Reply to the author's comments

- *Role of the social planner:*

  We don't disagree on the role of the social planner. You emphasize the viewpoint of the social planner to *study the real problem of an optimal material state of society*, whereas market interactions are only relevant to study whether the economy is able to achieve the optimum or not. Did I say anything different? I claimed that for this purpose the social planner only needs knowledge about the material flows, the technology, and the preferences – regardless whether the economy is a market-economy with/without governmental regulation, or an economy with centralized planning etc.

- *Endogeneity of knowledge:*

  I didn't say that endogeneity of knowledge is unrealistic or that knowledge creation should not be related to material flows. My claim is that "endogenous" usually means that it is the outcome of the model, e.g. it is explained by the decisions of the agents. However, H is determined by a fictitious social planner outside the model. In what sense knowledge is determined "endogenously"? This may also be a problem related with the less developed economic part of the model. Usually, the income, generated in the production and the recycling sector, can be used for consumption or could be invested in physical/human capital. Hence, K and H evolve endogenously (due to decisions of the agents or the benevolent government). This imposes additional dynamic constraints for the social planner. In this comparative-static approach, however, it is not clear whether the optimal levels of K and H could ever be achieved by accumulation.

- *Equation (26):*

  I do not understand your distinction in "labor stock" and "flow of labor services per unit of time". With the same logic you should also define the "flow of capital services" and the "flow of knowledge". However, in your production functions $(12) - (14)$ you use the capital *stock* but the "*flow* of labor services". In most macroeconomic production functions the inputs are capital and labor stocks. Since you have argued that every human provides *one* unit of labor per time unit, it would be convenient and consistent with macroeconomic literature to use the upper-case varibles N_v, N_R etc. as parts ot the total labor stock employed in the different sectors.

- *Utility function:*

  I buy your arguments, especially regarding $U_D < 0$. But since $U_K < 0$ seems to be your original new idea, the first time mentioned in the literature, it deserves a few more words of justification. Note, that in your reply you have also mentioned a countervailing example – the displacement of marble to the body of Venus of Milos. Since there are lot of people who enjoy the skyline of Manhattan (much more massive material displacement), $U_K < 0$ is not a matter of course.

- *Maximization problem p.16:*

  I withdraw (partially) my critical comment. It is clear that it is *mathematically* completely correct to treat all of the 9 variables as decision variables since they have to meet the 6 restrictions. I agree with your reply. But for the *economic interpretation* it would be more comfortable first to substitute clearly endogenously determined variables or definitional relations between variables so that the maximization problem depends on exogenous variables only.