, in: *Theory and Society* 32, 3, pp. 379-411.

26 Hodgson, Geoffrey, M. (2001): How Economics Forgot History. The problem of historical specificity in social science. London/New York.

cost of the new organization among the member states. Rather quickly, the diplomats agreed taking their relative economic wealth as a basis for solving this problem. The rich states should pay more than the poor ones. But how could national wealth be compared? The abstraction of the GDP figure was the answer.

In addition, connecting the GDP to the population census made it possible to construct a GDP per capita for every sovereign political body. This was an even more abstract indicator that turned economic outlooks all over the world into one single figure and paved the way for all sorts of inter-national comparison in space and time. The shorthand of a growth rate of GDP per capita made past performances commensurable with current situations and brought separate localities into one shared perspective.[27] This power of simplifying the world geographically and historically made the measuring of economic growth according to the figures of national income accounting very prominent in the political communication of the post-war era. Today we can get these comparative figures easily from digitally available data sources such as the *Groningen Growth and Development Centre* or the *Penn World Tables*.[28] Statistical offices in all countries update the figures. They produce the information resource for whole departments of applied economics at which thousands of doctoral students and hundreds of professors craft yet another complicated statistical regression in order to create new scientific expertise.

The end of World War Two encompassed a major break in the organization of international politics. First it brought up new international organizations. Second it brought scientific experts into politics. Third it turned all political questions into economic issues. And fourth it gave way to a ubiquitous mode of quantification. Carbon metrics have to do with all these innovations.

The metrics of carbon reduce a complex threat to a simple set of assumptions that enable certain actions while they prevent others. The same mechanism of reducing complexity initially gave rise to the economic calculus of the Gross Domestic Product. World War Two had not only devastated production facilities and transport infrastructure across Europe but also destroyed the fabric of social and cultural life. The war left Europe in complete disarray. Under these extreme circumstances politicians welcomed the reductive capacities of economic expertise. Everybody was happy to pretend that the consequences of the war were mainly economic and that it was economic growth that would lead out of the impasse.[29] Alternatively, one could also have dealt with this complication in the terms of a loss of cultural identity, but no other expert language was available for dealing with the issue than economic statistics.

This quantitative mode of supranational and intergovernmental politics has spilled over from the field of economic policy advice to the environmental protection

27 Maddison, Angus (2007): Contours of the World Economy, 1-2030 AD. Essays in macro-economic history. Oxford/New York.

28 http://www.rug.nl/research/ggdc; https://pwt.sas.upenn.edu.

29 Speich Chassé, Daniel (2014): Towards a global history of the Marshall Plan. European post-war reconstruction and the rise of development economic expertise, in: Grabas, Christian, and Alexander Nützenadel (Eds.): Industrial Policy in Europe after 1945. Wealth, Power and Economic Development in the Cold War. Basingstoke, pp. 187-212.

issue. First were the problems of economic growth and the comparative numeric of GDP per capita. Second were the problems of environmental degradation and the numeric of carbon. Both these modes of international knowledge have their book of rules. The measurement of carbon emissions is being objectified since the 1992 Rio Conference. National economic bookkeeping unfolded according to a *System of National Accounts* that was issued in a combined effort by the statistical office of the UN and OECD as of 1952.[30] The counting of environmental and economic global issues shares a historical logic.

Economic growth accounting was a prime example of the turn of global politics towards quantitative communication. It shows how politics embraced quantitative indicators. Yet accounting for economic growth is not only an example, it is also a template for this move. While the first guide for composing national accounts was but a short booklet, economic statisticians today have to deal with manuals running to thousands of pages. The national accounting framework has been under constant revision since its invention in 1952 in order to make these figures more compatible and more appropriate. Economic statistics aim at depicting all aspects of collective life. Their result is an image of «the economy» as social reality in itself. Everything has become economic or at least potentially approachable through economists' theories, models and statistics. Many social groups have tried to introduce their specific claims into the statistical framework. Think of the feminist claim that unpaid reproduction work in middle-class households should be accounted for as an important economic activity. Starting with the first UNEP Conference in Stockholm in 1972, environmental concerns have also become increasingly important issues in all societies of the world. It is no wonder, then, that environmentalists started trying to integrate environmental concerns in this very powerful measurement scheme that is economic statistics.

«Green GDP» is a case in point. Dubbed as the new «wealth of nations», the intangible assets that comprise natural capital need – thus the argument – to be monetized, registered, transformed into financial titles and traded at financial markets. How to evaluate carbon stocks in monetary terms and how to factor them into national accounts are two tasks currently undertaken within the System of Environmental-Economic Accounting (SEEA) of the UN Statistics Division. Adjusting net savings in order to include carbon dioxide emission damage is one of the many issues here.[31] SEEA gathers internationally agreed standard concepts, definitions, classifications, accounting rules and tables for comparable statistics on the environment and its relationship with the economy. The SEEA framework follows an accounting structure similar to the System of National Accounts (SNA)[32] and even uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics. The World Bank – a key actor in the introduction of GDP accounting in developing countries – today is advising these same countries through

30 OEEC (1952): A Standardised System of National Accounts. Paris.

31 World Bank (2011): The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium, http://siteresources.worldbank.org/ENVIRONMENT/Resources/ChangingWealthNations.pdf.

32 http://unstats.un.org/unsd/nationalaccount/sna.asp.

the *Wealth Accounting and Valuation of Ecosystem Services (WAVES)* initiative.[33] This initiative models the earlier form of making global political problems manageable through counting and accounting. It aims to profit from the power function of a global numeric metric.

Commenting on the task of assisting countries on accounting their natural capital, World Bank vice-president and special envoy for climate change Rachel Kyte in 2012 said:

«[…] Natural Capital is something fundamental to what we do as WB and what we want to be, […] to work with natural capital accounting is to go back to our core business. After the WWII, in the 50s, we went from country to country helping them to put their national accounts in order. Today, assisting countries to factor natural capital into their national accounts and make this a reality is central to the answer of the multiple crisis we face, from climate change to food price volatility».[34]

National income accounting and the compilation of a sum total of all social interactions in an abstract GDP has been one of the greatest successes in the history of political communication. However, mankind also possesses an archive that renders quantitative approaches to global problems questionable. The introduction of national economic bookkeeping was by no way simply an issue of «putting national accounts in order», as the World Bank official Rachel Kyte wrongly recalls. It was instead connected to a heated and fundamental debate on epistemological issues that also touched the question of what «the economy» was and what the science of economics was about. At the very heart of the matter is the fact that national economic accounts have no *a priori* order, according to which a national statistics bureau can arrange its figures in an orderly way. There is no single right way of counting the economy, and there is no wrong way either. It is all about conventions, and about who has the power to define the statistical order.

The first to object to the obsession with numbers in global politics were not some radical scholars or activists, but the economists themselves. All through the 1930s, the 1940s and the 1950s economic statistics was the object of controversy among economists. Their imagination was not easily captured by the idea that an all-encompassing statistical system could inform policy decisions through concise figures like a *gross* or net domestic product or investment and savings ratios. Politicians and diplomats crazed for global comparative numbers. But the economic experts were confronted with an almost Babylonian confusion concerning terminology and basic entities that in their view overshadowed such a perspective. Different political traditions and cultures, racial segregation, differing trajectories of governmental statistics and differences in the economic organization of societies made comparative investigations scientifically difficult. Economists in the 1940s were shocked by the prospect of one single figure – the GDP – reducing social life everywhere to one comparative framework of accounting for growth.

33 https://www.wavespartnership.org/en.

34 Personal communication. Side event: Mainstreaming natural capital and the CDB objectives. At COP 11, Convention on Biological Diversity, Hyderabad, India (October 2012).

The American economist Simon Kuznets for example, who won the Nobel Prize for his statistical work, understood his invention as a tool only to better understand the economic fabric of one industrialized community, but not as a device in global communication.[35] He was interested in the 1930s in better understanding the distribution of wealth in the US-American society and he thought it helpful to separate volumes of production and input according to the different sectors of industry. When he started to sum up statistics he first had to clarify which activities were to be considered «economic» and which instances of work had to fall out of his tables. Most prominently, Kuznets decided not to include unpaid female reproductive work in the middle-class households. He did so for methodological reasons in view of his academic research interest, not because he considered this field of activity in any general sense to be irrelevant. In other economic environments, as in relatively remote rural communities for example, work by women outside the monetized cycle obviously was of great economic importance. Consequently Kuznets always emphasized the fact that his statistical method only applied to the US. If one were to compose economic statistics for other countries, economies or societies with other academic research interests in mind one had to first go back to the basic question of which activity was to be included and which not. Thus, Kuznetsian economic statistics were not suited to spread across the globe. As one had to design a different system of categories for each entity under scrutiny, the end results and the sum totals could never be compared.[36]

The usefulness of comparing international macroeconomic statistics was controversially debated in the journal Econometrica, the publication of the Econometric Society, in the early 1940s. At the society's annual conference in 1947, which was held in conjunction with the world congress of the International Statistical Institute in Washington, the problem was the topic of several specialized sessions. Here the consensus emerged that sum totals of national accounts could only meaningfully be composed if it remained clear to what end such an operation was conducted. A GDP figure that was detached from specific research or policy aims did not seem useful to the majority of experts. Notably, Richard Stone, another Nobel laureate in economic statistics, asked at the Washington meeting:

«Why do we want to compare the United States with, say, China or India? What possible interest is there in it? Everybody knows that one country is, in economic terms, very rich and another country very poor; does it matter whether the factor is thirty or fifty of what? I suggest that . . . we should content ourselves with comparisons of a rather simple kind; and furthermore that we should not always expect to be able to sum up the relevant position in a single figure.»[37]

Kuznets also ridiculed the commensuration of states like China and the USA according to a single GDP figure. He quoted from a study that showed Chinese per

35 Kuznets, Simon (1949): National Income and Industrial Structure, in: *Econometrica* 17, Supplement (July), pp. 205-241, here: p. 209.

36 Kuznets, Simon (1933): National Income, in: Seligman, Edwin R. A. (Ed.): Encyclopedia of the Social Sciences. New York, pp. 205-224.

37 Richard Stone, quoted in Milton Gilbert (1949): ‹The measurement of national wealth: Discussion›, *Econometrica*, 17, p. 261.

capita GDP to have been below 40 Dollars annually in the period between 1925 and 1934 and fundamentally questioned the value of such a statement for the American reader:

«If we ask, could people live in the United States during 1925-34 for several years on an income substantially below $40 per capita, the answer would be «yes», if they were sufficiently wealthy to have lots of provisions to sell, sufficiently lucky to have rich relations, or sufficiently bold to rob other people. The one-third to one-half of the pre-industrial population of the world would scarcely be in that position; and if we assume that all they have produced and could consume per capita was less than 40 international units for several years, the conclusion would be all would be dead by now.»[38]

In his view, this was simply nonsensical science. Saying that an average Chinese lives on $40 per annum was not a meaningful proposition because it obviously meant that Chinese people had some kind of resources which were not accounted for in this calculation or at least that the accounting framework did not depict their reality in a meaningful way. However, the idea that half of the world was on the brink of starvation became an important topic in the global political imagination, and the methodological care taken by Kuznets and Stone somehow got lost when international organizations started to assist countries in putting their «national accounts in order». The economists were overrun by the demand for their expertise and finally started to produce those highly cherished figures, however reluctantly. Referring to the new GDP abstraction, one expert stated at the 1947 international conference in Washington:

«These figures have been produced and people use them. They will continue to be produced, and people will continue to use them. If we were starting afresh, I would have a great deal of sympathy with what has been said about not using a single figure, and not even producing one. But the way the thing stands now is that in every governmental problem where a multiplicity of regions or countries is involved, national-income figures are used. (…) And every international organization that has been formed has used national-income statistics in one way or another. Therefore, I think the statistician cannot bury his head in the sand in this matter. He should know the practical politicians will use his results and probably will misuse them. And therefore I do believe that it is imperative to make the best single figure that is possible and to use a few very simple rules for its application.»[39]

This is precisely what Richard Stone then did when he designed the famous System of National Accounts on behalf of the United Nations Statistics Division and the Organization for European Economic Cooperation (OEEC) in 1952.

As we count calories and temperatures today without reflecting the improbability of such ventures, and as we tend to take quantitative economic reasoning as a basis for global politics, these earlier doubts are very important to remember. Counting has a history that counts a lot.

38 Kuznets, Simon (1949): National Income and Industrial Structure, in: *Econometrica* 17, Supplement (July), pp. 205-241, here: p. 209.

39 Quoted in Gilbert, Milton et al.: The Measurement of National Wealth: Discussion, in: *Econometrica* 17 (1949) Supplement: Report of the Washington Meeting, pp. 255-272, here: p. 270.

4. Increasing visibility and invisibility at the same time

The counting of calories, carbon and economic growth makes things visible that would otherwise remain hidden from global communication. But every reduction of complexity through more visibility implies invisibility of all other realities and of their linkages. Statistics increase visibility and thus produce new knowledge, thereby empowering people to act upon that knowledge. At the same time they disempower people by rendering unwanted facts and realities invisible, robbing them of their reasoning for alternative solutions and answers.

This ambivalence is not easy to understand because it is very deeply rooted in the way modern societies relate to what they think is the real world in which they are set. The ambivalence of quantification is a direct outcome of the modern scientific worldview. Statistics have become a symbol of this worldview. They are a major tool in scientific inquiry and their history refers to the historical trajectory of the natural sciences. In order to understand this very broad context of today's carbon metrics, we need to look even further back in time than seventy years. We have to go way into the17th century, when a new approach to nature gained ground in Europe. During the Early Modern Epoch the secular European intellectual elites began to separate their immediate sensual experience of the natural environment from an analytical approach to nature. This move has been termed a «great bifurcation» that became the foundation of the modern sciences.[40] Its core was the laboratory.

The laboratory is the crucial place of modern science.[41] We can understand it as a technical apparatus designed to represent nature. A laboratory is like a carpenter's workshop where a rough piece of timber is being fixed and treated until it turns into a table or a work of art, like a statue. In his workshop the carpenter isolates a piece of wood and he himself is temporarily isolated from the weather, from his daily routines, and from the politics of his community. The laboratory is shut off from the rest of the world. In this artificially enclosed space the scientist starts experimenting on an isolated piece of nature in order to better understand general mechanisms. So there are always two trajectories involved in modern science: one is the isolation part, which means the shutting of the laboratory's doors, the reduction of complexity and the creation of invisibility. The other part is the innovation that brings new insights to the fore. Scientists usually produce an image of their object of study on paper and they

40 Whitehead, Alfred North (1920): The concept of nature. Tarner Lectures 1919. Cambridge.

41 Arabatzis, Theodore (2007): Experiment, in: Curd, Martin and Stathis Psillos (Eds.): Routledge Companion to the Philosophy of Science. London.

subsequently work on this paper issue and distribute their findings accordingly. The stabilizing of the manifold occurrences of life in the isolated setting of a workshop/laboratory and the proliferating of results on paper is the essence of scientific work.[42]

What we touch here very briefly is the very strong epistemic move that defines the essence of modern rationality. Natural scientists (who are an ideal image of modern man) separate nature into two dimensions. One is their subjective environment that needs to be made invisible. The other is their object. This process creates objectivity by bifurcating the (subjective) individual experience of environmental conditions from the (objective) scientific study of nature. Social scientists took some time to catch up with this hard epistemic model, because they lacked a laboratory setting. As a matter of fact, the social sciences have tried all through the 20th century to gain the status of a natural science and to emulate these epistemic procedures.

Economists like Simon Kuznets or Richard Stone also searched desperately for a laboratory and they found it in statistics. Despite their criticism cited above, they were not at all against quantification but rather to the contrary: they both were important agents in a methodological revolution that changed social science in the decades between roughly the 1880 and the 1940. During this phase an «Age of Economic Measurement» began and the study of economic social interaction changed from a humanities discipline that was close to history and literary studies into a mathematical field populated by numbers, models, and equations.[43] Large amounts of data and sophisticated techniques of statistical regression turned the complexities of reality into assumedly stable conditions, as if the world was a piece of timber in the workshop of a craftsman.

But the world is a complicated place. Kuznets and his colleagues were always fully aware of the merely representational characteristics of their statistics. They knew that they only talked about models, not about the real world, and that they reduced its complexity. This was precisely how they wanted to attribute more objectivity to their endeavors. Even today all academic economists are aware of this basic methodological mechanism. But when the results of their inquires travelled into the world of political communication, the knowledge about the artificiality of statistical facts did not travel along but remained in academia. Methodological considerations never found their way into the newspapers or the conference halls at international political gatherings. They stayed hidden in dull appendixes while the findings themselves gained the status of a reality – or a second nature, as it were.

The historical and epistemological critique of quantification in this paper shows that we are confronted with a naturalistic fallacy. The widely held assumption that numbers are the «hard facts» of the real world needs to be refuted. One way to do this is to highlight the ambivalences of visibility and invisibility and of empowerment and oppression that are inherent to the metrics.

42 Rheinberger, Hans-Jörg (1997): Toward a History of Epistemic Things. Synthesizing proteins in the test tube. Stanford, California.

43 Klein, Judy L., and Mary S. Morgan (Eds.) (2001): The Age of Economic Measurement. Durham/London.

One day's carbon dioxide emissions in comparison with Manhattan NYC

Source: Carbon Visuals – Flickr

Let us transpose the metaphoric of the carpenter/scientist to statistical quantification, such as the quantification of carbon or GDP, and first focus on the innovative side that enhances the vision. Statistics bring processes into view which would otherwise rest in oblivion. A key issue in the move towards accounting in politics is making previously unseen phenomena visible. This allows for making new claims. Accounting for nature, so runs current discourse, makes visible the costs and benefits of ecosystem services by pricing nature. One speaks of the «valuation» of ecosystems. This term, which in German is «*Inwertsetzung*» and in French «*mise en valeur*», was also important in colonial economic policy, to which we will return later. Accounting for nature is understood as a tool to make the claim for environmental protection more plausible. Furthermore, the quantitative turn to economic growth in international politics seventy years ago brought new problems to the fore and allowed for the articulation of political claims.

When imperialism was still largely uncontested, that is prior to 1945, nobody in Europe thought of the colonies as economically backward regions. In the colonizer's imagination the colonies appeared as being racially inferior and culturally backward but rich in economic resources. In the statistical mindset of the economists, however, the peripheries suddenly turned into economically «under-developed» countries and eventually into the «Third World.»[44]

In this move, one British economic statistician was important: Colin Clark, a complete outsider in the profession at the time. In a book on «The conditions of economic progress» that he published in 1940, he compared the national income of all countries and territories of the world.[45] When he looked at his comparative tables he realized that the world was basically a poor place. His epistemic tool rendered wealth only in Western Europe and in the northern and far southern part of the Americas. The richest countries in his compilation were the United States of America, Canada, Great Britain, Argentina, Switzerland and Holland. The poorest places were China, British India, the Dutch Indies, and all other colonial territories in Africa, Asia and Oceania. The Soviet Union figured in the lower part of the middle section somewhere between Italy and Portugal and way below Brazil. The chief discovery connected to Colin Clark's metrics of economic issues was global inequity between the Global North and the Global South. And the major political claim connected to this discovery was the call for political independence from the colonies.

For reasons which have nothing to do with Colin Clark and the epistemology of economic science, but a lot with economic constraints, the European empires went into decline after World War Two. A number of new countries in Asia and Africa emerged and the quantitative economic terms came in handy to conceive of these new political entities. Latin American so-called «under-developed» nations also joined this metric discourse. It were the metrics of economic growth accounting that made Western politicians realize that the world was much more diverse than colonial administrators had thought it to be. To their surprise it consisted not only of powerful

44 Prashad, Vijay (2007): The darker nations. A people's history of the Third World. New York.

45 Clark, Colin (1940): The Conditions of Economic Progress. London.

centers and dependent peripheries, but also included new political agents who now became visible and who before had remained hidden behind the European conviction of having a mission to «civilize» the world – with racial prejudice obfuscating the issue additionally.

Global power relations and the legacy of the declining empires proved to be complex. As with European post-war reconstruction, in this global perspective too everybody was happy to conceive of the inequity between the members of humanity as a problem of economic numbers. Alternatively, one could also have addressed this complication in terms of cultural identity, but again, as in the case of European post-war reconstruction, no other expert language was available for dealing with the issue than economic statistics. Colin Clark's statistics depicted the world in a politically useful way. His statistics made a new problem visible and at the same time suggested that it could be solved through the magic of economic growth and development. This turn towards practical policy advice is where the problem of invisibility came in. But before we address the invisibility side of the problem, the visibility issue needs further attention.

Late colonial rule in Paris and in London was far from a statistically transparent vision. The French had designed a policy of «*mise en valeur*», that is an economic «valuation» of the colonies, in 1923. And the British colonial authorities invented a new policy of «colonial development» during the Interwar Period.[46] The Germans would probably have spoken of «*Inwertsetzung*» if they still had colonies at that time. The wording sounds familiar. Yet this discourse was all about strengthening colonial rule, not about emancipation. The authorities in Paris and London tried to make social and economic life in the «Rest of the World» functional for supporting relatively high levels of economic wealth in the «West».[47] In contrast, Colin Clark's statistics brought up a more transparent view on the economics of the world. Politicians from the Global South drew upon his statistics in order to make their state of oppression quantitatively visible and thus politically important.

Decolonization strengthened the quantitative approach of accounting for economic growth in a worldwide comparative scheme. It is thus no wonder that the first generation of nationalist politicians in the emerging Third World embraced economics. Upon the achievement of independence every new government in the Global South was quick to design symbols of sovereignty such as a national flag, a national anthem, and a national economic account. Without GDP their nations simply would not exist in global political debate. A Western observer was quick to mock this symbolism when stating in 1963, «today in many independent countries national accounts are regarded, alongside the national flag and the national anthem, as symbols of independence». And he critically added: «This mystical belief can be turned to the

46 For the French Empire see Sarraut, Albert (1923): La mise en valeur des colonies françaises. Paris; for the British Empire see Havinden, Michael, and David Meredith (1993): Colonialism and Development. Britain and its Tropical Colonies, 1850-1960. London.

47 See on the fundamental dichotomy between the «West and the Rest» Hall, Stuart (1992): The West and the Rest, in: Hall, Stuart and Bram Gieben (Eds.): Formations of Modernity. Milton Keynes, pp. 275-320.

planners' advantage … . We at least should not become creatures of our own national accounts slogans».[48] A strong trust in the power of economic experts as policy advisors was rampant at the margins of the former empires. As the Ugandan intellectual Mahmood Mamdani recalls: «We were Africa's first generation of postcolonial intellectuals. Our political consciousness was shaped by a central assumption: we were convinced that the impact of colonialism on our societies was mainly economic.»[49] This quasi-unconditional focus on economic issues and on the respective statistics that had proliferated with the rise of economic experts shaped a new collective identity of poor states in global politics.[50] The comparatively «poorer nations» powerfully stepped into the international arena at the first UNCTAD conference that was held in Geneva in 1964 and subsequently convinced the General Assembly of the United Nations to issue a resolution on the creation of a «New International Economic Order» in the 1970s.[51] This was the heyday of economic reasoning and of economic statistics.

However, the statistical framework was not completely neutral. Western academic endeavors built upon prefigured sets of concepts, terms and assumptions when «going abroad» to places other than the USA. In order to give a full account of the global historical impact of economic metrics it is important to also highlight the oppression side of the issue and the many instances of creating invisibility. When the System of National Accounts became an international norm in 1952, economic statisticians were challenged to account for economic life in the colonies according to the emerging global template. But this was very difficult. Phyllis Deane, for instance, travelled to the southern regions of the British African possessions in order to count the economy. But her resulting 1953 publication on colonial social accounting in Northern Rhodesia and Nyasaland bore witness to the fundamental problems of the task. Deane stated quite clearly in that book:

«The problem of obtaining adequate data on the rural economies of Africa is the most serious obstacle in the way of framing satisfactory national income estimates for these territories. … The accounting problem is not simply that of the acute scarcity of quantitative data … it is also a qualitative problem, which brings into question the fundamental validity for primitive communities of the social accounting concepts themselves.»[52]

Deane was frustrated by the fact that the compilation of national accounts required quantitative information in the form of money prices. But subsistence production and barter trade largely dominated the entities of her study, in which the surprisingly widespread use of money was occasional and did not represent continuous

48 Barkay, Richard M. (1963): The Statistical Macro-Economic Framework Needed in Development Planning in Africa, in: Samuels, L. H. (Ed.): African Studies in Income and Wealth. Chicago, pp. 66-88, p. 85.

49 Mamdani, Mahmood (2001): Beyond Settler and Native as Political Identities. Overcoming the Political Legacy of Colonialism, in: *Comparative Studies in Society and History* 43, 4, pp. 651-664, here p. 651.

50 Prashad, Vijay (2013): The Poorer Nations: A Possible History of the Global South. Verso, London.

51 Murphy, Craig N. (1984): The Emergence of the NIEO Ideology. Boulder, Colorado.

52 Phyllis Deane, Colonial social accounting, Cambridge: Cambridge University Press, 1953, p. 115.

economic flows. Furthermore, these entities lacked internal cohesion to such an extent that it became questionable whether they should be represented as single economic units at all. While it seemed extraordinarily difficult to render all economic activities of the Central African territories within one single framework, it clearly turned out to be impossible to calculate a single figure – a GDP – that could reasonably be compared to other entities, such as the United States or Great Britain. Other economic statisticians encountered similar problems when conducting their African fieldwork. In a study on the national income of Nigeria published in 1953, A. R. Prest and I. G. Stewart observed the absence of a functional division of labor, in view of which most of the categorical divisions of national accounting collapsed. Prest and Stewart found the separation of a private sphere of the family from the public realm of wage labor completely useless. In Nigeria, they could not easily differentiate between consumption and production, or between investment and consumption, or between different economic branches or types of activity. In their view, economic activity in rural Africa was completely different from those realities that the American and British pioneers of national accounting had had in mind. They perceived Africa as being largely pre-modern and stated: „It is the pre-industrial revolution economics of Adam Smith and not the economics of the modern American college text-book which is the relevant standard».[53]

In other words, Prest and Stewart were unsatisfied with the statistical tools of national accounting and scanned the history of economics in order to find more adequate approaches. More specifically, they argued that within single Nigerian households a range of economic transactions were taking place that rather often had a monetized form and needed to be included in the sum total of economic activity. They thus violated the principle of national income accounting according to which the family was considered non-economic and all transactions within single households were excluded from the statistical compilation. Phyllis Deane did not go that far, but she too found the concept of the household highly impractical for African studies. All these authors were well aware of the progress in establishing international standards for the compilation of national income accounts, the center of which was at that time the Cambridge Department of Applied Economics, which in these years came under the direction of Richard Stone. Standardized categories were crucial for strengthening the analytical power of national income accounts. But the problem of difference proved complicated. Applying a standard category such as the household to rural African economies did not simplify the task of the economic statistician. When Kuznets described the United States, disregarding middle-class household work eased his description. But to the European statisticians working in Africa, households seemed to be important because they formed the core motor of economic life. In the industrial countries of the West relevant labor worked in factories and the core of economic activity was to be found in the industrial sector. Paid labor in the West stood opposed to unpaid work in the household in Nigeria and other African territories. To the statistician's eye fundamental differences in economic organization prevailed, which made

53 Prest, A. R., and I. G. Stewart (1953): National income of Nigeria. HSMO, London, p. 4.

it utterly impossible to estimate the sum total of economic productivity in a way that was comparable to – say – Simon Kuznets' national account of the USA in the 1930s.

The economic statisticians who worked early on in Africa were challenged by the emerging political communication through statistical abstractions. While international organizations like the UN demanded orderly national economic accounts and while the leaders of the new states based their fight against the former imperial overlords upon statistical numbers, the economic statisticians at the research front voiced severe objection. In the history of macroeconomic abstractions one often finds instances where the authors of such abstractions exhibit great zeal in estimating values and sum totals while at the same time calling the validity of their results fundamentally into question. The 1953 work of Phyllis Deane is a case in point. One reviewer of her book wrote in 1955: «The most valuable chapters are those describing the problems that must be solved if native African economies are to be forced into this mold that fits European and American economies only imperfectly. Unfortunately these sections will be read and quoted less widely than the estimates themselves. … The book itself speaks with two voices: the straight face with which the estimates are presented is disturbingly inconsistent with the bewilderment expressed in later chapters over the problem of evaluating native activities in units commensurable with those used for the European part of the economy.»[54]

The ambivalence highlighted in this quote was a major challenge to most economic statisticians who worked on the former colonies. Some of them were completely opposed to any quantification of non-monetized African economic transactions according to the unfolding global template of the System of National Accounts.[55] They felt that the quantitative and comparative approach of economics was not very well suited to create useful knowledge about the different economic realities in, say, the United States and Nigeria. Not economics, but anthropology seemed more suited to account for global differences. Until roughly 1950, anthropology was the chief mode of social scientific knowledge production about extra-European places. Anthropologists designed observational techniques, grounded in the substance of local phenomena, and tried to arrange them in a way that did not produce too many things invisible. But anthropology lost ground as an informant of global politics, ceding pre-eminence to the economists' quantitative view. Concurrently, the quantitative turn in economics increasingly weakened the economists' sensitivity for special local features. They lost interest in the findings of the anthropologists, which they once had. Economists now adhered instead to universal categories and models. With the unfolding of global political communication post-1945, economists gained great power in defining the issues at hand. Despite their initial doubts concerning global comparison they were quick to make the tool of economic growth accounting a standard procedure in global politics. By 1960 experts had learned to understand global economic interaction by measuring the objects under scrutiny against the industrial countries of Europe and

54 Jones, William O. (1955): Colonial social accounting, in: *Journal of the American Statistical Association*, 50, 271, p. 665.

55 Seers, Dudley (1972): What are we trying to measure?, in: *Journal of Development Studies* 8, pp. 21-36.

the Americas as the universal standard. Now, underdevelopment, which is a relative thing and the result of complicated comparative inquiries, became a global fact.

While many economists involved in the «valuation of ecosystem services» today claim to be merely interested in making visible natural wealth and dismiss the allegation of simply working towards putting up price tags and creating new market schemes, it is clear that as their work progresses they will rely a lot less on the work of ecologists to explain the world to them. Morgan Robertson in his paper «The nature that capital can see» describes his fieldwork among ecosystem assessment technicians in the US wetland banking scheme:[56]

»[…] the primary directive for monitoring technicians is not to produce falsifiable results that can circulate within a hypothetico-deductive paradigm […]. It is instead to produce data that successfully circulate in the networks of law and economics. As workers in a forum of articulation between science and capital, we made use of scientific codings and principles, but, ultimately, scientific operational logic was rejected in favor of the ad hoc logics (our «shared myths») that worked better to bridge the two systems.«

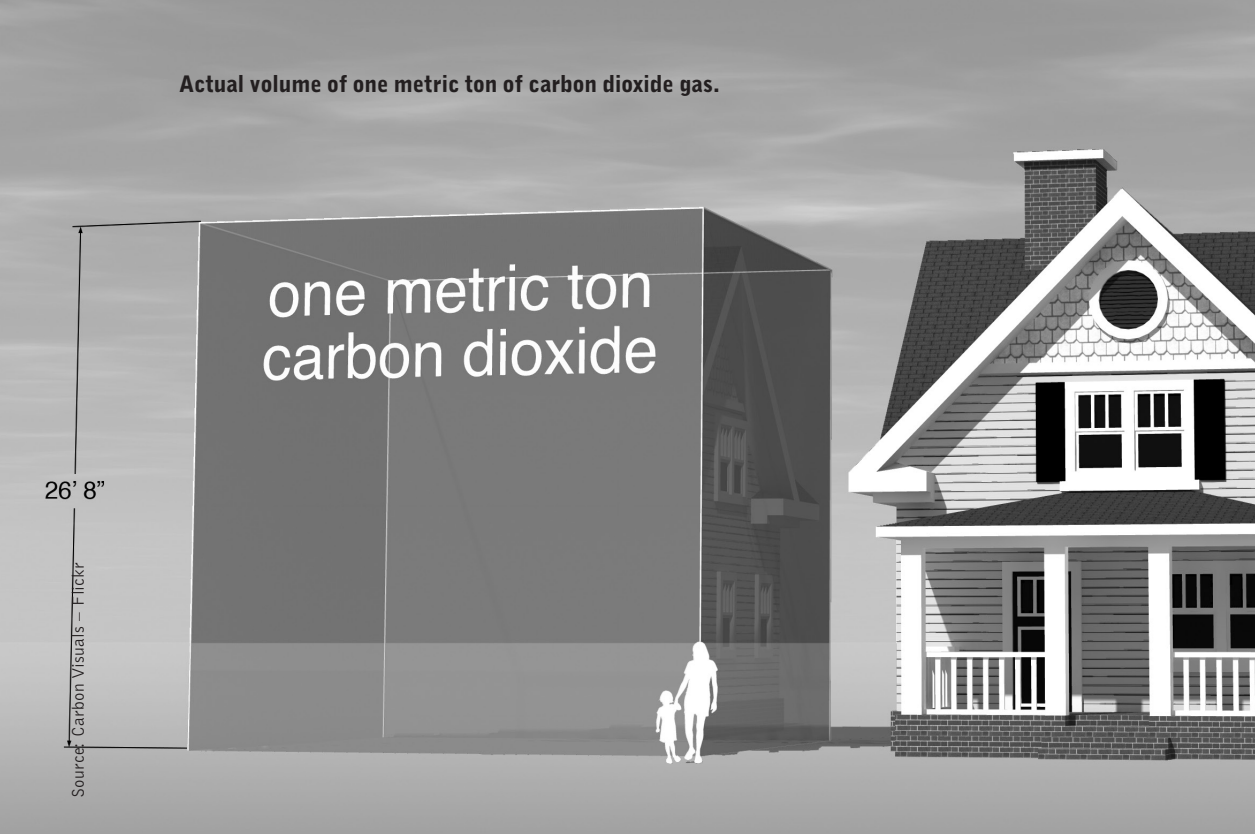
Once species and ecosystems have been entered into accounts, there is no need to look further into complexities, uncertainties and interlinkages. Ecology might well suffer the same fate that anthropology did when economics took over.

Decolonization occurred in step with an age of economic planning, in which statistical observation, macroeconomic modeling, and economic policies went hand in hand. Economists used quantitative comparison and gauged the respective difference. They defined non-European social worlds as being different from the European template in the negative terms of not yet having reached a Western economic form. Statistics made the non-West visible as a deficient entity, but not as a creative multitude. Thus, while offering powerful tools for decolonization, development economics also prolonged colonial structures of domination into the post-colonial world. A sharpened vision of the new «under-developed» states emerged but the assumed supremacy of the West remained unchallenged.[57]

The example of development economics shows that building up a numeric has an emancipatory potential and at the same time can help to stabilize power relations. Across the colonies in the epoch of decolonization, new techniques of quantifying macroeconomic interaction and new promises of the feasibility of planned social change gained ground. Late colonial policy took up this trajectory and gave rise to a heightened interest of Western economists in the poor parts of the world. In this, statistics offered two outlooks. First, it entailed a universal mode of describing social interaction irrespective of assumed racial or cultural differences. And second it

56 Robertson, M. M. (2006): The nature that capital can see: science, state, and market in the commodification of ecosystem services, in: *Environment and Planning D: Society and Space* 24(3) 367-387 (http://www.envplan.com/abstract.cgi?id=d3304).

57 Powerful post-colonial critiques of development economics have been put forward by anthropologists in the 1990s. See Escobar, Arturo (1995): Encountering Development. The making and unmaking of the Third World. Princeton, New Jersey, chapter 2; Mitchell, Timothy (1998): Fixing the Economy, in: *Cultural Studies* 12, 1, pp. 82-101.



Actual volume of one metric ton of carbon dioxide gas.

opened up a perspective on economic development that meant more efficient techniques of exploiting labor and natural resources in the colonies. Emancipation and oppression came together.

Such a contradictory setting also applies to the metrics of carbon. Subjecting carbon emissions to a numeric is a potentially powerful move. But history shows that when one turns global problems into merely quantitative issues it is not clear whether the basic assumptions also change. The «valuation» of the colonies has lead to the political independence of new states in Asia and Africa. But it also prolonged Western supremacy. Accordingly, the «valuation» of environmental system services might lead to a more sustainable global economy. But it will also prolong capitalist exploitation by allowing those in power to accumulate newly established «carbon rights» and control over ecosystems in the Global South. When we critically reflect on carbon metrics we have to take this ambivalence of empowerment and control / exertion of power into account. Who owns carbon? How can intangible «carbon» possibly be transformed into a new form of property rights? Is this new «layer» of property really detachable from the land and forests where this carbon is stored and/or produced?

A carbon-centric vision of the world that translates all living and dead biomass into fungible CO_2 equivalents can easily look at the Global North with its high fossil fuel dependency as poor in terms of «mitigation potential» and the Global South as «rich in mitigation potential» with its vast amounts of bio-carbon stored in biomass, soils and forests: these are often conveniently considered free of inhabitants, «degraded» or «marginal» lands when in fact they are public lands, indigenous territories, pastoralist

landscapes, etc. Echoing old ideas, like the colonial legal fiction of «terra nullius» – no man´s land – this view of the world that is common among today's climate policy experts can be interpreted as a new form of imperialism. The North can offset its fossil fuel emissions by paying the South to do what exactly? To implement forest protection, agriculture and land conservation practices that point to (often indigenous) local communities as the drivers of deforestation and let Big Business (big agrochemical companies, industrial meat industry, mining companies) off the hook. It is through these practices that carbon metrics meet GDP accounting and both merge into Green Growth strategies. When the dominance of GDP growth as a target marking political success remains untouched but needs to fit within a carbon constrained world, it is more than convenient not to have to equally deal with all the other planetary boundaries[58] or even the social and justice dimensions of the ecological crises.[59]

58 The Planetary Boundaries framework was first introduced in 2009, when a group of 28 internationally renowned scientists identified and quantified the first set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. Crossing these boundaries could generate abrupt or irreversible environmental changes. Respecting the boundaries reduces the risks to human society of crossing these thresholds. http://www.stockholmresilience.org/21/research/research-programmes/planetary-boundaries.html

59 The «planetary boundaries» framework can also serve to justify conservative positions. There is an ongoing critical reflection on the boundary setting issue, raising important issues like: which perspectives have a voice? Who/what is excluded? What is relevant ? (See for example the work of Barbara Muraca). Feminist scholars as Barbara Muraca often criticize natural scientists for blindly reproducing the specific gender and power relations which led to the current socio-ecological crises.

5. Decarbonization?

The reference to «carbon» has turned into an unavoidable element of how we talk, make sense, communicate and act upon reality, and, in a very fundamental way, how we envision and plan the future. Around the word «carbon» we have been shaping content and meaning that is central to political discourse and action in the 21st century. Global executives tend to use superlative wording. Take this statement by Christiana Figueres, the Executive Secretary of the UNFCCC as an example: «This is the first time in the history of mankind (…) that we are setting ourselves the task of intentionally, within a defined period of time *to change the economic development model that has been reigning for at least 150 years, since the industrial revolution*. That will not happen overnight and it will not happen at a single conference on climate change, be it COP 15, 21, 40 – you choose the number. It just does not occur like that. *It is a process, because of the depth of the transformation*.»[60]

Carbon has undoubtedly gained center stage on the international political agenda. Activists are confronted with a number of programmes and concepts. They reach from the Paris Climate Conference 2015 call on all countries to formulate «long-term low greenhouse gas emission development strategies» and UN backed country plans for a *Deep-Decarbonization Pathways Project*[61] to the EU *Roadmap for moving to a low carbon economy in 2050*,[62] private sector pledges to achieve carbon-neutral supply chains, bold moves like the *Carbon Pricing Leadership Coalition*[63] (supported by 74 countries, 23 sub-national jurisdictions and more than 1,000 companies) or even more wild proposals like to «*imagine a future where carbon is really the currency of the 21st century*», permeating the imagination of key World Bank officials.[64]

«Carbon» seems to have been incorporated in a very fundamental level within the discourse and strategies of the hegemonic actors: mainstreaming «carbon» in politics has even reached the G7. Under the slogan «Think Ahead, Act Together», G7 leaders at their latest meeting, in June 2015 at Schloss Elmau in Germany, agreed to back the recommendations of the IPCC, the United Nations' climate change panel, to reduce global greenhouse gas emissions at the upper end of a range of 40% to 70% by 2050, using 2010 as the baseline. The group, comprising the largest high-income economies

60 Figueres, Christiana (2015): Executive Secretary at the UNFCCC. Emphasis added, 11 February. https://europa.eu/eyd2015/en/unric/posts/questions-cristina-figures-cop21

61 http://unsdsn.org/what-we-do/deep-decarbonization-pathways/;http://unsdsn.org/wp content/uploads/2014/09/DDPP_Digit_updated.pdf

62 http://ec.europa.eu/clima/policies/roadmap/index_en.htm

63 http://www.carbonpricingleadership.org/what/

64 http://www.redd-monitor.org/2013/10/11/climate-change-at-the-world-bank-you-can-imagine-a-future-world-where-carbon-is-really-the-currency-of-the-21st-century/

(the United States, Japan, Germany, the United Kingdom, France, Italy, and Canada) jointly announced the commitment of its members to «*decarbonisation of the global economy over the course of this century*».[65]

According to the IPCC report of 2014, for example, nuclear energy can be grouped under the category of renewable energy and figures as a key element of a low-carbon energy system, with the report's scenarios showing how nuclear power boosts decarbonization efforts.[66] Under strict «carbon criteria», will nuclear be justifiable? Other contested technologies are also seen by the IPCC as key contributors within «decarbonization» pathways.

Indeed, carbon metrics support some very odd reasoning. The world can continue to produce emissions, as long as there is a way to «offset» them. So, if you have emissions in one place, and carbon sequestration (or «avoided» emissions) elsewhere, is it possible to consider the former neutral, or to have a «net zero» result? Then, instead of embarking on a radical emissions-reduction trajectory, we can continue to emit massive amounts of CO_2 – and even build new coal-fired power plants? Claiming to be taking climate action, for example, highly questionable technologies of «carbon capture and storage» (CCS, usually referring to the mechanical capture of CO_2 emissions from industrial sources, but the term can also include geoengineering) are gaining ground. For instance, Bioenergy with Carbon Capture and Storage (BECCS) is being promoted as a key technology under the new «overshoot approach» of net-zero emissions. BECCS entails planting a huge amount of grass and trees, burning the biomass to generate electricity, capturing the CO_2 that is emitted, and pumping it into geological reservoirs underground. Some argue that BECCS would have enormous development implications, provoking large-scale land grabs, most likely from relatively poor people or those without a clear tenure or land title. This is not some farfetched scenario; rising demand for biofuels has spurred devastating land grabs in developing countries for many years.

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65 https://www.g7germany.de/Content/DE/_Anlagen/G8_G20/2015-06-08-g7-abschluss-eng.pdf?__blob=publicationFile. *«Mindful of this goal (hold the increase in global average temperature below 2 °C) and considering the latest IPCC results, we emphasize that deep cuts in global greenhouse gas emissions are required with a decarbonization of the global economy over the course of this century. Accordingly, as a common vision for a global goal of greenhouse gas emissions reductions we support sharing with all parties to the UNFCCC the upper end of the latest IPCC recommendation of 40 to 70% reductions by 2050 compared to 2010 recognizing that this challenge can only be met by a global response. We commit to doing our part to achieve a low-carbon global economy in the long-term including developing and deploying innovative technologies striving for a transformation of the energy sectors by 2050 and invite all countries to join us in this endeavor. To this end we also commit to develop long-term national low-carbon strategies.»*

66 «In its 2014 report, the IPCC struck a note of urgency on the need to use all available low-carbon technologies to avert climate change. The sixth assessment report is not due until the end of the decade, and it's premature to speculate about what it will say regarding nuclear power. But trends suggest that major intergovernmental agencies increasingly view nuclear energy as an essential climate wedge within a global climate stabilization system. Two OECD agencies – the International Energy Agency and the Nuclear Energy Agency – projected that nuclear power will have to double by 2050 for the world to meet the international goal of limiting warming to 2 degrees Celsius». http://thebulletin.org/timeline-ipcc%E2%80%99s-shifting-position-nuclear-energy7975.

There is growing interest in «carbon capture and storage» technologies, whose claims to be climate-friendly should be treated with great caution. Carbon capture and storage usually denotes the mechanical process of trapping CO_2 emissions from industrial sources, but can also be used in geo-engineering, in other words, vast-scale technological intervention in the climate system. «Bioenergy with Carbon Capture and Storage» (BECCS), for example, is being promoted as a key technology. It is the poster technology for the new «net zero emissions» approach, which purportedly justifies exceedance of bio-capacity. The concept of BECCS involves large-scale planting of trees and crops, which extract CO_2 from the atmosphere as they grow, the use of this biomass in electricity generation, and the application of CCS to inject the resulting emissions into geological formations. However, the use of BECCS and the associated land-use change would have very serious impacts on the environment and lead to land grabbing, with particularly serious impacts on communities which are already relatively poor or lack formal tenure or titles to their land. This scenario is by no means far-fetched: growing demand for biofuels has been driving devastating land grabs in developing countries for many years. The BECCS debate has gained further traction in the wake of the Paris Climate Conference and the ambitious commitment to «Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels» (Article 2, paragraph 1 (a) of the Paris Agreement); this is because all the scenarios produced by the Intergovernmental Panel on Climate Change to limit global warming to 1.5°C (and most of those that look at 2°C) rely on the use of negative emissions technologies such as BECCS. As the international community's decision-making is reliant on the advice given by the IPCC, this leaves a bitter after-taste: given the high level of «ambition» underlying the Paris Agreement's objectives, the current de facto moratorium on geo-engineering imposed by the Convention on Biological Diversity (CBD) is unlikely to last for long.

What largely justifies this type of reasoning which entails vast social and environmental consequences is the prerogative of carbon over biodiversity. Biodiversity itself is increasingly being referred to as a «carbon co-benefit». For the sake of producing measurable, reportable and verifiable results (and thus to receive results-based payments), climate policies can support fast growing monoculture tree plantations, such as genetically modified eucalyptus, for carbon farming or biomass to produce biofuels: after all, it is carbon that «counts».[67]

Those are the kinds of issues that are beginning to take shape and will grow as challenges in the years to come. Acknowledging the wide implications entailed by the global spread of carbon metrics for our contemporary thinking – which have largely remained unconsidered as yet – what are the legitimate questions to be raised?

Our idea here was to propose a reflection on these questions and other basic assumptions, bringing some issues into perspective and shedding a different light upon the mainstream debate. What can history teach us, how can the collective

67 http://www.theguardian.com/environment/2012/nov/15/gm-trees-bred-world-energy.

A eucalyptus plantation in final stages at Arimalam.

Source: Balaji Kasirajan – Wikimedia

experience of mankind inform us? Are we addressing, or, instead, virtualizing, major issues of power?

As global, national and local public policies are all being shaped around «carbon», evoking shift, transformation and transition, we acknowledge an attempt, going on for almost a decade now, to analyze and communicate the economic benefits and costs of acting on climate change and to incorporate this dimension in shaping a new economic thinking, from the pioneering *The Economics of Climate Change* (2006; known as *The Stern Review* after its lead author, Sir Nicholas Stern) to broader initiatives such as *The New Climate Economy* (2014 and 2015).[68]

In October 2006 the Economics of Climate Change report was launched with a major media impact. Known since as the Stern Review, the report was a watershed in the consolidation of the greening of the economy as a hegemonic and programmatic response of capitalism to a new stage of accumulation.[69] Its main point was to be the pioneer of a new economic logic, where the environmental crisis enters the main

68 http://newclimateeconomy.net/

69 Moreno, Camila (2013): Las ropas verdes del rey. La economía verde: una nueva fuente de acumulación primitiva, in: Lang, Miriam, and Claudia López, Alejandra Santillana: Alternativas al capitalismo/colonialismo del siglo XXI. 2ed. Buenos Aires: Fundación Rosa Luxemburgo/Abya Yala/Ediciones America Libre, v. , pp. 63-97.

stage of international politics, because climate change represents the greatest market failure – but also a great opportunity. The transition to a green, low-carbon economy would offer enormous opportunities for better and stronger economic growth.

The main point of the Stern Review was that it was able to translate for the first time into economic terms the costs – but also the business and profit opportunities – of climate change, thus turning the environmental concerns over global warming into a «serious» economic case. According to the report, the lack of action and the maintenance of current emissions standards could have as costs the reduction of approximately 5% of the world GDP, reaching 20% GDP reduction in the worst case scenario. In contrast, the costs of stabilizing greenhouse gas emissions would represent the equivalent of 1% of global GDP annually until 2050.

According to the Stern Review, the «benefits» of fast action are considerably higher than the «costs». In values of 2006, the study found among its main conclusions: every ton of CO_2 we emit causes damages worth at least $85 in value, but emissions can be reduced at a much lower cost, $25 per ton. Putting the world on a low carbon path could, eventually, benefit the economy as much as $2.5 trillion per year; by 2050, markets for low carbon technologies may be worth at least $500 billion. Based on these economic reasons, the study called for quick action: «what we do now can have a limited effect on the climate over the next 40 or 50 years; but what we do in the next 10-20 years can have a profound effect on the climate in the second half of this century».[70]

To this end, its main recommendations were three: carbon pricing, technology policy and energy efficiency. Carbon pricing, more taxes, emissions trading or regulation, would show to society the «true cost» of their actions. The integrated goal should assign a global price on carbon, across all countries and sectors of the economy; emissions trading schemes, such as the one that operates for the whole European Union, should be expanded and linked. Technology policies should lead to the development and widespread use of a variety of low-carbon and high-efficiency products; norms and international standards may be introduced to classify these products. Climate change should be fully integrated into development policy and the rich countries must honor their pledges to increase support through overseas development assistance.

Much criticism has been directed at the review. For example, it can be said that its «technical» recommendations about the economic benefits of investment and adoption of low-carbon technologies, such as those attributed to biofuels, served as a key trigger for the land grabbing boom that followed the release and impact of the report, with consequences on land price speculation, evictions, expansion of monocultures, hunger, etc. But perhaps the biggest criticism that can be made of the Stern Review is the laconic way in which it crystallizes the mentality of its time, a mentality shaped by the consumer culture. On the occasion of the report launch in London in the second half of 2006, its lead author, Sir Nicholas Stern (member of the British nobility, Baron Stern of Brentford and former vice-president of the World Bank)[71] said:

70 http://www.wwf.se/source.php/1169157/Stern%20Report_Exec%20Summary.pdf
71 http://en.wikipedia.org/wiki/Nicholas_Stern

«Climate change is a result of the greatest market failure the world has seen. The evidence on the seriousness of the risks from inaction or delayed action is now overwhelming… The problem of climate change involves a fundamental failure of markets: those who damage others by emitting greenhouse gases generally do not pay […]». [72]

However, we ask: does the «polluter pays» principle also embrace the logic that he or she who can afford can, therefore, also pollute? Is there something like a «right to pollute» which can be purchased? This idea corresponds to the increasing introduction of flexibility mechanisms that allow individuals to comply with the rule (law) without the need for traditional instruments of sanction. Under this logic, environmental and climate policies are no longer based on human and collective rights, but consider citizens first and foremost as consumers and even conceive of the «right to pollute» and degrade the environment as a commodity. «Rights» can thus become a new branch of «services provision» directed by the markets in a world where buying «emission permits» (or biodiversity offsets) is already embedded in public policy - a major trend criticized also for the risks implied with the «financialization of nature».

In its origins, the carbon narrative was intended to capture and simplify the complexity of the environmental crisis and the challenges we face. Facilitating communication and action through «units», as carbon, is consonant with the instrumental rationality that permeates our contemporary thinking in general and, to a great extent, furthers the widespread social acceptance and naturalization of a trend towards market based/minded environmentalism. While reference to carbon means to express energy content, carbon functions as a performance metrics and also as an indicator, allowing for comparability and choices to be made.

A key issue in confronting carbon metrics is thus to understand how «choices» are reduced to the calculus of costs and opportunities. «Climate reasoning» is increasingly merging with the new economic discourse of greening the economy. In order to count as climate actions, countries' contributions need to be translated into emission reductions that can be measured, reported and verified (MRV). Only *MRVable* actions (under the carbon metrics) are to *be entitled to be registered and receive «result-based payments», as climate finance is currently mainly framed*. Under the UN, countries are working towards a worldwide system of carbon accountancy. To this end, countries are producing and putting in place comparable data: from emission inventories to systems of natural capital accounting (which includes carbon) with support from the World Bank. As when the GDP was established, carbon metrics rely on a profusion of data and statistical production.

Adding a new layer of complexity, data today is no longer regarded as static or stale, whose usefulness is finished once the purpose for which it was collected is achieved. New technologies made possible that information can be transformed into data. What can be «datafied» is what can be used by computers to process and run algorithms to analyze information that is indexable and thus searchable (words, locations, interactions, etc.), becoming this way a raw material for business, a vital economic input of our times, used to create a new form of economic value. With data mining, data

72 http://www.guardian.co.uk/environment/2007/nov/29/climatechange.carbonemissions.

collecting, processing and storage, Big Data is emerging as a global industry in the XXIst century and a key engine of the world economy, especially within a financialized global economy.[73] Carbon metrics in this sense fits in, and gives breadth, to this larger picture.

73 Mayer-Schönberger, Viktor and Cukier, Kenneth (2014) *Big Data*. Marinier Books, NY.

6. Metric mindset, capitalism and epistemicide

In the previous chapters we have analyzed historically and epistemologically the metrics of specific issues such as economic growth or environmental degradation. In concluding our argument we now briefly address an even more fundamental problematique, which is the imperial logic of metrics themselves irrespective of the instances and topics to which they are applied. The first important point in this respect is the fact that a system of measurement needs to be as universal as possible. The second point is that the dominant modes of counting are closely connected to capitalism. These two characteristics have lead to the effect that alternative modes of accounting and measuring things have receded – with some of these epistemologies at the brink of extinction.

Let us take a brief look at the unfolding of the predominant system, which is the metric system of measurement. Today we access reality and think through the metric system from the very basics of our own bodily self-consciousness (our height, our weight and circumference), to the pricing of the food we buy (1 kilo of meat or 1 liter of milk) and to the value for the rent we pay (in square meters) in a determined neighborhood. We don't ask why or find it odd that we all think in terms of the metric system to make sense, communicate about and attribute value to the world.

However, the invention of the metric system, which shaped the metric mindset under which we now globally operate, is relatively young. It was invented some 200 years ago in France and then spread all over the world. As one framework for global abstraction that has been historically created, the metric system (calories and Celsius degrees included) has been turned into a mindset. In many fundamental respects, our world runs on global abstractions: take the Gross Domestic Product (GDP), for instance, to measure the economic performance of a whole country or region. We seldom remember that those abstractions have a history that profoundly determines them in many ways.

Though widely adopted worldwide, up to today, the UK and the USA resist thinking under the metric convention, preferring to make sense of the world under the imperial weights and measures: inches, feet, miles, yards, ounces, gallons, pints, etc.[74] Although it has officially adopted the metric system, the UK resists in implementing it. The USA, Burma and Liberia are the only countries in the world which have not yet officially adopted the metric system.

74 http://time.com/3633514/why-wont-america-go-metric/

In the case of measuring temperature, Celsius sounds a pretty «reasonable» scale, for it assigns freezing and boiling points to water with round numbers, 0 and 100; in Fahrenheit those same tipping points are the counter-intuitive (related to the meter) and incomprehensible (for those not literate in it) 32 and 212. The scale comes from Daniel Gabriel Fahrenheit, a German scientist and the early inventor of the thermometer as we know it. In 1724 Fahrenheit was inducted into the British Royal Society and his system caught on in the British Empire. Under British colonial rule in the course of the 18th and 19th centuries the Fahrenheit became a standard temperature scale across much of the globe.[75] With the adoption of the meter convention, the Celsius scale became the new global reference.

The UK adopted the Celsius to measure temperature over fifty years ago in 1962, and Fahrenheit was retained as a secondary unit to aid the transition for a period of several years. In fact, today – half a century latter – British media resists, and many media outlets in that country still report weather forecasts in Celsius and in Fahrenheit degrees, some reporting only in Fahrenheit.[76] Meanwhile in the US, temperature is also predominantly understood and measured in Fahrenheit degrees.

Although it can be imposed by law, and indeed in many parts it was, wiring our brain into a new measurement system doesn't happen overnight. It is a long-term process. A metric mind requires a metric mentality, a way of thinking of its own, of apprehending the world in terms of figures. It is also a matter of *who measures and who is measured*, how it is being done and what for.

Through history, and the processes that forged the modern world-system we inherited, creating global uniformity through global abstractions cannot be dis-embedded from power relations. Unifying weights and measures under a universal system was key to facilitating international trade. The creation and adoption of the metric system was a decisive step in forging a truly globalized world, in the sense that wired our brains for global measures and mental infrastructures. As we don't ask why or find it odd that we all think in terms of the metric system to make sense, communicate about and attribute value to the world, we are also heading the same way with carbon. New generations, just as they are born «digital natives», will only know a carbon-constrained world.

In its pre-history, the idea of creating a unified system using decimal units to link length, area, volume and mass can be traced back to the late 16th century, when nobody used decimals in daily life. The idea gained strength in the late 17th century and only materialized another century latter. In 1867, the *Exposition Universelle* (the Paris Exhibition) devoted a stand to the metric system; by 1875 – less than a decade later – an international treaty known as the *Convention du Mètre* (Metre Convention) was signed by 17 states. Thereby, two thirds of the European population and close to half the world's population had adopted the metric system. This means that in most of these countries a law was passed to impose the new system. Official adoption and

75 http://www.vox.com/2015/2/16/8031177/america-farenheit

76 http://metricviews.org.uk/2012/10/50-years-of-celsius-weather-forecasts-%E2%80%93-time-to-kill-off-fahrenheit-for-good/

effective use of the metric system did not follow the same pace. By 1920 countries comprising 22% of the world's population, mainly English-speaking, used the imperial system; 25% used mainly the metric system and the remaining 53% used neither.[77]

This brief look at the history of the metric convention shows that the forging of a global and unified measurement system, as the one we today take unquestioned and as a given, was a monumental task in scale and scope which is not yet fully completed. It also shows that the spread of such a system is a process that can hardly tolerate alternatives.

Of course accounting and calculating were developed in many ways through history, in different societies and cultures. Quantitative thinking is by no means a European invention. But there is a special characteristic to the now dominant measurement system, which lies in its demand for totality and universality. What expanded from Europe was to become a globally unified system of measurement. This expansion was closely connected to a specific calculatory mindset that is linked to the emergence of the capitalist world system. In that process quantitative took over qualitative thinking as a widespread social phenomenon. In the «economic rationality» that defines the spirit of capitalism, calculation and calculatory reason play a defining role. Werner Sombart, a German sociologist and contemporary of Max Weber, wrote *Der Bourgeois* (1913), in which he explored the main characteristics of the capitalist *Geist* (spirit):

«(…) calculation forms an important element in the capitalist spirit, and this was recognized quite early in the history of capitalism. By calculation I mean the tendency, habit, perhaps more – the capacity to think of the universe in terms of figures and to transform these figures into a well-knit system of income and expenditure. The figures, I need hardly add, always express a value, and the whole system is intended to demonstrate whether a plus or a minus is the resultant, thus showing whether the undertaking is linked to bring profit or loss.»[78]

Calculation and capitalism have also been understood as intrinsically linked in critical studies of European imperial expansion. The Indian post-colonial scholar Arjun Appadurai analyzed the cultural conditions of expanding European notions of modernity to a global scale. In this, he explicitly mentioned numbers and argued that counting was instrumental. He suggested reassessing the study of colonial governmental practices and to further inquire into «the ways in which they employ quantification in censuses as well as in various other instruments like maps, agrarian survey, racial studies, and a variety of other productions of the colonial archive.»[79] In this context some specific inventions were turned into widely adopted social practices. The forging of a modern world system played a crucial role. The invention of double entry book-keeping was a key tool not only to transform the world into «data», but to

77 National Industrial Conference Board (1921): The metric versus the English system of weights and measures. pp. 10–11.

78 Sombart, Werner (1915): The quintessence of capitalism: a study of the history and psychology of the modern business man. T. Fisher Unwin, London, p. 125

79 Appadurai, Arjun (1996): Modernity at Large, p. 115.

apprehend whether a particular account or an entire venture was profitable or not.[80] The new system made it possible to translate the world into profits and losses. As Sombart said:

«Double-entry bookkeeping is born of the same spirit as the system of Galileo and Newton … With the same means as these, it orders the phenomenon into an elegant system, and it may be called the first cosmos built upon the basis of mechanistic thought. Double-entry bookkeeping discloses to us the cosmos of the economic world by the same method as, later, the cosmos of the stellar universe was unveiled by the great investigation of natural philosophy… One can scarcely conceive of capitalism without double-entry bookkeeping: they are related as are form and content. It is difficult to decide, however, whether in double-entry bookkeeping capitalism provided itself with a tool to make it more effective, or whether capitalism derives from the «spirit» of the double-entry bookkeeping.»[81]

This ultimately lies at the roots of how instrumental rationality and market logic gained ground, extending from commercial transactions to all realms of social life and social relations despite the ethical implications. The rationalization of commerce as an assumedly natural and universal way of reasoning leads to outcomes such as we have seen with the Stern Review on the economics of climate change, with its widespread implications for global policy and debate.

As a constitutional part of the emergence of capitalism, the invention of double-entry bookkeeping is part of a larger picture.[82] Capitalism can be defined, modestly, as a social relation, a world-system, but it is also an epistemic project that includes the broader and multilayered process sometimes described as «the quantification of Western society» (Alfred Crosby). This is a shift that took place in Europe from the Late Middle Ages to the Renaissance, when a concurrence of socio-cultural and technological factors influenced human perception.[83] Supported by innovations as mechanical clocks and cartography, new thinking habits around the measurement of reality developed and forged a unique *mentalité*, where the measurement of space and time, reducing and translating them into a unified metric system, was intertwined with the imperial enterprise as a means to explore and control new lands.

So it is important to keep in mind that the spread of the measuring mentality was an imperial project that could not tolerate other ways of doing things. The failure to recognize the different ways of knowing by which people across the globe run their lives and provide meaning to their existence is termed «cognitive injustice», or «epistemicide» (Boaventura de Souza Santos).[84] The global spread of the quantitative mind

80 Mayer-Schönberger, Viktor, and Cukier, Kenneth (2014): Big Data. Marinier Books, New York , pp 81.

81 Sombart, Werner (1928): Der moderne Kapitalismus (French translation 1992), vol II, part I, pp.118-119.

82 Chiapello, Eve (2007): Accounting and the birth of the notion of capitalism. Critical perspectives on accounting 18, 263-296.

83 Crosby, Alfred W. (1997): The Measure of Reality. Quantification and Western Society, 1250-1600. Cambridge University Press.

84 Santos, Boaventura de Souza (2014): Epistemologies of the South. Justice Against Epistemicide. Paradigm Publishers, Boulder.

was in this sense an integral part of «modernity» as an ideology, shaping the world as we know it. In the course of history, this process entailed, all over the globe, profound changes in the language through which we measure and value the material world around us, not only in terms of a mental switch in the abstract units we use – as converting from pounds to kilos – but a much more complex process of internalizing new and foreign parameters to replace culturally established and pre-existent references and the many diverse and traditional ways of measuring which have for ages been part of every local value system. «Epistemicide» is high price to be paid when one aims at pricing everything under the sun.

Lignite-pit of the RWE near Inden/Eschweiler.

Source: Axel Hartmann – Flickr

Concluding remarks

Over the years, carbon metrics emerged from the scientific realm in a process that integrated economic discourse and thinking in a dangerous way. We can ponder that «carbon» was, from the outset, a false or limited way to frame a much bigger problem. *But is it possible today to reassess this basic assumption?* And why should we do this? Today, counting carbon emissions and fusing this mode of accountancy into the larger System of National Accounts is presented as a revolutionary way of simplifying things in order to take action. We oppose this optimistic proposition because – as a matter of fact – quantification makes things much more complicated and raises many questions.

One could (and should) equally ask: Is it possible to talk about the success of certain political decisions without measuring them in terms of GDP growth? It is evident that many policies today would look different if they truly aimed to fulfill the interests and needs of real people and not the profit interest of shareholders. But what seems so obviously right would be so hard to change in practice.

In terms of the profound and transformative change we need, what does «decarbonization» translate into and what does it mean in the real world? Is the carbon-redux scheme really a key engine – as it is depicted – to respond to the magnitude of the crisis ahead? Or should it be challenged? Can we really expect to maintain environmental and social integrity under carbon accountancy? To what extent is transformative climate action actually hindered under a carbon-centric logic and what are the implications? Does such a thing as «carbon neutrality» make ecological and ethical sense? Can «carbon concerns» really encompass the social-justice and political dimension at the root cause of many of these ecological problems? These questions are all implied in the metric approach – but rarely posed.

To control and regulate «carbon» is also to control energy (and, in a way, the resource from which the energy is produced) and energy prices. If the common goal were to achieve a transition of the global economy out of fossil fuel dependency, a major issue would be who will control this transition, how and what for. Will we be able, on the basis of this epistemology, to really «choose» and plan for the post-oil society we want to live in and the transformative changes we want to bring about? Or will science rely on carbon metrics to model scenarios and pre-set mitigation «options» grounded in cost-benefit analyses? How can we debunk the myth that we can have «zero-net emissions» accountancy (an urgent matter in light of the Paris Agreement.)?[85]

85 https://www.project-syndicate.org/commentary/climate-change-alternative-approaches-by-camila-moreno-et-al-2016-03

Currently, the commons are resurging as a transformative vision and generative paradigm to confront the global challenges we face, from managing shared natural resources to creating innovative forms to organize the economy, to ensure welfare, to produce knowledge, etc.[86] Yet the commodification of carbon and the creation of private carbon rights in the name of «green growth» lead us in the opposite direction.

Current political debates are very much stuck in the carbon metric thinking and mindset, and it would take a long time and huge effort to change that. We would like to offer at least some perspectives. For one thing, global social justice is not possible without global cognitive justice. To recover and valorize the epistemological diversity of the world is an imperative. Reclaiming the «epistemologies of the South» is also part of reinventing social emancipation. A fundamental issue to be brought to the public debate is that under the pretended objectivity of the carbon metrics there is a great deal of violence: trying to make reality and its contradictions fungible into carbon units entails cultural, symbolic and epistemic violence.

We believe it is very necessary to preserve those spaces and communities where this logic is not dominant yet. From indigenous communities in the Amazon forest to agroecology and community-supported agriculture groups in Europe, Japan or the USA – alternative practices, lifestyles, economies and societies are possible and real. Often small, marginalized and precarious, alternatives practices should not be valued, judged acceptable or validated under the strict carbon metric. We need to ensure that policies protect these spaces and people, their rights and their cultures. Most importantly, we need to become much more innovative in how we can foster new initiatives and scale up and diffuse good experiences.

This is a key issue in our current political debate as mainstream thinking and policies regarding climate action are heading towards an overarching logic driven by «mitigation outcomes». In that logic, cost-opportunity valuation reduces environmental complexities to «transferable mitigation units», paving the way to worldwide offsetting schemes. We need to communicate strongly and loudly the false solutions and equally loudly point to alternative choices that our (elected) decision makers could take.

What would a radical decarbonization of our economy and lifestyle really look like if we were serious about phasing out all fossil fuels? How can we relocalize our economies? How can we dismantle the growth mantra? How can we regulate those industries that destroy and pollute and how can we prevent their lobbyists from simply buying political decisions in their favor?

Carbon or GDP alone will not point us the way. We need to challenge our mental infrastructures, how we acquire the established foundations for our thinking. As we have argued here, the all-powerful carbon paradigm can entail profound injustices. Beyond carbon, we need a multi-dimensional perspective, one which is aware of the metabolic, life-maintaining processes of the planet, taking into account its natural limits, as well as the fundamental rights and needs of all human beings and the ground rules of participation and inclusion as we move on.

86 Bolier, David, and Silke Helfrich (2012): The Wealth of the Commons: A World Beyond Market and State. Levellers Press, Amherst.

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Carbon Metrics

Global abstractions and ecological epistemicide

The environmental crisis is real, urgent, and of global reach and significance. Climate change is framed as the largest threat. But this threat is seen almost exclusively as a problem of too much CO2 emissions. Is climate change more important and more urgent than the loss of biodiversity, the degradation of arable soils, or the depletion of fresh water? Can any of these phenomena even be considered in isolation from each other?

This paper argues that the way we describe and frame a problem very much predetermines the kinds of solutions and answers we seek, e.g. carbon-centric mode creates and even destroys knowledge at the same time. The authors of this essay invite the readers to take a step back and brush climate policy against the nap.

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Heinrich-Böll-Stiftung Schumannstraße 8, 10177 Berlin
The Green Political Foundation 030 285340 info@boell.de www.boell.de