

THEORY AND PRACTICE

Marxism, Energy, and Ecology: The Moment of Truth

Daniel Tanuro, translated by Richard Fidler

The challenge of climate change cannot be met without a revolution in energy use involving a significant reduction in energy consumption and therefore in the transformation of matter. Can Marx's work assist us in developing our conception of this gigantic transformation? The reply is contradictory. On the positive side there is in Marx's work the analysis of the eco-destructive impact of capitalist ground rent and the concept of a rational regulation of material exchange between humanity and nature. On the negative side, Marx did not grasp the difference between stochastic energy (which is renewable) and stored energy (which is exhaustible). This is a serious error, resulting in the coexistence in Marx's thinking of two antagonistic development schemas: on the one hand, a linear and utilitarian schema of "resource > product > waste," similar to that of the classical economists, and on the other a premonitory ecosocialist schema based on the prudent management of natural cycles transformed by human activity. The 20th century Marxists generally overlooked the latter. However, the impending environmental catastrophe requires that it be adopted now and that we draw from it the necessary strategic implications.

Something Like "Marx's Ecology"

Greens of all shades never lose an opportunity to accuse Marxism of productivism and that Marx had no conception either of nature or of the finite character of resources. These statements do not stand up to serious scrutiny. Marx and Engels focused on human development within the framework of a comprehensive conception of natural history as a whole. Moreover, the use of environmental resources is very present in their analysis of capital. For example, they grasped the slow decomposition of feudalism as a movement of appropriation of these resources by the ruling classes, separating the producer from the means of production, land in the first place. This reading led them to develop a theory of capitalist ground rent that is based primarily—and this is not sufficiently emphasized—on a consideration of the finite nature of arable land and other natural resources.¹ According to this theory, it is the existence in limited quantities of soil, minerals, water power and other resources that conditions their appropriation by land-owners, thus determining the latter's ability to divert a portion of the overall surplus-value and therefore realize super-profits and perpetuate them in the form of rent.

In agriculture, for example, the monopoly of cultivable land allows owners to impose production prices fixed according to the return on the worst instead of average lands. Consequently, the more productive the land, the more it generates a surplus profit greater than the average: this is what Marx calls differential rent. From this it also follows that the greater the amount of capital invested in the exploitation of the soil (in the form of inputs or machines), the greater the increase in differential rent. The importance and relevance of this

¹ Daniel Tanuro, "Marx, Mandel et les limites naturelles," Ernest Mandel Archives Internet, November 19, 2005, online at: <http://www.ernestmandel.org/fr/surlavie/txt/colloque/tanuro.htm>.

theory are generally misunderstood. Claude Gindin has described it as a somewhat archaic curiosity: “The question of ground rent is prominent in Marx’s work because it is important in the societies of his day.”² Jean-Paul Deléage laments that Marx envisaged “the relationship between society and nature within the framework of a purely economic theory.”³ Both these statements miss the essential point. In reality, the Marxist theory of rent remains very contemporary, especially from an ecological point of view. For example, it provides the key for comprehending the capitalist intensification of agricultural and mining operations—one of the major manifestations of the eco-destructive dynamic of capitalism⁴—and starkly demonstrates the criminal inertia of this system faced with the threat of climate change.

Global petroleum rent, a particular form of ground rent, is estimated at some €1.3 trillion per year.⁵ Thirteen hundred billion in addition to the average profit: it’s not surprising that the beneficiaries of this fortune are trying to burn fossil fuels for as long as possible! And not surprising that they are generously funding the climate-skeptic think-thanks that have been purchasing scientists, politicians, and journalists for 20 years! What is less known, however, is that parallel to this the oil lobbies, well aware of the inevitability of peak production, are throwing their weight behind efforts to get governments concerned with developing renewable energy sources to favor those that will give them maximum opportunities to safeguard this rent. Here is one example of these pressures and their effectiveness: the Obama administration has chosen to give priority to the biomass/ethanol technology instead of the photovoltaic/hydrogen technology as an alternative to petroleum-powered transportation. This is quite consistent with the strategic orientation of such giants as ExxonMobil or BP, which, after some hesitation, have invested heavily in agrofuels. Renamed “Beyond Petrol,” BP has invested at least \$500 million in the creation of a research institute, the Energy Bioscience Institute, whose mission is to mobilize “genetic engineering” to develop second- and third-generation agrofuels from genetically modified plants, algae, and bacteria.⁶ Besides providing guarantees of maximum continuity in terms of fuel distribution systems and automobile technology, this strategy offers the hope that they can gain some form of monopoly over solar energy which, once transformed into organic matter on lands owned by the multinationals, will be able to generate ground rent and hence super-profits. This contributes to explaining the huge wave of land purchases in tropical and subtropical countries by a series of major multinational groups.

Marx’s theory of rent attests to an awareness of the finite nature of resources, notwithstanding certain somewhat ambiguous formulations. This assessment is amply confirmed when we examine his concept of rational regulation of material exchanges (or

² Claude Gindin, “Marx et la rente foncière,” *La Pensée*, 335, July-September 2003, pp. 67-79.

³ Jean-Paul Deléage, *Histoire de l’écologie. Une science de l’homme et de la nature* (Paris, La Découverte 1991), pp. 265-66.

⁴ Rent seeking is also a decisive factor in capitalism’s law of population. In previous modes of production, relative overpopulation favored agricultural intensification. Under capitalism, the intensification of agriculture driven by rent seeking produces relative overpopulation. See Ester Boserup, *The Conditions of Agricultural Growth: The Economics of Agriculture under Population Pressure* (London and New York: George Allen and Unwin, 1965).

⁵ This estimate of an average 15 percent profit rate is based on data provided by Jean-Marie Chevalier, *Les grandes batailles de l’énergie* (Paris: Gallimard, 2004).

⁶ The EBI is the largest university research project yet financed by private business. The Institute is based on the Berkeley campus of the University of California, where the research findings are simply appropriated by the multinational. See: <http://www.stopbp-berkeley.org/resources.html>.

“social metabolism”) between humanity and nature. The point of departure is prosaic. Thanks to the work of Liebig, a pioneer of soil chemistry, Marx understood that capitalist urbanization interrupts nutrient cycling: human manure and vegetable wastes do not return to the field and soil nutrients are depleted, with resulting fertility loss. But the author of *Capital* is not content with what Michael Löwy calls “a simple story of manure”:⁷ he generalizes the problem and poses the global question of “material exchange” (or metabolism) between the human race and the environment. As work is an inalienable imperative, characteristic of a species that produces its existence socially, he concludes that “Freedom, in this sphere, can consist only in this, that socialized man, the associated producers, govern the human metabolism with nature in a rational way.”⁸ Armed with this concept, he then returns to the problem of soil nutrient depletion and concludes that the separation between town and country, indeed, between global production and consumption of agricultural products, must be overcome.⁹

This methodological approach of Marx can rival the best contemporary conceptualizations of global environmental problems,¹⁰ and the way in which he deals with the question of soils deserves to be listed in any anthology of ecology. Today, the notion of a social metabolism of humanity and nature is particularly operational in the analysis of climate change. An examination of the carbon cycle reveals that the rapid exchanges between the biosphere/hydrosphere and the atmosphere are virtually in equilibrium. Fundamentally, it is the use of fossil fuels that upsets the system; their combustion short-circuits, so to speak, the long loop of the carbon cycle, which passes through the lithosphere and spreads over hundreds of millions of years. At present, about one half of the carbon sent into the atmosphere each year cannot be absorbed, so it accumulates. This saturation of the atmosphere is the most striking example of capitalist irrational management of material exchanges at the global level.

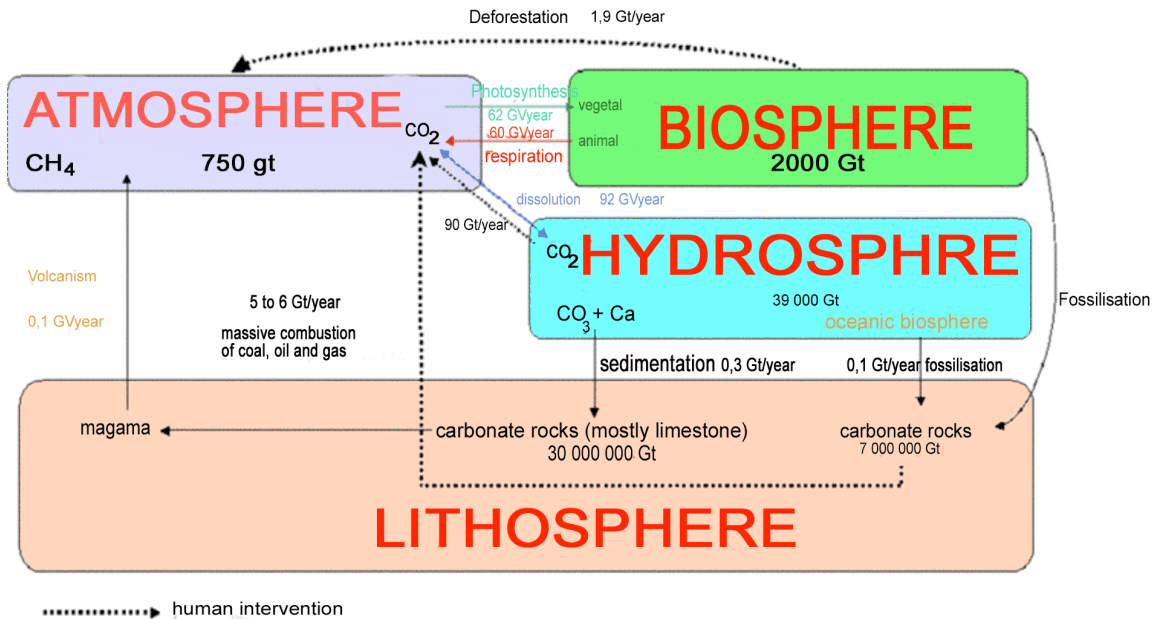
⁷ Michael Löwy, “Progrès destructif. Marx, Engels et l’écologie,” in J-M. Harribey and M. Löwy, *Capital contre nature* (Paris: PUF 2003).

⁸ Karl Marx, *Capital*, Vol. III, Penguin Classics (New York: Penguin, 1993), p. 959.

⁹ Marx mentions the world fiber trade as one of the causes of soil impoverishment as a result of capitalism. He does not conclude from this that agricultural production should be relocated, although this is consistent with his denunciation of the separation of town and country.

¹⁰ It is superior to the Gaïa hypothesis of James Lovelock, which, whether in its “strong” or “weak” form, does not take into account the social mode of production.

carbon cycle



To complete this rapid overview, it must be acknowledged that there is much more in Marx than the “ecological intuitions” conceded by Daniel Bensaid. But how much? John Bellamy Foster and Paul Burkett go so far as to say that there is a “Marx’s ecology” and even that ecology is at the heart of Marxism.”¹¹ Notwithstanding the foregoing, this statement seems excessive. It is true that, inspired by Liebig, the author of *Capital* unfurls a series of conclusions that confer on his work an ecological depth that is as astonishing as it is unknown. It is also true that the radical critique of commodity production is indispensable for understanding the environmental crisis as a crisis of the relationship between humanity and nature, and thus as social crisis. Finally, we will agree that the alternative indicated by this critique—the democratically organized production of use values and the re-appropriation of free time—is fundamentally the exact opposite of productivism, industrial gigantism, and a linear conception of progress. But Foster and Burkett exaggerate: an overall vision of the ecological dimension of the socialist transformation appears only fleetingly and indistinctly in Marx. Moreover, this vision is rendered largely inoperative by a serious error in the treatment of energy. This seems decisive to me.

An Error with Major Implications

It is striking that, in their analysis of the Industrial Revolution, Marx and Engels simply did not grasp the enormous ecological and economic implications of the passage from a renewable fuel, produced through the photosynthetic conversion of the solar flux—wood—to an historically non-renewable fuel—coal as a result of the fossilization of the solar

¹¹ John Bellamy Foster, *Marx’s Ecology: Materialism and Nature* (New York: Monthly Review Press, 2000). J.B. Foster and Paul Burkett: “Ecological Economics and Classical Marxism: The ‘Podolinsky Business’ Reconsidered,” *Organization & Environment*, Vol. 17, No. 1, March 2004, pp. 32-60.

flux. I will return shortly to the environmental consequences of this error. First, I want to draw attention to the fact that it affects the analysis of capitalism in general by introducing four types of incoherence:

1. *A defect in the completion of the analysis of the system.* Marx is a thinker of inclusivity *par excellence*. But in this specific case, a decisive aspect eludes him: he distinguishes in the Industrial Revolution the continuity of the social process of appropriation of resources (begun several centuries earlier with wood) but overlooks a factor of major discontinuity: the transition from wood to coal as an energy resource. As a result, while he understood perfectly that the tendency of capital for unlimited growth generally exhausts “at the same time the two sources from which are obtained all wealth: the earth and the laborer,”¹² he does not notice the incompatibility between this dynamic of accumulation and the energy base on which it develops—the limited stock of fossil fuels. This is a true “defect of inclusiveness.”

2. *Incoherence in relation to “human metabolism” as conceptual tool.* From the standpoint of material exchange, the two questions of soils and energy resources are analogous. In both cases the problem pertains to the difference between the rate of exploitation of the resource and the speed with which it is naturally reconstituted, thus the rational management of the cycles and therefore of human intervention in that process. One is tempted, therefore, to say that Marx, in this case, overlooked the ecological gold watch: had he been aware of the qualitative difference between stochastic energy and stored energy, his own brilliant concept of “human metabolism” would have led him to foresee the energy impasse into which capitalism was to drag humanity—and to infer the necessity, eventually, of a virtually complete stop to the exploitation of fossil energies. But he did not do so and, on this key point, his system is defective.

3. *A lack of understanding of the preconditions for rational regulation of “human metabolism.”* It would be overdoing it to criticize Marx and Engels for failing to foresee climate change.¹³ However, it is unfortunate that they did not extend their thinking about the limits of soil availability to equally systematic thinking about the limits to coal stocks. This inconsistency affects their “ecology”: the failure to grasp the qualitative leap from wood to coal prevented them from seeing that the necessary “rational management of material exchanges” offers a perspective of sustainable management if, and only if, one resorts to renewable energy sources.¹⁴ Indeed, there is no “rational regulation” possible in the long term using stock resources that are not only limited but exhaustible, non-recyclable and irreplaceable historically, if not geologically.¹⁵

4. *A flaw in the critique of capitalist technology.* In *The German Ideology*, Marx and Engels cite mechanization as an example of the fact that capitalism transforms the

¹² Karl Marx, *Capital*, Vol. 1 (New York: Vintage, 1977), p. 363.

¹³ The role of CO₂ was known by 1861 (John Tyndall), but no one imagined that tiny alterations in atmospheric composition would suffice to reduce significantly thermal radiation from the Earth to space. This possibility was demonstrated in 1897 by Arrhenius, who thought it would have positive effects.

¹⁴ The production of biomass is renewable but necessarily limited by autotrophic productivity and the earth’s total surface area. The latter limit applies to the other forms of solar energy.

¹⁵ Oil reserves are probably not renewable geologically over time because of the existence today of organisms that degrade biomass more efficiently.

productive forces into “destructive forces.”¹⁶ In *Capital*, referring to the fate of the embryonic class of wage-laborers prior to the Industrial Revolution, Marx notes that “[t]he subordination of labour to capital was only formal, i.e. the mode of production itself had as yet no specifically capitalist character.”¹⁷ Hans Jonas is clearly wrong, therefore, to impute to Marx the idea of technological neutrality.¹⁸ And yet, there might indirectly be some unconscious truth in this criticism. The failure to take into account the difference between renewable and non-renewable energies leads more or less spontaneously to the implicit conclusion that energy sources are neutral. But if the sources are neutral, why should the technologies not be neutral? This point leads us to pass from the global implications of Marx’s error to the implications from the standpoint of ecology.

Technically, a wood-fired boiler does not differ qualitatively from a coal-fired boiler, and a steam engine put in motion is the same in both cases. In terms of social and economic organization, a biomass system involves smaller and more dispersed converters—which, viewed through our present ecological lenses, may seem more propitious to democratic management. But biomass would have been incapable of supplying the necessary steam for the Industrial Revolution. Moreover, we must avoid romantic visions: far from favoring any local democracy or “harmony with nature,” the capitalist wood-fired system involved the super-exploitation of dispersed workers, while the concentration of coal-based industry facilitated the struggle of the proletariat.¹⁹ It is necessary to bear in mind these considerations when asking ourselves today how the founders of Marxism could have believed in the neutrality of energy sources. But, most probably, they did not even ask themselves any questions in this regard.

Anyway, what is certain is that the problematic of the (non-)neutrality of sources remained virtually imperceptible in Marx’s time. It became evident with the technological development of capitalism. Today, there is no avoiding it: if we compare the classical thermal systems to the nuclear system, we find immediately that the different sources involve different technologies and that they are not neutral. In other words, Marxists who accepted the hypothesis of the neutrality of energy sources and who persist in this are now trapped because they are in contradiction with a fundamental premise of historical materialism—the historically and socially determined character of technology. This is what has happened to the French Communist Party, but also to an anti-Stalinist organization like Lutte Ouvrière, which claims to adhere to anti-capitalism based on a rigorous knowledge of the evolution of science.

¹⁶ K. Marx and F. Engels, *The German Ideology*. I. Feuerbach: Opposition of the Materialist and Idealist Outlooks, <http://www.marxists.org/archive/marx/works/1845/german-ideology/ch01c.htm>.

¹⁷ Karl Marx, *Capital*, Vol. 1 (New York: Random House, 1976), Chapter 28, p. 900.

¹⁸ Hans Jonas, *The Imperative of Responsibility: In Search of Ethics for the Technological Age* (Chicago: University of Chicago Press, 1984).

¹⁹ This concern is clear in Lenin: “The coal industry creates mobility of the population, establishes large industrial centers and inevitably leads to the introduction of public control over production. In a word, the change-over described is of the same progressive significance as the replacement of the manufactory by the factory.” *The Development of Capitalism in Russia*, in *Works*, Vol. 3, available on the Marxist Internet Archive at: <http://www.marxists.org/archive/lenin/works/1899/dcr8vii/vii8ix.htm>.

That is why it can be said that the energy question represents a Trojan horse in “Marx’s ecology” and in Marxism in general, irrespective of tendency. Let us synthesize the steps in the possible slippage:

- (a) the failure to take into account the qualitative difference between renewable and non-renewable energy can lead to the idea of energy source neutrality;
- (b) the presumed neutrality of energy source may suggest that the choice between technologies would be determined for all time—including in post-capitalist society—in favor of large facilities and centralized systems, because the concentration of production creates the most favorable conditions for workers’ struggle;
- (c) to the degree that different energy systems involve different technologies, the idea of neutrality of sources and systems may mean bringing in through the window the idea of technological neutrality that Marx put out through the door.

“From a scratch to the danger of gangrene,” Trotsky’s expression, used in another context entirely, is quite applicable here. Viewed in the context of the day, the initial error seems relatively unimportant, almost a detail. But this detail is not such, because it is addressed to an absolutely central question: energy. By definition, energy is the *sine qua non* of all labor, of all human activity. Minimal as it may be, an error at this level cannot help but acquire a systemic nature.

Two Antagonistic Schemas of Development

In Marx’s own work, the amalgam between renewable and non-renewable energies has no direct consequences: rather, it constitutes a sort of blind spot, a shadow zone. But this shadow zone is potentially dangerous, because it conceals the *de facto* coexistence of two schemas:

- a progressive cyclical schema: starting with the problem of soils, as we have seen, the foundations are laid for an authentic socio-economic thinking built around the notion of regulation of material exchanges, and thus the rational management of natural cycles modified by human impact. The vision is cyclical, but not rigid: humanity transforms nature by balancing, to the extent possible, the exchanges within the environment;
- a linear schema: the cyclical approach applied to the soils question is not transposed onto the terrain of energy. Here, because he does not grasp the difference between renewable and non-renewable energies, Marx in fact reiterates the utilitarian schema—resource > use > waste (CO₂)—which is that of classical economics. There is no mastery of the impact, because the conditions for completing the carbon cycle are not taken into account.

These two schemas clearly follow two different logics. The first tends to favor a prudent intervention in natural mechanisms (for societies are only the “beneficiaries” of the earth and “have to bequeath it an improved state to succeeding generations, as *boni patres*

familias,” as Marx writes in *Capital*),²⁰ while the second is informed by the productivist peril (“the constantly accelerated development of the productive forces” and “the unlimited increase of production” thanks to the “deliverance of the means of production from the bonds that the capitalist mode of production had imposed upon them,” as envisioned by Engels).²¹ Between the two, there is not just a contradiction but an antagonism. If the system is to be coherent, one of the two logics must necessarily yield to the other.

Some will object that this antagonism is far from explaining all of the difficulties of Marxism or of those who claim to approach the ecology question from a Marxist perspective. That is obvious. It would be absurd, for example, to attribute to Marx the energy policy of the Stalinist regimes. Khrushchev’s goal of “overtaking capitalism” by every possible means, including the dirtiest and most dangerous technologies, does not stem from Marx’s error but from the existence of a privileged bureaucracy that betrayed Marx’s thinking by coexisting with capitalism and which, by aping productivism, ended up with its own disintegration. The rational management of materials exchanges is incompatible with “socialism in one country.”

Because it was bureaucratic, the U.S.S.R. worked through the distribution of incentives to managers on the basis of the amount of energy, coal, steel, etc. used in the factories. As a consequence, the managers took advantage of production inefficiency. The difference with capitalist productivism is obvious: a boss will try to use less energy, coal, and steel per unit in order to maximize efficiency, lower the costs, and produce more units. In the short term, the result is the same: more and more resources used and more and more ecological destruction. But in the long term, the Soviet system was unsustainable, because the political regime was in contradiction with its social-economic infrastructure. It could not identify nor fulfil needs, not even in an alienated way. That is why it collapsed. This is not the case for the capitalist system: it will not collapse for that reason, which means there is no limit to the capitalist destruction of the environment.

Having said that, it would be even more fallacious to argue that Marx’s error is of no significance to the “failed encounter” between Marxism and ecology. On the contrary, it has played an extremely important role. Indeed, a review of the intellectual production of the 20th century Marxists indicates that the antagonism between the two logics was resolved in practice by the disappearance, pure and simple, of the first. Quickly, soundlessly, and without debate among Marxists, the linear schema became established as the exclusive model in practice. The audacious anticipatory thinking about “social metabolism” sank into complete oblivion. It is beyond debate that this disappearance helps to explain why Marxists were caught unprepared when the ecological question suddenly appeared as a major issue in the 1960s.

A typical example in this regard can be found in Ernest Mandel’s critique of the Mansholt report in 1972 on “zero growth.” Mandel stood out among the Marxists of his generation by his great sensitivity to social problems, and he was without a doubt the opposite of a productivist. Faced with Mansholt, however, his quandary was obvious: he

²⁰ Karl Marx, *Capital*, Vol. 3, Penguin Classics (New York: Penguin, 1993), p. 911.

²¹ F. Engels, *Anti-Dühring*, Part III, Chapter 2, <http://www.marxists.org/archive/marx/works/1877/anti-duhring/ch24.htm>.

rightly denounces the apology for austerity which, under cover of ecology, is aimed above all at preserving profits, but he seems unable to admit that the finite nature of resources poses some limits on human development. It is quite noteworthy that Mandel simply alludes vaguely to the capitalist break with “social metabolism.” As deeply knowledgeable Marx specialist, he is acquainted with the notion but apparently does not know what to make of it. Worst of all, he superficially cites *The Closing Circle* by the great ecologist Barry Commoner without even noting the homage therein to Marx’s cyclical schema.²²

How are we to explain this selective amnesia of the Marxists? A reply is beyond the scope of this contribution. However, I will suggest four possible explanations:

- The objective centrality of the energy question. It seems obvious that this had to favor the linear schema, which was, in fact, Marx’s in this regard;
- The historical context. The revolution triumphed in Russia, a backward country that could not reasonably be rebuilt after the war and civil war without relying on fossil fuels. This context profoundly influenced all communist currents, including the anti-Stalinist opposition;
- The contradictory situation of the workers movement, in particular the trade-union movement. As a class, the workers have an interest in defeating capitalism. But in isolation, or on a company-by-company basis, their jobs and wages from day to day depend on business prosperity;
- The erasure of the question of soils. With the invention of synthetic fertilizers by the late 19th century, capitalism produced its own solution to the break in the nutrient cycle, the basis for Marx’s thinking on the management of cycles. The concept of social metabolism might have been used to question this solution (from the point of view of sustainability) and address further problems of resources management (such as energy), but no successor of Marx did so.²³

An Indispensable and Urgent Overhaul

As the foregoing illustrates, the “ecologization” of Marxism involves more than the mere glassy-eyed rediscovery of “Marx’s ecology” to which Foster and Burkett invite us. And it involves more than a consideration of the “second contradiction” (more accurately, the antagonism) of capital and nature that James O’Connor would add to the contradiction

²² E. Mandel, *La dialectique de la croissance: À propos du rapport Mansholt*, in *Mai* (Brussels, Nov.-Dec. 1972). Some years later, in *Power and Money* (London: Verso, 1992), Mandel writes, in a self-critical way:

Today we have become aware, with much delay, that dangers to the earth’s non-renewable resources, and to the natural environment of human civilization and human life, also entail that the consumption of material goods and services cannot grow in an unlimited way. Saturation of demand, of consumption, is not only possible; it is absolutely necessary for the survival of humanity. That is one of the reasons why it has become a life-and-death question to eliminate a system which institutionalizes scarcity by stimulating demand for ever-changing goods, with all the attendant frustrations and psychological or even macro-economic irrationalities.

²³ Which shows that J.B. Foster is wrong to attribute the loss of continuity with “Marx’s ecology” to “Western Marxism” alone. For a further discussion of Foster’s balance sheet of Western Marxism on ecology, see D. Tanuro, “Energie de flux ou énergie de stock? Un cheval de Troie dans l’écologie de Marx,” online at ; <http://www.europe-solidaire.org/spip.php?article8382>.

between capital and labor.²⁴ In fact, both approaches overlook the need for a clarification at the very heart of Marxism: it is necessary to bring out into the light of day the Trojan horse—the amalgamation between renewable and non-renewable energy; and its avatar, the linear resource > product > waste schema. This is indispensable if Marxists are to set to work on the basis of what Marx produced in terms of ecology: the brilliant schema of the rational management of natural cycles evolving under the impact of human activity.

The objective situation makes this overhaul very contemporary and very urgent. According to the Intergovernmental Panel on Climate Change, and following the precautionary principle, to reduce global warming trends we must begin to curtail global greenhouse gas emissions by 2015 at the latest in order to attain a 85 percent decrease in greenhouse gas emissions by 2050, at least.²⁵ Considering that the developed countries are more than 70 percent responsible for climate change, this effort shall have to be adjusted as follows: (i) the industrialized countries must reduce their emissions by 95 percent by 2050, with an intermediary reduction of 40 percent by 2020 (compared to 1990); (ii) the developing countries will have to “deviate substantially” (by 15 to 30 percent) from the “business as usual” reference standard by 2020 (2050 for Africa).²⁶

In the present state of scientific and technical knowledge—and if we exclude nuclear energy, massive agrofuels production for the world market, and large-scale geological stockpiling of CO₂, as we must²⁷—these objectives can be achieved only by substantially reducing the consumption of energy in the developed countries. In Europe, for example, a reduction of close to 50 percent is necessary for a successful transition from fossil sources to renewable sources. In the U.S., a reduction of 75 percent could be necessary.

Although the relationship is not linear, this reduction in energy consumption necessarily implies a certain decline in material production. Here the ecological and social crises are so inextricably mingled as to impose a search for an outcome common to both. The situation can be summarized quite simply: on the one hand, material production must be reduced in order to avoid a climate catastrophe; on the other hand, the satisfaction of the fundamental human needs of billions of people necessitates the production of more housing, food, clothing, health centers, schools, public transportation, books, heating facilities, sewer and water treatment systems, etc.

It is obvious that both these requirements can be met simultaneously only if wealth is redistributed, if we stop manufacturing useless things (advertising expenses, gadgets of all kinds), harmful things (weapons!),²⁸ and prematurely obsolescent things, and if we replace the production of commodities for the profit of a minority with the production of use values

²⁴ James O'Connor, “The Second Contradiction of Capitalism: Causes and Consequences,” Conference Papers, CES/CNS Pamphlet 1, Santa Cruz, 1991.

²⁵ IPCC Working Group III contribution to the 2007 report, Technical Summary, Table TS.2, page 39.

²⁶ IPCC Working Group III contribution to the 2007 report, page 776. The IPCC figures are of a 50-85 percent reduction globally and an 80-95 percent reduction for the developed countries (25-40 percent by 2020). Like many others, I think these objectives must be radicalized to take into account non-linear phenomena like ice-cap disintegration.

²⁷ See also David Schwartzman, “Solar Communism,” *Science & Society*, Vol. 60, No. 3, 1996, pp. 307-331.

²⁸ See David Schwartzman, “Ecosocialism or Ecocatastrophe?” *Capitalism Nature Socialism*, Vol. 20, No. 1, March 2009, pp. 6-33.

for the satisfaction of real needs, democratically determined by the majority (for example by the radical extension of the public sector, nationalization of energy and the banks under democratic control, etc.). In this, the activists rediscover their bearings: the outcome can only be anti-capitalist, and Marx is more relevant than ever.

Yes, Marx is more relevant than ever. But both requirements, social and environmental, must be met at the same time. Those four little words—at the same time—encapsulate the difficulty and the novelty of the situation. Generalized commodity production has brought humanity so close to the abyss that a new long wave of growth—whether “green,” “selective,” or “left-wing”—would result in a dreadful climate shift.²⁹ Maybe it already has, given that greenhouse-gas levels due to the combustion of fossil fuels is higher now than at any time in the 700,000 years before, if not longer. Postponing the ecological question on social emergency grounds would amount to condemning hundreds of millions of the world’s poor to a brutal degradation of their conditions of existence.

For Marxists, the moment of truth has arrived: productivism must be eradicated, and a clear choice must be made between the two schemas of Marx. The “rational [and prudent] management of material exchange between humanity and nature” is more than ever, and literally, “the only freedom possible.” Overlooked in the 20th century, the ecosocialist schema sketched in *Capital* must now be seen as the immediately necessary framework for human development on a world scale. The task is to deepen and expand the concept and develop from it demands, forms of struggle, and strategies for party-building.

Who will be the agent of these demands, these struggles? Where is the historical subject of this red-green revolution? Ultimately, that is the question. The difficulty cannot be eluded: the link with the day-to-day class struggle is far from obvious, especially in the ultra-defensive context of today, of a recession that is sending millions of workers to the unemployment lines. Because of their subordinate position, workers are led spontaneously, company by company, industry by industry, to seek nothing more from their boss than a job and increased purchasing power. New products, new markets, new commodities, therefore. New commodity fetishes to compensate for social malaise. This is a major obstacle, owing to the economic alienation of the workers, shackled as they are to the capitalist mode of production on which they depend for their day-to-day existence.

To be sure, provided it is selective, determined by genuine social needs, and coupled with the redistribution of wealth, a decline in material production is compatible with an improvement in well-being, and in the richness and quality of life of the immense majority of humanity. The logic must even be turned around: it becomes increasingly a condition of such improvement, for it is synonymous with a radical reduction in workloads, decreased pollution, improved health, extension of free services, preservation of the beauty and diversity of ecosystems, etc. But this can only be comprehended and achieved at the level of the exploited class as a whole, and it postulates a radical anti-capitalist orientation that is

²⁹ On the relationship between the long waves of capitalism and climate change, see D. Tanuro, “Alternative sociale et contrainte écologique,” online at: http://www.contre-attaque.be/contrib/Contre-attaque_09-NI-01-annexe_2-Contrib_Tanuro_Danie_12-12.pdf.

The task is immense and of unprecedented complexity. It is totally illusory to think that it might be accomplished spontaneously, in the heat of mass action. It has to be prepared, politically and practically. To rise to this historical challenge, a political instrument is indispensable. A new party of the exploited and oppressed that is not only anti-capitalist but ecological. A century later, faced with another “imminent catastrophe,” we confront the kind of problematic maligned by so many in Lenin’s *What is to be Done?* Ecosocialist consciousness must be brought to the working class from outside.