DIALOGUE

Response to Næss and Høyer

David Schwartzman

Næss and Høyer's paper is a useful critique of so-called sustainable economic growth under the capitalist mode of production and consumption, in particular the "decoupling" approach that claims that the link between economic growth and environmental degradation can be cut. By examining the Norwegian experience, the authors show how decoupling has not met the predicted outcomes of its proponents. This is a valuable contribution, since it serves to emphasize how even in a social welfare capitalist state such as Norway, the increased consumption driven by "sustainable" economic growth has actually increased carbon dioxide emissions and other indices of negative environmental impacts in the two decades since the Brundtland Commission first proposed this strategy.

However, their paper fails to look deeper into the critical sources of this failure, in particular the character of energy consumption and the global context of Norwegian economic growth. The rise of domestic carbon dioxide emissions is directly the result of increased fossil fuel consumption, particularly of natural gas. Further, Norway globally contributes significantly to carbon emissions as a major petroleum exporter, especially to the European Union.

The source of energy driving an economy is especially relevant when we consider the authors' theoretical basis for their critique, Georgescu-Roegen's theory of entropy. They approvingly quote Georgescu-Roegen:

> Every time we produce a Cadillac, we irrevocably destroy an amount of low entropy [high quality] that could otherwise be used for producing a plow or a spade. In other words, every time we produce a Cadillac, we do it at the cost of decreasing the number of human lives in the future. Economic development through industrial abundance may be a blessing for us now and for those who will be able to enjoy it in the near future, but it is definitely against the interest of the human species as a whole, if its interest is to have a lifespan as long as is compatible with its dowry of low entropy. In this paradox of economic development we can see the price man has to pay for the unique privilege of being able to go beyond the biological limits in the struggle for life.

Unfortunately, this invocation of the entropy principle (fully expressed in Georgescu-Roegen's 4th Law) is not examined critically, in particular, with respect to the qualitative aspects of the energy supply that powers an economy. In their paper they make no mention nor take into account the critique even by mainstream ecological economists of Georgescu-Roegen's theory—a fallacious theory which unfortunately continues to inform many well-intentioned critics of capitalist economic and environmental policies. Næss and Høyer claim that I take "a reductionist approach where the multi-causal situation in open systems is ignored." This is a curious argument in light of the authors' already noted endorsement of Georgescu-Roegen's interpretation of entropy. The authors' failure to confront Georgescu-Roegen's fallacious formulation of his so-called 4th Law—in particular, its conflation of open and closed systems—makes their invocation of the relevancy of "open systems" suspect. Georgescu-Roegen's claim of irrevocable destruction of low entropy energy (or matter) is only valid for an economy powered by finite reserves of fossil fuel or

even nuclear energy and not for our open system biosphere with an ever-continuing low entropy solar flux. It is important to note that Georgescu-Roegen's entropy theory has long fertilized pessimistic assessments of the potential contribution of high-efficiency solar energy collection to the modern economy, as shown once again in this paper.

Now to address the specifics of their very concise critique of my paper (I would have welcomed a more sustained critique!). They claim:

> This criticism [a reductionist approach] is also appropriate to raise against David Schwartzman's belief in a "solar utopia" as a way to make sustainable economic growth possible. Apart from the huge infrastructure requirements in order to collect and distribute solar energy to all relevant and steadily growing purposes, Schwartzman does not take into consideration the encroachments on nature and the consumption of raw materials that continual economic growth would entail, solar-driven or not.

Unfortunately the authors misread my paper. My concept of solar utopia (communism) refers to a fully solarized global civilization, likely close to steady-state on our planetary surface, and not to the ecosocialist transition out of capitalism. As I previously made clear, this transition will entail economic growth, especially in its qualitative aspects, i.e., a transition from an unsustainable physical economy powered by fossil fuels/nuclear energy/big hydropower to a sustainable one increasingly powered by high-efficiency solar energy (wind, concentrated solar power, and photovoltaics). Indeed, the necessary infrastructure requirements will be large but still achievable within the constraints of existing energy and material resources, especially since, as the authors point out, "more efficient resource use by means of 'eco-efficiency' and 'dematerialization' is also important, because it can give us breathing space to carry out more fundamental changes." I will return to this issue later with more concreteness.

The authors define economic growth as specified by Gross National Product (GNP). This metric of present capitalist economic activity roughly tracks the negative environmental and ecological impact of the economy, especially with respect to carbon emissions to the atmosphere. As the authors point out: "The belief in limitless economic growth is a consequence of the separation of mainstream economics from any material context, illustrating the 'autistic' character of the dominant parts of the discipline, where the axiomatic assumptions are, so to speak, immune to any corrective inputs from other sciences." Then, I assume the authors would join with me in supporting a program to prevent—assuming it is still possible—the onset of catastrophic climate change ("C3") by taking full account of the inputs of the sciences of *real* thermodynamics, climatology, biogeochemistry, etc. Yes, it is precisely the material context of economic growth that is critical in this prevention program, both the material and energetic basis and its interaction with the greater biosphere. C3 prevention will require radical and rapid increases in energy efficiency and decarbonation of the energy infrastructure, while simultaneously opening up unprecedented possibilities for ending the rule of capital on this planet, since the main obstacle to C3 prevention is arguably the military-industrial complex—the core of global capital reproduction—with its colossal waste of energy and material resources. This project is clearly not "business as usual," one company at a time turning green; rather, it will be a revolution in both the physical and political economies that will, if realized, far surpass in a compressed time frame the industrial and scientific technical revolutions of the last 200 years. I have argued that there are three main components of this revolution:

demilitarization, solarization, and agroecology. For this revolution, "decoupling" is not only possible, it is necessary for the ecosocialist transition.

Now to return to my alleged neglect of the huge infrastructure requirements of solarization and its encroachments on nature and consumption of raw materials of solar-driven economic growth. First, what exactly do the authors mean by "nature"? Lets be clear: there is no pristine nature—i.e., nature that is completely unaffected by anthropogenic impacts—left on our planet, except for parts of the deep ocean which have not yet been touched by dumping. I submit our challenge is to optimize the interaction of the technosphere with the rest of the biosphere, not to preserve some mythical untouched nature where Tarzan and Jane can swing from tree to tree. As a first approximation, I will take their valid concern regarding encroachments on nature to be equivalent to the imperative of preserving biodiversity and to maintain by *human* management the health of our ecosystems, oceans, forests (old-growth and new-growth), wetlands, and deserts.

Let's look more closely at the material requirements for global solarization. The projected material resources for renewable energy creation, such as steel and construction materials, are already within reach by global society. The existing anthropogenic stocks of metals, particularly iron, could with much more efficient solar-powered recycling sharply reduce mining and the negative impacts of fossil fuel energy that are currently used to manufacture the metal and the seemingly endless stream of products that now exist. Industrial ecology powered by solar energy is a critical component of the material basis of ecosocialist transition. The progressive reduction of mining raw materials from the crust and biosphere coupled with the increase in recycling will significantly *reduce*, not increase encroachment on nature and the primary consumption of raw materials. Solarization coupled with restoration of land despoiled by the exploitation and use of fossil fuel and nuclear energy will again reduce encroachment on nature. The critical point that has escaped the authors' attention is that in contrast to fossil fuels and nuclear energy, once created, a solar infrastructure pays its "entropic debt" to space in the form of the global heat flux.

The land area needed for global solarization is already within reach. For example, siting photovoltaics with an assumed conversion efficiency rate of 20 percent on just 15 percent of the present world rooftop area would meet current global electricity generation capacity. Similarly, a global wind turbine infrastructure could deliver several times the present global energy consumption while not closing off most of the land where it is sited to other uses (e.g., farming). Concentrated solar power in the Sahara could supply the current global electricity consumption on less than 6 percent of the Saharan land area (not that concentrated solar power should be sited only in the Sahara of course!). A global mix of these three solar technologies coupled with a sophisticated grid and energy storage capacity can replace the current unsustainable energy infrastructure if sufficient transnational political power can be generated to make this transition possible in a time frame sufficient to prevent C3.