

Earth Syst. Dynam. Discuss., community comment CC1  
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## **Comment on esd-2021-21**

Richard Rosen

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Community comment on "Lotka's wheel and the long arm of history: how does the distant past determine today's global rate of energy consumption?" by Timothy J. Garrett et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2021-21-CC1>, 2021

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It has been long known that the ratio of energy consumption to annual GDP has been falling at somewhere between 1-2% per year, depending on the year. This implies that energy consumption will slowly fall with respect to cumulative production as well. But this is merely a matter of math and not a cause and effect relationship, since the technologies used for production many decades ago can not affect energy consumption today, except to the extent that a few of such technologies still consume energy. Whatever the lifetime is for old energy consuming technologies, this fact would say little about how fast energy consumption could be made to drop each year in the future. With strong energy efficiency policies in place, energy usage could be made to drop much faster in the future than it has averaged in the past. For example, all electric vehicles which are good for mitigating climate change are far most energy efficient than the currently fleet of vehicles. All electric vehicles could be phased in within 20 years. Similarly, old buildings could be rapidly renovated to reduce their energy consumption. The authors demonstrate that there is a lot of "momentum" built into the energy/economic system, with a fairly constant "velocity" in the past. With enough policy "force" applied to the system, this velocity could be greatly slowed down, as we all hope will happen as climate change is rapidly mitigated, to use a Newtonian metaphor! Thus, the world is not constrained by past energy consumption trends.