# Stating the Thermo-Entropic Limits of Substantive Democracy

Robert Drury King
Core Humanities Program
University of Nevada, Reno
Thompson Building, Virginia Street, 102 MS 1051, USA
Email: rdruryk@gmail.com

**Abstract:**

This article first offers a criticism of the theory of neoliberal democracy, not because of its philosophical assumptions, but because of the unreasonable claims it presupposes about thermodynamics. This paper then outlines a dissipative, systems-theoretical view of democracy based on thermodynamic analysis of the viability of democratic social structure within the system of capital. The paper claim that democracy confronts the challenges of any system: it must fight off its tendency to decay (entropy) across perturbations in its environment by drawing inputs of matter, energy, and information from energy pools in its environment in order to reproduce its social structure as an output. The two ultimate limits to any viable democratic social structure include 1) ecological, physical environments (this is indeed an ultimate limit for any system) and 2) the overcoming of the structural parameters required for the reproduction of capital (e.g., capital's expansionary profit motive, the exploitation of human labor, particularly in the Global South and periphery), which any democracy must be structurally opposed to, in principle. Here it is argued that a rich, substantive form of democracy is thermodynamically impossible within the system of capital because it cannot provide the substantive (vs. merely formal) equality that is a generative condition for any democracy, no matter the scale of analysis.

**Keywords:** democracy, thermodynamics, entropy, neoliberal, systems theory

That public men publish falsehoods
Is nothing new.
That America must accept
Like the historical republics corruption and empire
Has been known for years.
Be angry at the sun for setting
If these things anger you.
(Robinson Jeffers)

## Democracy's Outmoded Assumptions

It may be peculiar to quote Robinson Jeffers in the context of any theory of democracy, but his poem, "Be Angry at the Sun," perfectly expresses a key challenge to the establishment and successful reproduction of democracy and its institutions: that of stating the ultimate, thermo-entropic and ecological limits within which any viable democratic space may be constituted.

This article will outline a dissipative, systems-theoretical view of democracy based on entropic-thermodynamic analysis of the viability of democracy's social structure within the system of capital. Democracy confronts the challenges of any system: it must fight off its tendency to decay (entropy) across perturbations in its environment by drawing inputs of matter, energy, and information from energy pools in its environment in order to reproduce its social structure as an output. Rather than maintain that democracy can exist within the structural space of the system of capital, this article argues that it cannot, and that a low-input alternative to capital's high-input dynamics must be theorized. This thesis follows precisely from thermo-entropic analysis of the capital system and its limitations and forms of exclusion of democracy; the thesis thus does not make a formal appeal or morally condemn capital. Indeed, the idea is that low-input alternatives require a democratically constructed, community-oriented view of social practices because low-input alternatives are not compatible with capital's imperialist and thus exclusionary, high-input modes of control over social systems. Low-input strategies of social reproduction offer viable alternatives for theorising the restructuring of social systems in line with the sorts of democratic objectives that would be required by ecologically healthier, and thermodynamically less wasteful, social systems. Thermo-entropic and ecological limits to democracy must, then, be taken into account when theorising democracy.

Yet such important limits to democracy are entirely missed in conventional analyses which view democracy, and associated notions like liberty and freedom, in the absence of such limits, ignoring basic biophysical laws. Ralf Dahrendorf's 2006 piece, "Inequality and Discontent," published at Project Syndicate, is here representative. Despite its somewhat recent date of publication, Dahrendorf's piece could no longer be written today, not in good conscience. After the 2007-2008 financial crisis and with growing awareness about the relation between the financial-economic system and global warming and its dire consequences, the world has perhaps become wiser to our thermo-entropic, energetic, and ecological limits. There is a consensus that the global populace, whether Main Street or Wall Street, in New York City or rural Pakistan, knows we can no longer pretend to believe in the world Dahrendorf characterizes. In his "Inequality and Discontent" Dahrendorf (2006) makes the following claims: "the last two decades have brought increased wealth to the world as a whole;" "globalization's dynamism has benefited many;" "an egalitarian climate does not promote innovation and a sense of dynamic development." Perhaps the article's least critical line is expressed in Dahrendorf's (2006) assertion, "inequality is not merely compatible with freedom, but is often a result of and stimulus for freedom." But freedom for whom? And what is meant here by freedom?

While Dahrendorf addresses freedom, this article extends analysis of freedom to the theory of democracy. For, while this need not be the case, it is often argued (and more often assumed) that the political pre-condition of freedom is some actual democratic framework (often capitalist and nation-state-oriented) of concepts and especially of material institutions. If democracy itself confronts thermo-entropic limits, how might we better conceive the term freedom? Startlingly,

questions about the material and institutional conditions of freedom are never addressed in Dahrendorf's piece. Readers are left in a position of having to reconstruct the answers for themselves. One does catch a glimpse of Dahrendorf's (2006) assumptions when it is stated that "a free society recognizes two limitations to economic and general inequality." Dahrendorf (2006) cites these limitations as follows: 1) an individual's access to participation in political community (by which he means the market and civil society) and 2) a basic economic income status. Access to rights and economic means. Such limitations form the matrix of an all-too-common common sense, consistently presupposing an already-established democratic framework. Thus again, this article is intended to interrogate the limits of a more concrete conception of democracy (and its attendant social structure), but uses Dahrendorf's insights on freedom as a springboard to provoke reflection on democracy and its limits.

But why distinguish between economic and *general* inequality, as Dahrendorf does? From what point of view are the two different? This is left unstated, but certainly from the democratic point of view, the distinction seems specious. Yet if one believes, as many ecological economists do (and many heterodox economists more generally) that the economy ought to be embedded in the ecology – Georgescu Roegen's famous insight – then it is *not* possible to separate out the economic from the ecological sphere, so long as one wants to do good economic analysis. Further, is it not the case that economic inequality already signifies a generalized inequality?

Democracy cannot rightly count as democracy if it is not undergirded by the concept of a substantive, material equality on a global and not-limited scale. Reaching back to the conceptual and historical origins of democracy, this piece contends that democracy is only democracy if it equates to a rule by the many (the "demos"), carrying connotations of a global realization of substantive equality. Further, since inequality in the economic sphere is here already a sign of generalized inequality, democracy must be attained through real, substantive means, for example, equality of not only access to, but real acquisition of the material supports of equality.

By contrast, what is meant by formal equality above is merely a non-material ideology of democracy, one that, definitively does not carry the mark of real substantive or material equality but might be represented by, say, the capacity to vote in an election, or by a mere constitutional guarantee where in either case there is no correlate in the real acquisition of substantive equality, on actual, material terms.

But for Dahrendorf, economic inequality is not general inequality; the two are left separate. This is why Dahrendorf (2006) will make such claims as "an egalitarian climate does not promote innovation and a sense of dynamic development." No? Why not? Where then does such innovation come from? Has Dahrendorf solved this riddle? Has Dahrendorf witnessed some model of egalitarian climate and traced out its structural causes and consequences? What can be said definitively – and here again we see a sea-change in basic ideology – is that Dahrendorf remains committed to the notion that egalitarian phenomena stem from a framework of individuals poised in basic competition with each other.

So where are the free individuals, the free markets they create and that rightly constrain them? Where is the invisible hand? Such assumptions, often characterized as neoliberal but with their roots in neoclassical theory, have now realized their Cartesian nightmare. They have been identified and brought to the fore of the global consciousness for rigorous examination; they have largely been isolated as fantasy. Now, perhaps we cannot do without fantasy, but some fantasies are downright dangerous. In terms of our awareness of today's ultimate, thermo-entropic and ecological limitations, Dahrendorf's core theoretical commitments seem both quaint and sinister. Of course, Dahrendorf's views are partially representative of a certain neoclassically-trained establishment; still, the neoclassical tradition continues by and large to support a richer, more far-reaching network of analysis – what might be termed "liberal political economy" – dominant in contemporary economic thinking. For the space of this article, we will not rehearse liberal political economy's guiding assumptions about freedom, liberty, and democracy, but suffice it to say that liberal political economy remains an anti-ecological view on the world. Thus, its vision of freedom and democracy tends to reject the wider ecological view, as with neoclassical theory.

We confront new limitations to democracy (and to freedom and liberty) today: they are ecological and energetic, broadly construed. They are, ultimately, thermo-entropic, respecting basic biophysical insights about how the dynamic systems that constitute our world actually work and how they can be empirically modeled. If we are to speak of democracy and the "wealth" (however measured) it brings, we must cast democracy in lights that respect the basic insights of thermodynamics, of entropy and energy production. Here, democracy must be measured on the standard of the ecological and thermo-entropic limits to equality it might present, versus Dahrendorf's limited perspective. Like all phenomena, democracy is not some basic essence, naturally given from the past and promised for the future, but would, like any real world system – open and dynamic – be threatened from without, for example, from forms of fascism or crass interventionism (to say nothing of ecological threats); rather, like fascism or interventionism, democracy is constructed in physical confrontation with actual, ecological limits in its environment (that which is external to its constitutive social structure).

From this point of view, democracy *is* compatible with inequality, but the inequality that characterizes the behavior of dynamic, dissipative systems, *in toto*. Following the work of Ilya Prigogine, to take a seminal instance, such systems violate the postulates of some natural and universal equilibrium, both in the physical universe and in neoclassical economic theory (which depends upon its own specious postulates of equilibrium). If we are to adequately address the limitations democracy suffers today, the sense of inequality – or rather, disequilibrium – that characterizes actual systems cannot be conceived on terms akin to Dahrendorf's. Thus, what is outmoded in much of the theory of democracy today is 1) its rootedness in the still dominant neoclassical theory that support's today's liberal political economy, the mainstream view for economic and political policy formation today and 2) its anti-ecological character which neglects insights from the study of thermodynamics and entropy.

Recent systems-theoretical work in the theory of democracy (and its institutions) views democracy in the context of its entropic and ecological limits. I here make reference to dissipative systems theory in particular as it has made impact on social theory. Democracy, like all things, is subject to the basic laws of thermodynamics. Democracy must confront the challenges of any dynamic being or system: it must be constructed or built by taking inputs of matter, energy, and information from environmental surrounds. It must then be reproduced, continuously, and is subject to the law of entropy: the tendency to decay. Not only this; in this very act, democracy—and whatever liberty or freedom it might afford—produces waste. Just in order for systems – actual systems in the real world, in real geographies in space and time – to reproduce themselves, they must also dissipate their decay, their entropy, into some external environment. Confronting its internal limits, the production of democracy must flush its own entropic by-products into an external environment. If this cannot be achieved, its waste attacks it from within, as with a bodily cancer run amok, or from without.

Historically, if the (symptomatically Western) wealthiest enclaves of countries have enjoyed greater degrees of democracy, this is because these countries have found ways to better manage – ecologically; certainly not "better ways" – and to expel their waste. Such countries have exported or flushed the waste that comes with generating democracy into the Global South, where labor seems to come cheaper, and into natural environments, like oceans, forests, and the atmosphere. Yes, Dahrendorf is right: freedom is compatible with inequality. But shall we continue to view this inequality as stemming from the differential behavior of individuals and nation-states? (No; such views and the assumptions upon which they are built are outmoded.)

After all, it is difficult to pursue democracy where one has been stripped of the political communities necessary for its production, as when the Global South finds its labor forces decimated. Or, shall we begin to view inequality as the *necessary* precondition of system-building in the very basic sense, thus establishing the ultimate, thermodynamic and ecological limits that any democracy must overcome just in order to *be* at all? On these latter terms, we may refuse Dahrendorf's (2006) limits and thus his entire conceptual apparatus of inequality and freedom. He states, and we quote him at length here:

> ...while a free society recognizes limits to inequality, it also accepts that inequality exists, for it provides hope for many by showing what one might achieve with ability and luck – or perhaps even luck alone. Inequality adds color and variety to societies; it is one of the marks of lively, flexible, and innovative countries. It is thus not bad in itself, even if its excesses must be capped in the name of citizenship for all. Social exclusion and personalized power through wealth are always unacceptable. But if we want freedom, then social and economic inequalities are a legitimate, and necessary, price to pay.

The global populace has been paying the price for such disappointingly mainstream views for far too long. What is worse, and it bears repeating, the entire viewpoint is based on outmoded assumptions. Let us consider new limits to democracy.

## The Thermo-Entropic Limits of Any Viable Democracy Within Capital's Structural-Reproductive Mode of Social Control

The two ultimate limits to any viable democratic social structure include 1) thermo-entropic, ecological, physical environmental constraints (this is indeed the ultimate limit for any system) and 2) the *overcoming of the structural parameters required for the reproduction of capital* (e.g., capital's ceaseless and expansionary profit motive and its exploitation of human labor particularly in the Global South and periphery, to name but two parameters).

Any democracy must be structurally opposed to the second limit, in principle. This is because the system of capital cannot provide the *substantive* (vs. merely formal) equality that is a generative and sufficient condition for any democracy. By generative, I mean that democracy cannot be constructed and maintain in its structural reproduction unless it respects physical, thermodynamic laws and limits. By sufficient, I mean that not only must the necessary, physical thermodynamic limits be respected in terms of the energy requirements (on the ecology) for the construction of democracy, but that democracy must be concretely actualized in space and time out of the matrix of limits and potentials provided by the thermodynamic laws. We might find the criterion of democracy's actualization in space and time as the attainment of substantive equality.

Yet these are tough conditions indeed to meet, stretching the limits of our imagination as well as, most likely, our physical world. For, if we were to model the construction of democracy on anything like the material realities of the wealthiest enclaves of countries which identify themselves as democratic, i.e. – attaining the wealth resources and satisfying the energy consumption demands of the U.S, Western European countries, and Japan (the global core countries) – then it is well-nigh impossible, *given current* material and technological resources, to imagine any global conception, a true rule by the many, whereby democracy might be actualized. Imagine extending the wealth and energy extraction and consumption patterns of these wealthiest countries to a global context (especially given peak oil). At best, in our current context (of the capital system) we might be able to speak of democracies only in certain countries, but again this would violate the historical conception of democracy as rule by the many, or as the attainment of (a global) substantive equality.

What prevents the actualization of democracy on a global scale is internal to the capital system and to the reproduction of its structural parameters. That is, the core parameters that make the capital system what it *is*, are extremely expensive (on Energy Return on Investment (ERoI) parameters, for example) to reproduce over time (capital now in its perhaps 5$^{th}$ century of existence is already taxing, very highly, natural ecological systems and human labor). The capital system, just in order to reproduce the basic structural parameters within which it can be reproduced, contains mechanisms that cause it to 'overdevelop' and which require it to produce immense, *high-input* quantities of disorder in its environments, high-input quantities (e.g., from the production of food waste and hydrocarbon fuel burning to the maintenance of its militarization tendency).

These high-input quantities cannot be sustained within anything like a democratic structure conceived on terms of substantive equality; the entropy of capital makes this impossible. This is because, as stated, just as a condition of its reproduction, capital produces massive quantities of

entropy, energy which can no longer be taken back up into its core wealthiest enclaves of countries in anything like a fashion that would be consistent with democracy. This makes the capital system, and especially its core wealthiest enclaves, wasteful and harmful to the environments it funnels its entropic disorder into.

Moreover, for the first time in its five-hundred year history, this production of entropy now seems to spell catastrophe for the system as a whole. There is no longer a true periphery to dissipate capital's entropy into. We now confront a systemic and no-longer cyclical crisis. The difficulty of democracy can thus be gauged according to the ways in which this entropic dumping is conducted, governed, and reproduced. According to Robert Biel, for example, we now live in an age in which capital is trying to adapt to its own entropy production, becoming "cannibalistic," (Biel 2012, 235) ramifying the difficulties for democracy (or for any non-authoritarian order of control over energy and resource management).

Before discussing Biel's framework of analysis of the capital system it is important to be clear about why it is that the key confrontation with democracy lies in the realm of the transcendence or abolition of the capital system. Accepting this argument, it will also become apparent why reforming the capital system also fails democracy, putting emphasis on the necessity of a revolutionary transformation of the system. Again, capital, like any dynamic system, must direct inputs (and outputs) of energy, matter, and information toward the maintenance of the key structures which allow it to emerge and maintain its order. It must continuously reproduce core, structural components, over time, in order to maintain its integrity, as a system, against perturbations from its environment (financial meltdowns, ecological disaster, systemic revolt, etc.). Indeed, if the core structures of any system are not reproduced, then the system will undergo determinate crises or collapse. For example, the feudal/seigniorial system depended on certain inputs—e.g., an agricultural surplus product, distributed in a certain proportion between lord and vassal, precise obligations, services, and bonds of fidelity between the social networks—ultimately, when these structural components could no longer be reproduced, the feudal system collapsed.

The driving idea here is that the dynamic material structure of a society cannot be maintained other than by directing its inputs and outputs in the service of reproducing its structurally necessary components; otherwise, it succumbs to entropy. With respect to the capital system, for instance, there must be a continuous conversion of the bulk of its energy, materials, and information into the reproduction of the following structurally necessary components (brief list):

- A structurally enforced inequality between capital and (ultimately human) labor.
- Constant accumulation of capital with an expanding profit motive.
- Property system with private ownership of means of production.
- An, in principle, uncontrollable global market with fetishistic production objectives.
- Nation-state system as framework of international relations where each state confronts each other, sometimes violently, over the control of inputs and outputs.

- Nuclear family which socializes individuals to ensure the legitimization of the minimal, status-quo objectives of the state.

If a significant portion of these structurally necessary components of the system of capital are removed or suffer breakdown, the system demonstrates signs of crisis or collapse and the reproductive integrity of the system is threatened or ruined.

So why isn't democracy compatible with capital, say, even in a reformed version of it? First, it is impossible to generate substantive equality, for example, when there is a deeply structurally-enforced gulf between capital and human labor. Capital is not human, though labor, in our definition, is. First, then, democracy is, in our conception, a human form of social organization and its reproduction. Capital acts then as a sort of alien force in democracy. Even if democracy may admit of alien forces, it is nonetheless clear that democracy cannot tolerate an alien force that, in virtue of its very structure, produces inequalities between capital and human labor. If the substantive aims which make possible anything like a democratic rule by the many are to be made concrete and integrated within a thermo-entropically viable social-institutional framework, then capital's structural inequality with human labor is an intolerable condition for any democracy.

The requirement of a constant accumulation of capital with an ever expanding profit motive (over the long term, if not the business quarter) also clearly confronts the thermodynamic and ecological limits mentioned above. Accumulation and expansion cannot go on forever, not least without dire consequences for our ecology, as we witness today. Certainly a private property system with ownership by the capitalist class, which, by definition, dispossess labor – here again, human labor – from the very means of generating wealth is also in deep structural disagreement with democracy, defined substantively.

If reform is impossible in such a system it is because the deep, core structural components, establishing the parameters of capital's systemic dynamics, act to generate inequalities in the first place. Reform here becomes a mere patch on the wound. For, there would be no capital without such inequalities, yet such inequalities structurally reinforce the impossibility of democracy and deepen the rift between the established capitalist order and any attempt at democracy-building from within this frame. Additionally, the core structures of capital have also generated cyclical problems with over-accumulation and underproduction (boom and bust cycles). Excepting Dahrendorf's (2006) ecologically and thermodynamically (severely) limited views on wealth inequality, it seems undeniable that such cycles have long interfered with social attempts to build democracy in any substantive, global sense. The same should be said for the appropriation of human labor by capital since it separates the majority of the population from access to the inputs defining the means of producing wealth and oftentimes bare subsistence. As well, the structure of the private ownership of the means of production, and the productive resources and technologies used to extract surplus labor, aids separation of productive forces (i.e., between capital and human labor).

On Biel's thermodynamically astute assessment of the capital system – one he defines on high-input terms – capital's over-dependency on material resources (e.g., hydrocarbon inputs) for surplus wealth production (both industrial and financial) limits the construction of democracy severely. Add to this the fact that capital's monetary system, reserve banking, and fiat money-systems support the financialisation of the economy rather than the development of a real economy based on substantive material wealth, the kind that would be a pre-condition for democracy. (This understandable lament over the financialisation of the economy is a common complaint of Keynesians and post-Keynesians as well (the reformatory nature of their economic programs notwithstanding)). Ecologically, the politics of nation-states and national identities within the international relations framework become problems not only of political representation (merely formal democracy versus substantive), but are more and more problematic inasmuch as these international political relations are controllable only under the parameters of a militarization tendency produced within the capital system, indeed, as the control agency vis-à-vis its core structures. Without heavy militarization, and the vast sums of capital investment that go into it, it is likely that the capital system would collapse. All of the aforementioned structures of the capital system, most of them visible from the system's outset, produce the sort of non-democracy-inducing problems of poverty which global governance institutions like the IMF and World Bank are simply unable to control, despite promises of their bringing democracy. Rather, such institutions more and more act to violate the kind of autonomy that democracy requires simply as a coherent concept.

Biel's assessment of the system of capital is attuned to the thermodynamic and entropic limits of capital and thus can provide ecologically astute analysis of the limits and potentials of democracy. For Biel, because of thermodynamic and ecological constraints, the system of capital is now cannibalizing itself. In his *The Entropy of Capitalism*, he notes: "...in order to survive, the system must parasitise (sic) upon sources of vitality wherever it can find them. The key problem then becomes how to control them while doing so" (Biel 2012, 235). Capital, for Biel, thus has distinctly constrained paths of development open to it. He mentions three: one, the attempt to continue to impose top-down order within the system, the reinstatement of "the hierarchical and state-centric methods of early imperialism" (Biel 2012, 235). Now, with the system becoming "too complex," (Biel 2012, 235) as Biel puts it, and suffering a global crisis (economically and ecologically), this top-down form of control goes hand in hand with the *restoration* of the old order (including in the more contemporary sense: domination by the Western core countries, neoliberal political economy, globalization, business as usual, etc.). Forgetting the point that top-downism of any variety ought to conflict with any but formal (not concrete) actualizations of democracy, capital, at least within the wealthiest enclaves, has historically unfolded through top-down control (powerful nation-states have always captured and controlled flows of capital and distributed them out to allies). Capital has always had its anti-democratic command centers, even if they have shifted over time (though located in the Global North, Euro-centrically, almost

exclusively), and thus has always relied on differentials of power and political and military force to reproduce its structural order. What makes such top-down control incompatible with democracy, however, is the very thermodynamic impossibility – within our current, capitalist system – with its economic and ecological crisis, to construct democracy. Biel's is not a moral theory. It is not a liberal (or neoliberal) theory which eschews thermo-entropic, ecological analysis, but is a thermodynamically informed theory which actually takes into account the thermo-entropic and ecological impossibility of democracy within the capital system.

Biel's analysis of capital's entropy production suggests, then, that top-downism, with all of the inputs of energy required to maintain it, is thermodynamically too costly. Attempts at restoring capital's conventional order in times of systemic, ecological crisis seem doomed to failure. Moreover, such top-downism, considering the thermo-ecological limitations of our planet at this point in its history, would necessitate imperialist dominance over the capture of the essential inputs and outputs of matter, energy, and information. It would (and indeed has) yielded the creation of a periphery in which the capitalist core countries dump their waste. After all, selling vast amounts of consumer products using plastics and radioactive materials has to go somewhere. But leaving aside the issue of imperialism, even post-Keynesian theories today which call for renewed investment in infrastructure (the fixing of rotting pipes or crumbling roads and bridges) express precisely the problem with the restoration of top-down order as a governance and control strategy within the capital system: where is the money and the resources for such infrastructural improvement projects to come from?

This difficult question leads Biel to imagine his second path of development for the capital system: the spontaneous emergence of the energy required to build order (Biel 2012, 263-342). As complex systems theories confirm, order "comes for free" in a variety of natural and physical systems. One might here think of Stuart Kauffman's theories on the generation of life, as self-organization, where life emerges "spontaneously" from the merely chemical pools defining Earth's early elemental history. Instead of managing the extraction of material and energetic wealth through costly forms of top-downism, why not take advantage of social order that "comes for free," as it were, as in the emergence of social movements like the Arab Spring, or the ways in which communities may abandon usual behaviors and share resources in times of crisis?

The problem with this more laissez-faire phenomenon of capitalist control and management of energy is that it can easily be co-opted by capital's current top-down regimes and interests, thus reintroducing the problem of ant-democratic imperialism. While locally or in punctuated times of crisis such spontaneous emergence of order can generate democratic behaviors, these do not arise globally or perdure. Capital's top-down imperialist regimes tend to take advantage of such spontaneous emergence of order, forcing the creation and diffusion of bad forms of chaos. Biel (2012, 263-342) suggests as an example the U.S. Defense Advanced Research Project Agency's – initiated under the U.S. neocons of the George W. Bush regime – development of robots that are designed to forage over battlefields consuming human and other biomass to refuel themselves and

thus go on killing or serving whatever other programmed directive they are meant to carry out. This is the unfortunate consequence that too often attends to Biel's second path: the co-optation of spontaneous emergent order represents one of the scarier trends in capital's development. As Biel (2012, 255) puts it, "it's a bit like the control of the seed multinationals over experimentation in farming: the system cannot tolerate diffuse innovation, or any autonomous emergence which might go in creative directions."

## The Low-Input Alternative as Thermo-Entropically Viable Case for Democracy

Given the limitations of the first two paths of capitalist development, Biel puts his hope in the third path he isolates: low-input solutions to capital's high-input modes of systemic control. Again, this control is here conceived as control over the inputs and outputs of matter, energy, and information that serve as the material resources through which some viable construction of democracy might proceed. Low-input means simply that lower quantities of inputs of matter, energy, and information would go into the creation of a structural (here, social) order and its generation of the structural outputs it needs to reproduce or maintain that order. Biel conceives this as an alternative to the capital system because, just in order to be, capital has, historically, as mentioned, drawn its inputs from natural environments and cheaper labor pools in the Global South through top-down imperialist control.

Since, again, today the system of capital is in danger of being unable to reproduce itself except through the most dangerous and anti-democratic of ways, the low-input approach – which does not mean low-output production, as Biel contends, "surprisingly, small farms and gardens turn out to be more efficient than plantation agriculture" (Biel 2012, 321) – must be conceived as an alternative to the capital system; it must be a revolutionary reordering of the dynamics of the social system of human beings. This does not hold true only for the way in which the low-input alternative challenges the historical constitution of capital, but, because capital's dynamics have everything to do with the history of its reproduction, the challenge is to capital's structural-reproductive dynamics as a whole.

Indeed, low-input methods of the extraction and production of energy are less wasteful and more efficient. They produce less entropy, thus avoiding the forcing of the social system into a cannibalistic phase (at least not in the near-future, that is, should the capital system actually be abolished and replaced by a social system that is ecologically sound, respecting thermodynamic laws and entropic limits). If the low-input alternative has the outcome of using lesser quantities of inputs of matter, energy, and information – drastically less as compared to the system of capital – it might provide the framework for a potentially democratic alternative. Biel (2012, 321) thinks as much when he notes:

> this is the real significance of urban agriculture with sufficiently high productivity to make a serious contribution to feeding the people (this is the crucial condition), then we could afford to withdraw

> part of rural agriculture from the current, unsustainable system and still retain the total net food production while this part is being converted to organic, low-input methods.

Here we see that Biel believes that low-input food production would minimally allow for the withdrawal of the food production sub-system from the capital system, thus removing a frame of social control which, as argued, is structurally incompatible with democracy. Moreover, low-input alternatives do not apply solely to the realm of food production, even if this is Biel's preferred example. He focuses on examples of low-input food production such as the urban agricultural movements operating in metropolitan centers like Detroit, Chicago, or New York City, but peoples in rural Pakistan are also implementing similar low-input projects, and not just in food. He also cites the aquaponic greenhouse system technologies as another example of his proposed low-input alternative. So, the third path Biel has in mind is not solely concerned with one subsystem of the capital system (low-input food production) but suggests a fully systemic alternative to capital.

Because low-input alternatives are, potentially, enriching to local communities everywhere, especially *if* conditions of imperialist control over the system can be transcended, there is a global import to such methods (and Biel *does* think imperialist control can be transcended because thermo-entropically it *must* be: again, the system can no longer continue to function *via* its high-input dynamics because it is too costly ecologically). The global import of low-input methods align historically and conceptually with the construction of democracy, implying the "demos," the global many, as well as notions of autonomous self-rule for communities. Low-input alternatives actually *require* a democratically constructed, community-oriented view of social practices in order to work because low-input alternatives cannot be based on (capital's, for instance) exclusionary dynamics (core-periphery, capital-labor, private property-commons), but must be based on tactics that actually empower communities, substantively, to grow their own food, for instance.

Any low-input practice would, in principle, not exclude active participation in autonomously generating the inputs required as part of larger democracy-building practices. Low-input strategies of social reproduction may thus offer viable alternatives for restructuring social systems in line with the democratic objectives that would be required by healthier social systems. Where the system of capital requires high-input structural reproduction just to reproduce itself, low-input regimes require a different set of structural supports premised on the logic of a different, democratic form of political economy (one that is systemically and ecologically rather than liberally or individualistically-minded)—supports such as community-based resource production divorced from all the trappings of high-input drains on natural environments.

The theory of democracy and its concepts (e.g., substantive equality in the economic sphere, liberatory formulations of postcolonial identity, etc.) often runs aground on poor analyses of the capital system as a totalized and totalizing structure, which must then be countered by high-input forms of resistance or else escaped or abandoned. Missing the point of Jeffers' poem above, pro-democratic resistance (to capital) tactics are, then, founded on poor assumptions about the thermodynamics of viable social structure ("Be angry at the sun if these things anger you"): high-

input modes of resistance would fail *just the same* as capital's high-input dynamics are failing, especially as concerns the construction of democracy (even if this were even feasible within capital's structural-reproductive parameters). Thermodynamically feasible and ecologically more sound (that is, within the parameters of democratic social structure and its reproduction), *low-input alternatives* to the system of capital would allow for more intelligible opportunities for resistance to capital, for the construction of democracy.

Briefly, recently there have been raised objections to low-input alternatives, often referred to as horizontalist (versus top-down, bottom-up) oriented solutions to the problems generated by the capital system (one thinks here of the accelerationist movement as is put forth in the *Accelerationist Manifesto for an Accelerationist Politics* of Nick Srnicek and Alex Williams). Objectors believe rather that we ought to harness the rich techno-capacities of capital in order to transform the system toward positive ends or else encourage use of the robust economic and political dynamics of capital to hasten its demise. Yet how such strategies would work is unclear, especially when one realizes that the core structures *of* capital are the ones that generate capital's immense problems to begin with, for example, its poverty-creation for those dispossessed from the technologies of wealth-production.

Other accelerationist arguments include appeals to the notion that people need large-scale institutional social structures (like vast transport or health-care systems), especially in times of crisis. Yet such objectors and objections miss the point that the question is not so much whether such strategies are really in keeping with the needs or desires or human beings, but whether the capabilities to continue to take advantage of heavier technologies and large-institutions is still thermodynamically possible, entropically safe, or ecologically-sound in today's world. They also miss the point that Biel's low-input alternative does not imply a low-output result (Biel thinks that low-input food production can be even more productive than high-input production). In any case, where the theory of democracy is concerned, what the low-input alternative gets right is the fact that such an alternative provides a thermo-entropically astute assessment of possibilities for viable democratic social structure.

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