

The Ideal of a Zero-Waste Humanity: Philosophical Reflections on the Demand for a Bio-Based Economy

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Abstract In this paper we inquire into the fundamental assumptions that underpin the ideal of the Bio-Based Economy (BBE) as it is currently developed. By interpreting the BBE from the philosophical perspective on economy developed by Georges Bataille, we demonstrate how the BBE is fully premised on a thinking of scarcity. As a result, the BBE exclusively frames economic problems in terms of efficient production, endeavoring to exclude a thinking of abundance and wastefulness. Our hypothesis is that this not only entails a number of internal tensions and inconsistencies with regard to the ideal of BBE, but ultimately undermines the ideal itself, by pushing purported regenerativity into a cataclysmic and terminal discharge. We here point to the strategies that the BBE employs in this exclusion, the fundamental assumptions regarding the relation between energy and economy that underpin this endeavor, as well as to the resulting inconsistencies and their catastrophic consequences. We finally argue for the introduction of the presently excluded question of abundance and wastefulness and explore the implications of such a question for the ideal of a zero-waste humanity.

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*And sun,
Oh, sun enough!
Ezra Pound*

Introduction

“In a world with growing pressures on resources and the environment, the EU has no choice but to go for the transition to a resource-efficient and ultimately regenerative circular economy” (European Commission 2012b, 1). With these resounding words the European Commission’s *Manifesto for a Resource-Efficient Europe* places the demand for a Bio-Based Economy (BBE)¹ center stage. The BBE is defined as “the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy” (European Commission 2012a, 3). The demand for a BBE has in fact been developing for some time; while spuriously mentioned in the 1990s, the BBE was officially launched in 2005 (European Commission 2005) and has received increasing attention since (see McCormick and Kautto 2013).

In this paper we inquire into the fundamental assumptions that underpin the ideal of the BBE as it is currently developed. By interpreting the BBE from the philosophical perspective on economy developed by Georges Bataille, we show how the BBE is fully premised on a thinking of scarcity. As a result, the BBE exclusively frames economic problems in terms of efficient production, endeavoring to exclude a thinking of abundance and wastefulness. Our hypothesis is that this not only entails a number of internal tensions and inconsistencies with regard to the ideal of the BBE, but ultimately undermines the ideal itself, as it pushes the purported ‘regenerativity’ into a cataclysmic and terminal discharge. We here point to the strategies that the BBE employs in this exclusion, the fundamental assumptions regarding the economy that underpin it, as well as to the resulting inconsistencies and their catastrophic consequences. We thereby argue for the introduction of the question of abundance and wastefulness which presently remains excluded in conceptualizations of the BBE.

In the first part of this paper we provide an overview of central constituents of the BBE and situate our questioning alongside existing discussions. In the second part we introduce the concepts of *restricted economy* and *general economy* as developed by Georges Bataille in order to raise the presently overlooked philosophical question pertaining to the fundamental relation between energy and economy. In part three, we examine the BBE in terms of this question. The themes of *solar energy* and *waste* are analyzed from the perspective of the BBE on the one hand and

¹ What we here call BBE is sometimes referred to as ‘Knowledge Based Bio-Economy (KBBE)’, or simply ‘Bio-Economy’. Although subtle differences between the various definitions exist, we maintain that our arguments here concern general aspects that can be found in all of these definitions.

Bataille's thought on the other. This contrasting analysis reveals how current BBE approaches understand both of these concepts exclusively in terms of scarcity, thereby rendering the BBE the ultimate restricted economy sensu Bataille. This results in several inconsistencies with respect to the ideal of BBE, which will be shown to ultimately prove fatal. Accordingly, in part four, we argue that a perspective in which the relation between energy and economy is oriented towards abundance and dissipation remains wrongfully absent in current discussions of the BBE. We indicate several ways in which such a (Bataillean) perspective can be developed, and how this encompasses a vital dimension of questioning that, at the present, is absent.

What is the Bio-Based Economy?

Context and Central Ideals of the BBE

In order to situate the subject, it is first of all necessary to ask what the BBE is and how the demand for a BBE acquired its footing. If the BBE is defined as “the production of renewable biological resources and the conversion of these resources and waste streams into value added products (...)” (European Commission 2012a, 3), we must ask what problem this is supposed to resolve, and what the central ideas for resolving these issues are.

The opening citation serves as the starting point for answering both of these questions²: ‘Growing pressures on resources and the environment’ constitute the backdrop of the BBE-ideal. Natural resource scarcity, climate change, and environmental pollution are three of the fundamental obstacles that the BBE is designed to overcome (cf. Asveld et al. 2011b, 18–21; McCormick and Kautto 2013, 2589). As for the second question, it becomes clear that the problem we are currently facing is to be surmounted by moving ‘to a resource-efficient and ultimately regenerative circular economy’.

One may recognize *three* central themes to the envisioned solution: *circularity*, *cascade*, and *zero-waste*. As for the first theme of *circularity*, the problem of natural resource depletion is said to necessitate a new and different economic approach, i.e., a shift from non-renewable towards renewable resources. The traditional approach, sometimes referred to as *petrol-based*, may be thought of as linear: depletable fuel as input and products and polluting substances as output. The bio-based approach, on the contrary, is envisaged to be circular: renewable bio-fuels as input and recyclable products as output.³ The transition from a linear chain towards a closed loop is both a fundamental ideal and a challenge for the realization of the BBE (see Koppejan and Asveld 2011, 73). Figure 1 shows the schematics of how circularity is envisioned to operate.

² A somewhat simplified answer to both questions suffices for the present purposes. For a more detailed overview, see McCormick and Kautto (2013).

³ True circularity would, of course, render terms like *input* and *output* redundant.

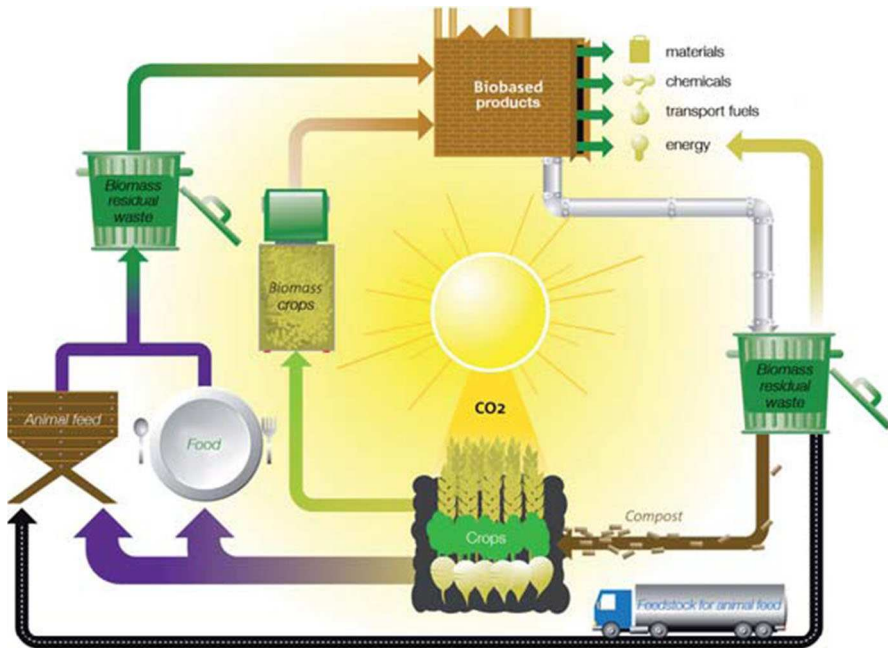


Fig. 1 Schematic overview of the BBE. *Image source* Ministerie van Landbouw, Natuur en Voedselkwaliteit (2007)

The circularity is established as follows: Solar energy (center) is transformed into crops (bottom center), which in turn are transformed into biomass (center-left). This biomass can be refined into products (top). The residual waste resulting from this production process is fed back into the loop (clockwise) and is either used as compost to help grow crops, turned into food or animal feed, or used to supply the energy required by other steps in the entire process.⁴

This last mentioned ‘feedback’ points to the *second* of the three themes envisioned within the BBE. To guarantee circularity, the production process must operate according to what is referred to as a *cascading model* (cf. Asveld et al. 2011b, 22). This means that all of the production processes within the BBE are connected in a cascade. The original biomass is initially turned into high value products (e.g. pharmaceutical materials). The waste stream of this production process is subsequently utilized as the supply stream for a lower-level production process that produces products of lesser value. This process of feeding waste-streams back into the cascade is repeated until the waste-stream can no longer be refined into products. In the final stage of the cascade, the waste is incinerated, providing additional power to energize various operations (e.g. transport, heat etc.) within the closed loop.⁵

⁴ See Wubben et al. 2012 for the complexity of biomass valorization in supply chains.

⁵ “Most bio-derived products are now produced in facilities dedicated to a single primary product... Ultimately the industry is expected to move toward large integrated biorefineries cost-effectively

The *third* theme concerns the ideal of *zero-waste*. It follows the logic of the circularity and the cascade: waste streams of production processes are to be redeployed to serve other processes internal to the system, thereby ideally eliminating waste entirely.⁶ “The sun is the main source of energy, and some clever logistical planning prevents even a cell of biomass from being lost. The chain hence becomes a closed loop” (Asveld et al. 2011b, 24).

In light of this short exposé, we can understand what the European Commission’s definition of the BBE amounts to: “the production of renewable biological resources” is thematized as *circularity* and “the conversion of these resources and waste streams into value added products” (European Commission 2012a, 3) bears upon the theme of *cascade*. The resulting closed loop ideally produces *zero-waste*: “Ideally, the bio-economy should be an efficient economic system that produces no waste...” (Asveld et al. 2011a, 11).

Situating Our Inquiry Alongside Existing Criticisms

The ideal of the BBE as presented in terms of its circularity, cascade, and zero-waste, has not been received without resistance. Critiques have been developed from various directions: First of all, there are those who doubt whether this ideal can be realized at all. Examples include Latham and Wilson, who wonder whether the BBE “is not so much a real and substantial prospect but more a fantasy future” (2007). They criticize the EU’s conception of BBE for lacking proper proof concerning economic and technological prospects. Others wonder whether this presentation of the BBE can actually deliver on its promises with regard to sustainability, particularly in light of the vast amounts of biomass that will need to be produced (Koppejan and Asveld 2011; Cf. Pfau et al. 2014, 1233).

Additionally, questions have been raised from ethical and political perspectives. One of the critiques here is that BBE is primarily framed in terms of economic gains, whereas risks and ethical issues are seen as less important (Hilgartner 2007). Further, Parry challenges the uniqueness and novelty of the biotechnologies by means of which the BBE is supposed to be realized, arguing that the emphasis on biotechnological solutions contributes to a political agenda that favors certain specialists’ positions (Parry 2007, 387). A somewhat similar charge is made by Birch, Levidow, and Papaioannou, who argue that BBE frames the problem of sustainability exclusively as a problem of inefficiency (Birch et al. 2010; McCormick and Kautto 2013, 2597). As a result, solutions are considered solely through the lens of (bio) technological progress, which serves the drafting of a unilateral ‘master narrative’ that excludes alternative solutions. Due to this heavy emphasis on solutions derived from the life-sciences and the development of biotechnologies, the BBE is accused of blatantly disregarding other social actors

Footnote 5 continued

producing biofuels, high-value bioproducts and potentially cogenerating heat and/or power for onsite use” (US Department of Energy 2011, 1–5).

⁶ For a more detailed and scientifically elaborate analysis of these processes, see Ragauskas et al (2006).

like small-scale farmers, who end up in second place when it comes to distributing (bio) resources (cf. Blok and Lemmens, 2015).

While siding with the abovementioned critiques insofar as we agree that these are matters that need to be discussed, we will here argue that a crucial dimension of questioning currently remains absent. This dimension concerns fundamental assumptions that underpin the ideal of the BBE. More precisely, it concerns the philosophical perspective vis-à-vis the unobserved horizon of energy and economy towards which both the ideal of BBE and many of the accompanying critiques are oriented. Even though the abovementioned critiques demonstrate that controversy exists with regard to (bio) resource production in the BBE, we observe that the relation between energy on the one hand and economy on the other remains uncontroversial and therefore unquestioned.

In what follows, we argue that there is good reason for controversy on this point, and we maintain that a philosophical questioning of the relation between energy and the economy is in order. Methodologically, the philosophical approach means that we are not primarily concerned with the viability or desirability of particular solutions envisaged in the BBE. This means that we presently forego the question as to whether the themes of circularity, cascade, and zero-waste are realistic, or indeed pertain to the ‘fantasy future’ that one of the abovementioned critiques suggests.⁷ The present inquiry involves a reflection on the mode of thinking that undergirds this ideal itself. It will become clear that the mode of thinking present in the ideal of BBE implicitly assumes the relation between energy and economy to be universally marked by scarcity.

In order to pursue the philosophical question regarding energy and economy in the BBE, we will interpret the ideal of BBE from the perspective of the French philosopher Georges Bataille. His work is especially relevant to the BBE for two reasons. First, because it provides a framework for analyzing the relation between energy and economy. Second, because it allows us to consider the implications of the BBE for the ideal of a ‘zero-waste humanity’. Our hypothesis is that the BBE fully belongs to what Bataille calls a restricted economy: it implicitly understands the relation between energy and economy in terms of scarcity and utility alone (Sect. “[The BBE as Restricted Economy](#)”). Our interpretation lays bare the hidden premises that steer the BBE in this direction. At the same time, we will demonstrate a number of resulting inconsistencies and tensions that ultimately undermine the ideal of BBE in a catastrophic way (Sect. “[The Bio-Based Catastrophe](#)”). This gives rise to a consideration of the ideal of a zero-waste humanity (Sect. “[On the Necessity of a Pressure Valve](#)”). We must begin, however, by an inquiry into the foundations of Bataille’s philosophy of economy and energy, which is the topic of the next section.

⁷ Particularly the theme of zero-waste is questionable in this regard, since it ultimately seems to suggest a perpetual motion machine which defies the laws of thermodynamics. Whether realistic or not, it is an important part of the ideal of BBE.

Georges Bataille on Economy

Georges Bataille published his theoretical work on economy first in 1949 under the title *The Accursed Share: An Essay on General Economy* (1991).⁸ The first part, subtitled ‘Consumption’, was supposed to be the first part of a trilogy, but parts two and three were never published during his lifetime. Apart from a number of satellite texts, we will chiefly focus on this first part (usually simply referred to as *The Accursed Share*) where Bataille presents his reflections on economy most systematically. We first ask what Bataille means when he speaks of economy and how this differs from our ordinary understanding of economy. Next, we review how Bataille analyzes this ordinary understanding of economy as the restricted economy, which must be seen as embedded in the radically different general economy. We then analyze how Bataille detects a prevailing yet disastrous disregard of the general economy and how he conceives of an alternative. Bataille’s diagnosis will prove to be of vital importance for our discussion concerning the BBE in Sect. “[The BBE from a Bataillean Perspective](#)”, because in the BBE, the general economy remains unconsidered.

What does Economy mean for Bataille?

In the introduction to *The Accursed Share*, Bataille explains that in his reflections on economy, he “wanted to avoid redoing the work of the economists” (Bataille 1991, 13). What this amounts to is that unlike ordinary considerations of economy as the study of the production, distribution, and consumption of goods, Bataille is concerned with economy in terms of a much larger framework. This framework is indicated as the general economy and is understood in terms of the circulation of energy that is constitutive of “living matter in general” (Bataille 1991, 23), meaning a continuum that involves the vegetal (e.g. leaves of plants as products of the circulation of energy called photosynthesis) and animal (offspring, reproduction), up to socio-cultural phenomena (human economies and works of art). The products of this circulating energy—things in the world—are appropriated in what Bataille calls the restricted economy, where ‘the economists’ self-evidently consider of them as economic goods. The latter perspective of the restricted economy of goods is said to overlook the general economy which concerns the transition of energy into living matter *in general*. The difference between the general and restricted economy bespeaks a difference in relation between energy and economy, and it is Bataille’s contention that this difference is forgotten in ‘the work of the economists’ who falsely universalize the restricted economy and therefore solely see energy as an economical good. They thereby fail to see how this only corresponds to a particular situation that exists within the larger framework of the general economy. In order to see Bataille’s point and its consequences for the BBE, we first ask how the relation between energy and economy is understood within the restricted economy.

⁸ Originally published in French : *La Part Maudite. Essai d’économie générale* [1976b (1949)].

Restricted Economy

The restricted economy designates a particular situation that perceives of energy as an economic good like any other; it is valued according to a system of production and consumption which is characterized by a logic of *scarcity* and *utility*. The characteristic of scarcity does not primarily point to a specific quantitative shortage of the specific good of energy (e.g. electrical energy), but designates the category in which energy appears. In the restricted economy, energy is considered within the category of scarcity, which is to say that it is considered like any good of which one does not have enough and is therefore in demand. Demand of goods requires supply of goods, which is understood in terms of *utility*, denoting the attempt to overcome scarcity by means of useful labor, viz. the production of the goods that are in demand. The restricted economy thus implicates a means-end relation, in which the *end* is the overcoming of scarcity by *means* of the production of goods. In this relation, energy appears as an economical good that can be deployed as a means to produce other demanded goods. We will see in Sect. “[General Economy as Ground for the Restricted Economy](#)” how this understanding of energy as just another economical good overlooks a more fundamental dimension regarding energy and economy, i.e. the general economy.

The restricted economy corresponds both to how one commonly conceives of economy, as well as to modern economic science. The situation of scarcity and utility is commonly taken for granted, considering that one generally acknowledges the *need* to do useful, productive work in order to make up for what is lacking: one needs to go to work because it is necessary to produce the goods that are demanded in society. Further, one must do so in order to get a wage which can be used for what is needed. Farmers must labor in order to produce crops (utility), both because food is in demand (scarcity) and because it yields a wage which can be used to supply the needs (scarcity) of themselves and their families.

Likewise, economic science corresponds to the restricted economy, because in its study of the production, distribution and consumption of goods, scarcity and utility are ubiquitous. To consider some classical definitions: Lionel Robbins defines economy as the “science which studies human behavior as a relationship between ends and scarce means which have alternative uses” (1932, 16); and Adam Smith sees economy as “a branch of the science of a statesman or legislator [with the objective of providing] a plentiful revenue or subsistence for the people” (1976, 428).⁹

In sum, the restricted economy designates an economical understanding of reality in which the world is encountered in terms of scarcity, lack, and need, all of which is to be compensated for by means of useful labor. It involves a particular mode of thinking that is present in both colloquial comprehension of economy as well as in economic science,¹⁰ and which Bataille articulates as “the consciousness of a

⁹ Smith of course calls this ‘political economy’.

¹⁰ It is debated whether Bataille is correct in subsuming all of modern economic science under the restricted economy. Jean-Joseph Goux denies this (cf. Goux 1990, 206–224), whereas Alan Stoekl criticizes Goux for misreading Bataille (cf. Stoekl 2007b, 271; Stoekl 2007a, 137–138). This discussion is

necessity, of an indigence (...)", where individuals come into view as "nothing but eternally *needy* individuals" (Bataille 1991, 23). Such an economy of neediness implies a specific understanding of the relation between energy and economy in which energy is approached as a good existing within an economy of supply and demand.

General Economy as Ground for the Restricted Economy

According to Bataille, the restricted economy corresponds only to a particular, isolated (i.e. restricted) situation, which is part of a much larger framework (Bataille 1991, 20). The latter constitutes the ground of the former, but is itself usually forgotten.

Bataille's economical thought centers in on this larger framework. It concerns the general flow of energy, which he examines in terms of what he calls the general economy. This bespeaks an important difference in the relation between energy and economy: here, energy is not primarily considered as a good existing within a particular economy, but is understood ontologically as that what first constitutes and literally sets all processes and activities of life on the surface of the globe, including particular economic processes of production and consumption of goods, in operation. This means that a particular, restricted economy in which energy appears as a good is itself constituted and driven by the more general flow of energy in an ontological sense. Bataille's general economy takes account of this constitutive energy as characterized by *abundance* and *dissipation*.

Regarding energy as constitutive for goods as well as its characterization in terms of abundance and dissipation, the sun exemplifies what is at stake in the general economy. For Bataille, solar energy is the origin and source of all life and wealth: "Solar energy is the source of life's exuberant development. The origin and essence of our wealth are given in the radiation of the sun" (Bataille 1991, 28). Life and living matter are constituted by the sun in the sense that they are transformations of solar energy. Such transformations are essentially characterized by abundance: on the one hand, the sun gives without ever receiving (cf. Bataille 1976a, 10), which is to say that solar energy is dispensed relentlessly, cannot be given back, and must go somewhere. On the other hand, the particular living systems that exist as transformations of this gift of solar energy have "at [their] disposal greater energy resources than are necessary for the operations that sustain life" (Bataille 1991, 27). Because particular living systems do not and cannot consume the sun's gift completely for self-maintenance, a surplus of energy accrues. Bataille speaks of "a superabundance of energy on the surface of the globe" (Bataille 1991, 29), and conceptualizes this in terms of rising pressure. This pressure first causes particular living systems to grow, to extend maximally (Bataille 1976a, 11). Hence, the living systems that are first constituted as transformations of solar energy are put under pressure by the sun's gift and therefore tend to extend maximally. However, given

Footnote 10 continued

beyond the scope of the present paper, which is not concerned with modern economic science in general, but focuses on the BBE.

that the surface of the globe is limited, and the sun's gift is unremitting in the face of such a limited space, "the impossibility of continuing growth makes way for squander" (Bataille 1991, 29). At this juncture, squander is understood as "the production of increasingly [costly] forms of life" (Bataille, 1991, 33).¹¹ If plant life uses most of the sun's gift for growth or extension, higher organisms waste or dissipate vast amounts of energy in eating and death: they eat plants and animals without growing to the same extent, thus making self-preservation and growth a 'costly' affair. Additionally, the extravagant, intricate, and painstakingly extensive sexual behaviors of higher organisms imply a costly way of procreation: "the mammalian organism is a gulf that swallows vast quantities of energy" (Bataille 1986, 60). It squanders or dissipates the sun's gift, thereby releasing the pressure. In short, living matter as constituted by energy and confined within a limited space responds to the sun's abundant and pressurizing gift by dissipation in the form of costliness and inefficiency.

Humans occupy a specific position in this constellation. Although humans are conditioned by the same movement of life, their activity, by way of labor and technology, "opens up a new possibility to life, a new space" (Bataille 1991, 35–36). The specificity of this new possibility first designates association with an augmented supply of energy. The application of increasingly sophisticated technologies and organization of labor makes it possible to exploit living and dead matter (e.g. animal domestication and fossil fuels), thereby gaining access to gigantic energy resources. In unlocking greater parts of the sun's gift when only a small fraction of this energy is used for self-preservation, an increasing surplus of energy accumulations results, giving rise to an increasing pressure. As with other systems of life, this pressure is first incorporated in terms of increased extension or growth, where growth is now to be understood in the form of demographic expansion, conquer, and imperialism. However, expansion cannot continue indefinitely due to confinements of space, which means that the incorporation of pressure is eventually hindered by limits to growth.

Catastrophically or Gloriously

The question of what happens when limits to growth have been reached and expansion or conquer can no longer absorb the excess of energy goes to the core of Bataille's project. His answer is that the accumulating energy "must be spent, willingly or not, gloriously or catastrophically" (Bataille 1991, 21). The latter option is said to occur when a particular system can no longer grow, yet continues to be put under increasing pressure by the sun's relentless giving: ultimately something has to give, causing the system to burst in a feat of cataclysmic explosion. This in fact constitutes the ominous backdrop of Bataille's considerations of economy. He writes his studies in the aftermath of what he views as two massive occurrences of catastrophic energy spending: the two world wars as "the greatest orgies of wealth (...) that history has recorded" (Bataille 1991, 37). Although these wars are not

¹¹ Hurley translates 'onéreuses' as 'burdensome', but we maintain that 'costly' is a more accurate translation. (Cf. Bataille 1976b, 40).

claimed to be singularly caused by the colossal amounts of surplus generated through rapid industrialization, Bataille does take them to be calamitous and violent exudation of the resultant accumulations of energy that had to be spent. Such disastrous and destructive expenditure constitutes the outlet for a system that can no longer incorporate the sun's gift by means of expansion.

The alternative to the catastrophic and unwilling expenditure of energy in war consists in spending energy willingly and gloriously. This alternative implies radically acknowledging one's position within the general economy, which comes down to considering the relation between energy and economy in its corresponding terms. Energy is then not to be taken as a (scarce) good that must be produced, accumulated, and deployed, but instead it comes into view as the constitutive ground which sets all particular economies, organic and human alike in operation. This entails understanding energy as the sun's constitutive and abundant gift, which evokes a response to this gift in terms of abundance and dissipation.

Bataille is the first to admit that such a response remains difficult to fathom, since it "is to go against judgments that form the basis of a rational economy" (Bataille 1991, 22). It calls for a radical changeover of perspective that "actually accomplishes a Copernican transformation: a reversal of thinking" (Bataille 1991, 25). The reference to Copernicus makes clear that although such a reversal may be strange, it is not inconceivable.

In an attempt to articulate the conceivability of reversal, Bataille traces several occurrences of the logic of abundance throughout cultural history, with the analysis of the potlatch as the most famous and important.¹² As a ritual performed by indigenous people in the American northwest, the potlatch concerns the obliteration of accumulated resources for the purpose of humiliating, challenging and obligating rivals, thereby gaining rank over them. Examples of such destruction include the killing of one's own slaves, the wrecking of canoes, up to setting one's own village on fire (Bataille 1991, 67–68). Although the ritual displays a certain purposefulness and thus utility in the gaining of rank over a rival, Bataille is adamant in pointing out that "the principle of [such utility] is nevertheless determined by a resolute squandering of resources that in theory could have been acquired" (Bataille 1991, 72). Compared to straightforward rapine, the potlatch designates an extremely costly way of gaining profit. In short: "There would be no potlatch if... the ultimate problem concerned the acquisition and not the dissipation of useful wealth" (Bataille 1991, 68). Bataille interprets the potlatch as exemplifying a transgression of the restrictions of utility and scarcity, thereby manifesting the conceivability of encountering the sun's gift in terms of abundance and dissipation.

The potlatch is only one of many cases that Bataille investigates along these lines. Other examples include the construction of pyramids which, to the eyes of rational economists who operate in terms of profit and efficiency, must appear "a monumental mistake; one might just as well dig an enormous hole, then refill it and pack the ground" (Bataille 1991, 119), and Lamaist monks who parasitize upon the

¹² The Potlatch was first described by Marcel Mauss in his ethnographical studies of Native American cultures in the American northwest (cf. Mauss 2011); Bataille emphasizes its importance in a note: "reflection on potlatch led me to formulate the laws of *general economy*" (Bataille 1991, 193, note 25).

surplus produced by Tibetan workers, dissipating it “in contemplative life ... [which] avoids activity” (Bataille 1991, 109). Bataille provides such examples as articulations of dissipation or expenditure of accumulated energy, which implies acknowledgement of the general economy.

Without doubt, thinking in terms of abundance is peculiar: by contemporary judgment, setting one’s own village on fire is nothing short of demented. Yet for Bataille, instances like the wasteful potlatch are revealing precisely because of this peculiarity. Because “the movement it structures differs from ours, it appears stranger to us, and so it is more capable of revealing what usually escapes our perception” (Bataille 1991, 72). This points to both the necessity and glorious conceivability of thinking the question of energy and economy in terms of abundance and dissipation. To take its necessity first, the very fact that the potlatch appears so peculiar shows that our customary mode of understanding is sturdily anchored in the restricted economy, which “excludes in principle non-productive expenditure” (Bataille 1985, 117). Bataille views the generalization of this customary mode of understanding as ultimately ending up in a catastrophic explosion akin to the world wars. In principally excluding the wastefulness or non-productive expenditure such as exemplified in the potlatch, the situation in which energy appears as a good within the categories of scarcity and utility becomes generalized. Bataille observes such a generalization of the restricted economy in both colloquial understanding of economy as well as in economic science: “The human mind reduces operations [...] to an entity based on typical particular systems [...] Economic science merely generalizes the isolated situation” (Bataille 1991, 23). Such universalization of a specific relation between energy and economy neglects that the situation to which it corresponds is itself a particular, isolated, and restricted product of the flow of energy in the sense of the general economy. Since the restricted economy is itself literally set in operation by energy in the constitutive sense of the general economy, it is itself subject to the sun’s abundant and pressurizing gift. This pressure remains unconsidered, because generalization of the restricted economy entails solely encountering energy within the categories of scarcity and utility. As a result of forgetting energy in this ontological sense, that is, of forgetting the general economy, the universalized restricted economy can only incorporate pressure by extending and must ultimately explode once extension is no longer possible. The peculiar wastefulness encountered in the potlatch teaches us something about our customary mode of understanding the relation between energy and economy, which in its generalized form leads to catastrophe. It indicates that if catastrophe is to be avoided, it is necessary to refrain from universalizing the restricted economy and instead seriously consider the peculiarity of wasteful expenditure, which is to say, to precisely transgress the restrictions of the restricted economy. As Bataille puts it: “the extension of economic growth itself requires the overturning of economic principles” (Bataille 1991, 25).

Bataille sees a glorious alternative to catastrophe in such transgression or overturning of economic principles. It is the transgressive that constitutes an alternative: one must precisely transgress or move beyond the principles of the restricted economy that exclude wasteful expenditure in order to keep the restricted economy from its catastrophic terminus. Approaching the question of why such an

alternative is thought to be glorious is best illuminated with the case of the BBE in mind. We therefore first turn to the BBE and the implications of Bataille's thought for this ideal. Afterwards, we will return to the question of the glorious alternative to catastrophe, which also turns out to be central to the BBE.

The BBE from a Bataillean Perspective

Bataille's thought has important implications for the BBE. We explore these implications in the present section. First, we will review the BBE in light of Bataille's conceptualization of the restricted economy and general economy. We argue that the BBE turns out to be the apex of the restricted economy. Secondly, we show how this makes the BBE vulnerable to the problems that Bataille diagnoses with regard to the restricted economy: it implicitly and wrongfully universalizes the relation between energy and economy that belongs to the restricted economy. We will see how such universalization not only leads to internal inconsistencies with respect to the ideal of the BBE but ultimately causes this ideal to undermine itself in a catastrophic way. Thirdly, we plot a trajectory in which the BBE can avoid such catastrophe. In line with Bataille, this points to a peculiarity that is necessary and glorious. We conceptualize this trajectory by claiming that the BBE is in need of a pressure valve.

The BBE as Restricted Economy

Bataille's thought on the relation between energy and economy is of interest for the discussion of the BBE, because the latter fully adheres to the restricted economy. This can be shown by investigating the relation to the sun on the one hand, and the themes of circularity, cascade, and zero-waste on the other.

As is the case in Bataille's thought, the sun occupies a central position in the ideal of the BBE. Figure 1 depicts the BBE as a perfectly heliocentric operation where the sun constitutes the main source of energy. The relation between this source of energy and economy corresponds to the restricted economy, which is to say that *the sun appears in terms of scarcity and utility*. This may seem an odd claim at first, since the sun is obviously the BBE's energy source of choice precisely because it is not scarce but virtually inexhaustible. This inexhaustibility is, after all, what is to facilitate a transition from a petrol-based towards a bio-based economy. However, scarcity must presently not be taken to refer to a specific quantity of solar energy, but instead designates the category or mode in which solar energy appears. It appears as a good of which we do not have enough (scarcity) and which must therefore be produced (utility). This can be observed in the BBE's endeavor to maximize the utility-potential of solar energy. In the design of the BBE, one finds a strong demand for increase of predictability, efficiency, and control with regard to solar power and its products.¹³ As seen in the first section of this paper, this is

¹³ Cf. Birch et al. who analyze this point in terms of an intensification of the productivity of natural resources (2010, 2907), and Boyd et al. (2001) who analyze this idea of productivity in terms of the Marxian concepts of formal and real subsumption of nature.

tantamount to optimally capturing solar energy, while at the same time rendering this energy maximally useful through circularity, cascade, and zero-waste: “Ideally, the bio-economy should be an efficient economic system that produces no waste” (Asveld et al. 2011a, 11). This means that even though solar energy may be abundant, one is nonetheless required to render this energy maximally useful by capturing and controlling it without any, i.e. ‘zero’ waste.

The ideal of the BBE thus relates to the sun in terms of a *need* for maximum *utility*. In light of a Bataillean perspective, this relation appears as the relation of ‘needy individuals,’ and involves the understanding of the relation between energy and economy that belongs to the restricted economy. In short, if the restricted economy designates the relation between energy and economy according to which energy appears like any other good that is in demand and must therefore be produced, i.e. where reality is encountered in terms of scarcity on the one hand and utility as the compensation for scarcity on the other (Sect. “[Restricted Economy](#)”); and if the BBE relates to energy in terms of a *need* for maximum (zero-waste) *utility* in reference to the *good* of energy (Sect. “[The BBE as Restricted Economy](#)”); then it follows that this ideal of the BBE is completely oriented towards the restricted economy.

The Bio-Based Catastrophe

The BBE thus belongs to the restricted economy. Further, in demanding maximum utility and zero-waste, it generalizes the corresponding relation between energy and economy. It solely encounters energy as a good that must be harnessed, produced, and not wasted. This disregards energy in the ontological, constitutive sense: the ideal of the BBE forgets the general economy in favor of a universalized restricted economy. It accordingly mistakes an abundant gift for a scarce one; by exclusively focusing on utilizing the sun’s gift, the BBE fails to take notice of the question where this energy is supposed to go.

The consequences of this forgetfulness first of all point to an internal inconsistency within the ideal of the BBE itself, since it must deny its own demand for circularity and grow. If the BBE is prompted to maximally capture solar energy, and if nothing, i.e. zero of this energy goes to waste, then the result can only consist in ever increasing energy accumulations: a rising pressure in Bataillean terms. This increasing pressure forces the BBE to grow, but such growth is at odds with the ideal of the BBE itself. Although portrayed as a ‘regenerative circular economy’ (European Commission 2012b), the BBE must, by virtue of its own logic, deny this demand of circularity and increase. The mode in which solar energy is encountered leads to an increasing pressure that breaks open the closed-loop or circular system, turning it into an ever expanding spiral. Whereas one may of course argue that such economic growth is part of what the BBE is designed to achieve,¹⁴ this would mean that it is not at all envisioned to be a circular economy, but rather to

¹⁴ E.g. “The Bioeconomy offers Europe a unique opportunity to address complex inter-connected challenges, while achieving economic growth” (“Bioeconomy - ensuring smart green growth for Europe - Research - European Commission” n.d.). Retrieved January 3, 2015, from <http://ec.europa.eu/research/bioeconomy/>”.

incorporate particular circular production processes as constituents of an overall spiral or growth economy.

Next to it being inconsistent with regard to the ideal of the BBE, the second, more problematic consequence of forgetting the general economy is that incorporation of the sun's energizing gift by means of extension cannot go on indefinitely, since the available space is limited. As became clear from the previous section, a Bataillean perspective shows how with regard to living systems "the impossibility of continuing growth makes way for squander (Bataille 1991, 29)" in forms of costly procreation. But the BBE cannot allow for the latter, given its adherence to zero-waste.¹⁵ The BBE must grow, and upon reaching its own limits to growth, it must let pressure build up within its restrictions. Pressure cannot be piled up interminably within a limited space: ultimately something has to give in a feat of cataclysmic explosion.

The current ideal of the BBE can thus be observed to undermine its own ambition in a catastrophic way. Its ambition is to guarantee a sustainable future by becoming regenerative and circular, but regenerativity understood as zero-waste or absolute utility can only spiral out of control towards a catastrophic discharge. Based on this diagnosis, we argue that the BBE overlooks a vital and essential element: a pressure valve. In the following section, we will elaborate the meaning of this concept, as well as its implications for the BBE and the ideal of a zero-waste humanity.

On the Necessity of a Pressure Valve

The catastrophic self-undermining that marks the present conceptualizations of the BBE roots in a disregard of the general economy, which implies a mistaken universalization of the specific relation between energy and economy that belongs only to the restricted economy. In Bataille's words, such a mistake "causes us to *undergo* what we could *bring about* in our own way" (Bataille 1991, 23). We learned from Sect. "[Georges Bataille on Economy](#)" how Bataille thinks that accumulating energy eventually must be spent, either catastrophically or gloriously. Against the present conceptualization of the BBE that must undergo the catastrophic variant of expenditure, we here opt for bringing about the glorious.

This amounts to claiming that what is missing from the BBE as depicted in Fig. 1 is a pressure valve. Conceptually speaking, the pressure valve points to a way in which a closed, circular system that is put under pressure by the sun's giving can exhaust accumulating pressure. If the system portrayed in Fig. 1 must by virtue of its own logic (zero-waste) grow and eventually burst, a pressure valve indicates a way to deal with accumulating pressure.

¹⁵ The previously mentioned criticism regarding the scientific invalidity of zero-waste (see Sect. "[Situating our Inquiry Alongside Existing Criticisms](#)", particularly note 7) is of no avail here: even if zero-waste is physically impossible due to the laws of thermodynamics, solar energy remains abundant. This abundance is not dispelled by the necessary loss present in every energy conversion which thermodynamics discusses. If this were the case, the economy of energy would be in equilibrium, which is not the case, as evidenced by the phenomena of growth and squander.

Implications of the Pressure Valve for the BBE

The pressure valve has four important implications for the ideal of the BBE. First of all, it signifies the acknowledgement, rather than the forgetting of the general economy. It takes seriously the idea that the relation between energy and economy as depicted in the restricted economy is not universal, but particular. That is, the situation in which energy appears as a good that is characterized by scarcity and utility is itself set in operation by energy in the constitutive sense of the general economy. The pressure valve acknowledges this and takes account of the fact that the general economy pressurizes the restricted economy and hence pressurizes the BBE. This means that if the BBE is to fulfill its ambition of working towards a sustainable future, it must incorporate the pressure valve as designating the explicit consideration of the relation between energy and economy instead of the presently manifest disregard for the question concerning this relation and its implicit restriction to the logic of the restricted economy (see Sect. “[Situating our Inquiry Alongside Existing Criticisms](#)”).

Secondly, the pressure valve signifies the necessity and conceivability of spending of the sun’s accumulating gift in a non-catastrophic way. This implies allowing for wasteful expenditure of energy. It may be clear that the current ideal of the BBE cannot allow for expenditure such as witnessed in the potlatch, since the wastefulness portrayed there is antipodal to zero-waste. Yet if catastrophe is to be avoided, the BBE must find a way to include considerations that transgress the restrictions of its habitual mode of thinking that is solely based on a thinking of scarcity: it must consider energy in terms of abundance, which means that zero-waste has to be replaced with wastefulness and dissipation. For the BBE, in addition to considering the relation between energy and economy, the pressure valve further implies the overturning of zero-waste and instead admits questions of abundance, dissipation, and wastefulness.

Thirdly and more concretely, the pressure valve points to a different order of the transformation of solar energy. The BBE as presently developed ultimately restricts its considerations of such transformations to scarcity and utility. The qualitative transformations of solar energy that occur in the BBE (e.g. crops and derived products, see Sect. “[What is the Bio-Based Economy?](#)”) are considered as products or goods that are valued in the terms of scarcity (zero-waste, maximal efficiency) and utility (assurance of circularity). The pressure valve, conversely, suggests a qualitative shift regarding the transformation of solar energy, which implies moving production beyond the restricted economy.

We can recognize several domains toward which the BBE can look to incorporate pressure valves as qualitatively different transformations of energy. A possible domain to which Bataille points is art. We have encountered the example of the pyramid (Sect. “[Catastrophically or Gloriously](#)”) and can expand this to involve the arts more generally. Art and artworks can of course be considered to be transformations of energy that are understood according to a logic of scarcity and utility, i.e. as economic goods. However, they cannot, by definition, be fully comprehended as such. Artworks are never solely valuable because of their usefulness or scarcity; their signification and significance goes beyond such criteria.

They are prime instances of wasteful expenditure, as exemplified by the case of the pyramid as possibly the least efficient way to bury someone. So although works of art can be seen as economic goods from the perspective of the restricted economy, they do not primarily accumulate energy in a quantitative way: they are instead the result of a glorious spending of energy. From this perspective, art can be seen as a pressure valve that prevents the catastrophic expenditure of the accumulated surpluses of energy in the BBE. This means that contrary to viewing art as cultural adornment of the economy or taking it into consideration as an aberrant fringe phenomenon, a BBE that aims to be sustainable should recognize pressure valves like art, i.e. instances of qualitative transformation and spending of accumulated energy, as an integral part of a sustainable economy.¹⁶

Another domain toward which the BBE can look for incorporation of pressure valves concerns what could be called an ethic of passivity, where the latter term does not necessarily mean the lack of any activity whatsoever, but rather the lack of an activity that reinvests its products. We have seen how Bataille gave the example of Lamaist monks (Sect. “[Catastrophically or Gloriously](#)”) who consume a surplus without reinvesting it to the economy from which this surplus stemmed. The artist from our previous example fits this role as well. One could further think of science, although it would need to be understood as involving more than providing fundamentals for application. Scientific knowledge and the vast expenditure of resources needed to acquire such knowledge would then move beyond a valorization simply in terms of the eventual production of useful products or goods, and would rather be considered as transformations of a qualitatively different order, more akin to the arts than to instruments. On this point, philosophy and theology are suitable candidates as well. The excessiveness encountered in such an ethic of passivity constitutes a possible pressure valve for the BBE, which means that it should not simply be condemned and debarred as unproductive wastefulness, but rather be hailed as the pressure valve that a circular, regenerative economy needs. Fidelity to such an ethic of passivity quite obviously requires the Copernican transformation mentioned in Sect. “[Catastrophically or Gloriously](#)”, and is further complicated by entailing political questions regarding which (groups or classes of) people are included in, or excluded from such an ethic. None of these issues is easily dispelled, but if the BBE needs pressure valves, and if an ethic of passivity is a good candidate for such a valve, the principle of such wastefulness (contrary to zero-waste) deserves serious consideration.

While our analysis is far from exhaustive, we have given several suggestions as to how the BBE might incorporate pressure valves. Such suggestions cannot, in any simple way, be expanded to provide a full-fledged recipe for avoiding the catastrophe that the BBE faces, for the practical reason that the BBE is a project that is still in development. This means that deliberations such as the ones above should be developed alongside future discussions regarding the development of the BBE. We maintain that the concept of the pressure valve helps illustrate what is at stake and should thus be accorded a place in such discussions. However, next to this practical reason, a more fundamental reason exists. This reason points to the fourth

¹⁶ The further exploration of the role of art in our society in general and in the BBE in particular is beyond the scope of this article.

implication of the pressure valve, which gives rise to the ethical question of a zero-waste humanity, the topic of the next and final section of this paper.

The Pressure Valve as a Glorious Possibility: Beyond a zero-waste Humanity

We have argued that the BBE needs a pressure valve and have indicated both what this implies and how the BBE can incorporate it. Yet the nature of this pressure valve calls for further reflection. If Bataille argues that economic growth *requires* the overturning of its own principles (Sect. “[Catastrophically or Gloriously](#)”), and if we argue that the BBE *needs* a pressure valve (Sect. “[On the Necessity of a Pressure Valve](#)”), we are in fact implying that what is needed is an instrument for avoiding catastrophe: the pressure valve is then considered as a safety measure. And indeed, we maintain that the BBE needs such a measure, i.e. an overturning of zero-waste in order to avoid a catastrophic terminus. Such a pressure valve is necessary, conceivable, and possibly successful in the context of the BBE. Abovementioned expenditures (arts, passivity), can be integrated into the BBE in order to deny zero-waste and occasionally release pressure, thereby guaranteeing circularity.

What must be recognized is that the pressure valve thereby points to a paradox with regard to utility: the valve is useful as a safety measure precisely because it involves something wasteful, i.e. useless. Our argument for the necessity of the pressure valve involves a similar paradox, since it calls for moving beyond the restricted economy and its accompanying consciousness of necessity, but is at the same time itself framed in terms of an economy of necessity, i.e. the need to avoid catastrophe. This returns us to a question left open at the end of Sect. “[Catastrophically or Gloriously](#)”, as it demonstrates what is at stake when Bataille speaks of the glorious, i.e. the expenditure of energy as an alternative to the catastrophic. This notion of the glorious is of particular interest for the BBE, because it gives rise to the ethical question concerning the character of humanity associated with the BBE.

For Bataille, the glorious indicates the venture beyond an economy of need, as it derives its legitimacy from this transgression itself, rather than from the ultimate utility of this venture. We can return to our example of art as a pressure valve to clarify this. We have argued for the incorporation of art as a qualitatively different transformation of energy, i.e. as a pressure valve that is needed to secure the sustainability of the BBE. This means that one can recognize the useless, wasteful expenditure of energy occurring in art to ultimately have a use insofar as it helps to avoid catastrophe: the uselessness is rendered useful. Importantly, in order to see this usefulness of the useless, one must make two steps with regard to the relation between energy and economy: *first*, suspending the demand for zero-waste or absolute utility and acknowledging the general economy and its corresponding abundance of energy as pressure; *second*, recognizing that useless expenditure has its use as a pressure valve. Via these two steps, the legitimacy of art can be derived from its utility. Conversely, the glorious for Bataille derives its legitimacy and value not from an ultimate goal or use, but rather from the transgressive venture itself. It takes the first step but not the second.

Bataille analyzes the glorious in terms of an experiential domain that is opened in instances of expenditure, in which utility and scarcity are of no concern. This domain specifically concerns humans, since they are involved in the transformation of vast amounts of energy (Sect. “[General Economy as Ground for the Restricted Economy](#)”) and can be conscious of this involvement (Sect. “[Catastrophically or Gloriously](#)”). Therefore, humans can be said to take part in the glorious, insofar as the economy of neediness can be consciously transgressed. On multiple occasions, Bataille analyzes this in terms of ecstatic and rapturous experience, for example, the experiences connected to eroticism (a wasteful practice that can never be exclusively considered in terms of efficient procreation) (cf. Bataille 1986), being moved by art, or being absorbed in (religious) festivities and rituals (cf. Bataille 1988, 1989). What these have in common is that they concern instances in which one’s everyday consciousness of neediness and accompanying character as functionary of an economy of need are momentarily suspended, as one moves to an experiential domain beyond restrictions of scarcity and utility. This is called glorious precisely because it is not for the sake of something else, for future results, or to acquire ends, but rather transgresses the restrictions of necessity altogether to sovereignly exist for the sake of itself.

This indicates a question for the humanity that is associated with the BBE: if the BBE needs a pressure valve, and if consideration of this pressure valve involves a transgression in the sense of a suspension of zero-waste and of acknowledgement of the general economy, then the question is how humanity living in a BBE relates to this transgression. This clearly is an ethical question, although it differs from the existing ethical questions pertaining to the BBE which generally concern matters of risk and consequences for particular groups of people (see Sect. “[Situating our Inquiry Alongside Existing Criticisms](#)”). The ethical question raised in terms of the pressure valve concerns the character of humanity that belongs to the BBE.

Must humanity belonging to the BBE be considered a zero-waste humanity? The latter’s character would then come down to being a functionary or worker¹⁷ that guarantees the operations of cascade, circularity, and zero waste as portrayed in Fig. 1 (see Sect. “[What is the Bio-Based Economy?](#)”). Based on the previous deliberations, we can say that such a zero-waste humanity existing in a zero-waste BBE is anything but sustainable. A truly sustainable BBE rather implies a wasteful humanity. The ethical question then concerns how one relates to this wastefulness. One possibility is to evaluate it by the standard of utility and see how it guarantees stability and sustainability, which would render humanity a wasteful functionary in the service of the stability of a (bio-based) economy. Yet Bataille’s notion of the glorious suggests a venture beyond this as well. In terms of the glorious, wastefulness does not find its legitimacy in its ultimate utility, but points to the possibility of a domain beyond utility altogether.

For the BBE, the pressure valve therefore finally involves the question of allowing for contemplation that is beyond an economy of need. This points to a

¹⁷ See for the concept of humanity as worker: Jünger, E. *Der Arbeiter* (Klett-Cotta: Stuttgart 1982); cf. Blok, V. Rondono de Vloedlijn. *Filosofie en kunst in het machinale tijdperk. Een confrontatie tussen Heidegger en Jünger* (Aspekt: Soesterberg 2005).

radical rethinking of not only a closed-loop, zero-waste economy, but also of the humanity that exists economically.¹⁸ To be sure, such a rethinking cannot consist in simply replacing utility with wastefulness, but rather resides in accepting wastefulness as the continuation of utility, as well as accepting that this raises the ethical question of what wastefulness means for humanity. This question is important for the BBE, precisely because of its focus on absolute utility and zero-waste. In light of the above, it may be clear that this ethical question is not of the order of questions that admits a finally defined answer. Indeed, demanding a defined, ready-made answer to the question pertaining to the character of humanity that belongs to a BBE means already answering the question, as it presumes the character of humanity to ultimately be a defined or definable element existing in a closed, circular economy. Bataille's notion of glorious expenditure points to the human possibility beyond well-defined restrictions. Accordingly, the challenge that the BBE offers can then be considered to reside in the possibility of shifting from an ultimately needy, zero-waste humanity towards a humanity that accepts wastefulness and is willing to face the glorious, beyond the restrictions of need.

Conclusion

The argumentation presented in this paper consisted of six steps. First, we have argued that the ideal of the BBE as presently developed fully corresponds to what Bataille calls the restricted economy. Secondly, the BBE was shown to implicitly generalize a specific relation between energy and economy, implying a mode of thinking fully characterized by scarcity and utility. As a result, energy appears solely as a good to be rendered optimally useful while nothing, zero, goes to waste. Thirdly, we have argued that this forgets its own ground, a ground that Bataille articulates as the general economy within which energy appears as constitutive and abundant. Fourthly, we have shown how the general economy puts the BBE under pressure, whereas this pressure remains unseen from the perspective of the BBE. This results in an internal inconsistency within the ideal of the BBE, since economic circularity must be denied in favor of growth. This growth was in turn shown to fatally undermine the BBE's ambition of being a regenerative and circular economy. The demand for zero-waste implies that pressure can only be incorporated in growth, which means that the system must ultimately explode when growth ceases to be an option. Fifthly, we have argued that the BBE is in need of a pressure valve, which designates the need to transgress its own standards of absolute utility and zero-waste by way of wasteful expenditure. We have claimed that future discussions concerning the BBE and sustainability must take seriously this idea of a pressure valve and have indicated several directions in which this can be further developed. Sixthly, by discussing the nature of the pressure valve, we have pointed to a paradox revolving around the utility of the useless. In reference to Bataille's

¹⁸ One promising line of thought can be found in Emmanuel Levinas' concept of enjoyment, which is developed against the background of abundance and economy as well (Levinas, E., *Totality and Infinity. An essay on Exteriority* (Duchesne UP: Pittsburgh 2011)). The further exploration of a Levinasian concept of humanity in relation to the BBE is beyond the scope of this article.

notion of the glorious, we pointed out how the pressure valve gives rise to the ethical question pertaining to the character of humanity that belongs to a BBE.

The BBE offers a challenge on this point. The pressure valve that the BBE needs raises the question of our willingness to take considerations regarding economical humanity beyond an economy of need. We maintain that this challenge remains overlooked if the relation between energy and economy remains unconsidered. The implications of the notion of the pressure valve as developed in this paper may serve to bring this question into view, thereby making possible an ethical dimension that deserves consideration in future discussions regarding the BBE.

This, then, is both a critique of the current conceptualizations of the BBE and at the same time an exploration of the possibility for a radical reconsideration of economy and humanity in light of a bio-based future. It is a critique insofar as we argue that because of the unobserved assumptions regarding the relation between energy and economy, the BBE is inconsistent and self-undermining. It is an exploration of the possibilities for reconsidering humanity's bio-based future insofar as we argue for the need of a pressure valve, but discover in the articulation of this latter need, a possibility to consider our neediness as such. This finally concerns the question of humanity as it asks whether a bio-based future involves a humanity fully captivated by the logic of scarcity and utility—a zero-waste humanity—or perhaps a humanity that is willing to gloriously lay to waste the restrictions in which it finds itself.

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