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How much kinetic energy can the large-scale atmospheric circulation at best generate?

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I use thermodynamics and an Earth system approach to determine how much kinetic energy the atmosphere is physically capable of generating at large scales from the solar radiative forcing. The work done to generate and maintain large-scale atmospheric motion can be seen as the consequence of an atmospheric heat engine, which is driven by the difference in solar radiative heating between the tropics and the poles. The resulting motion transports heat, which depletes this differential solar heating and the associated, large-scale temperature difference, which drives this energy conversion in the first place. This interaction between the thermodynamic driver (temperature difference) and the resulting dynamics (heat transport) is critical for determining the maximum power that can be generated. It leads to a maximum in the global mean generation rate of kinetic energy of about 1.7 W m^{-2}, which matches rates inferred from observations of about 2.1 - 2.5 W m^{-2} very well. This represents less than 1% of the total absorbed solar radiation that is converted into kinetic energy. Although it would seem that the atmosphere is extremely inefficient in generating motion, thermodynamics shows that the atmosphere works as hard as it can to generate the energy contained in the winds. I then show that this view of atmospheric dynamics is essentially the same as a maximised generation rate of Available Potential Energy (APE) for the Lorenz energy cycle, and that it is also consistent with the outcome of the proposed principle of Maximum Entropy Production (MEP) while representing a more physically interpretable approach. This supports the notion that Earth system processes evolve to and operate near their thermodynamic limit, which permits the use of this constraint to do climate science analytically with less empirical input.