

# Marxism and entropy

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Marxism is criticised by some ecologists as inconsistent with the laws of thermodynamics, and in particular the second law of entropy — that energy is only transformed from more ordered to less ordered forms. Marx and Engels are accused of responding indifferently or even negatively to Sergei Podolinsky's attempt to introduce certain elements of thermodynamics into socialist theory.

In the early 1880s, Podolinsky published an energetic analysis of human labour and tried to reconcile Marx's labour theory of value with the first law of thermodynamics (conservation of energy). Green writers argue that Marx simply ignored it, while Engels abruptly dismissed it without giving it a serious thought – even though Podolinsky had personally contacted them seeking their comradely opinions and approval.

This myth has been decisively refuted by Paul Burkett and John Bellamy Foster, by going back to original texts and examining exactly what Podolinsky argued. Podolinsky's analysis was published in four different languages over the years 1880-83, and there were significant differences between the four versions. The first version appeared in Russian in Slovo (1880); the second in French in La Revue Socialiste in June 1880; the third in Italian in La Plebe in 1881; and the final version in German, in Die Neue Zeit magazine in 1883, after Marx's death.

Burkett and Foster found that Marx had taken detailed extracts from Podolinsky's work, but only with reference to a French-language version that Podolinsky had mailed to him in April 1880. This version seems to have been an early draft of the Revue Socialiste article. Although we know from Podolinsky's own correspondence that Marx wrote back to him at least once, neither that letter nor any other letter that Marx sent him has survived. Still it seems likely that Marx sent comments on the draft to Podolinsky, some or all of which were incorporated into the published French version. The most likely reason no copy of Podolinsky's original draft was found in Marx's papers and that all we remains is extensive verbatim extracts from Marx's notebooks is that, as was customary in the days without copying machines, Marx sent the manuscript back to Podolinsky with marginal notes on the manuscript.

Burkett and Foster argue that the text of the Revue Socialiste article, as far as we can deduce from Marx's extracts from the draft version sent by Podolinsky, contains significant additions to the earlier draft. Among these additions are the main reference to Marx's concept of surplus labour, the calculation of energy equivalents for agricultural labour and its output, and the attempt to analyse the energy efficiency of labour utilisation under the feudal, slave, capitalist and socialist modes of production. Burkett and Foster arranged for a full translation of the Italian version published in La Plebe. Their conclusion was that "Podolinsky had not even come close to establishing a plausible thermodynamics basis for the labour theory of value that could have been adopted by Marx and Engels". (2006 pp.177-178)

Engels letters on the matter not only rejected Podolinsky's energy-reductionist conception of human labour, posing a more metabolic alternative, but also emphasised the failure of Podolinsky's energy-productivity calculations to take into account the great extent to which human production had operated as a "squanderer of past solar heat", especially by "squandering our reserves of energy, our coal, ore, forests, etc". (Engels to Marx, 19 December 1882, MECW 46 p.411)

In other words, Engels' responses were far more advanced ecologically than Podolinsky's analysis. He criticised the crude mechanistic and energy-reductionist purposes to which thermodynamics had been put in some analyses of human labour. Burkett and Foster argue that Engels' argument against energy reductionism emphasised the irreducible biochemical character of human labour and its products, and the fact that use-value is not reducible to pure energy. As Engels put it, "Podolinsky went astray" when he "sought to find in the field of natural science fresh proof of the rightness of socialism", thereby "confused the physical with the economic". (MECW 46 p.412)