This manuscript describes the formulation of an economic model that is supposed to include a better treatment of inflation, mixed in with some „thermodynamic“ interpretation and link to climate (I think). I should note that I am not an economist, so it may need assessment from someone familiar with economics as well. Yet, the journal is also not an economics journal, but an interdisciplinary Earth system sciences journal. Given that, I found it really difficult, actually, near to impossible to follow, and, quite frankly, unsuitable for an interdisciplinary journal in its present form. There may be an interesting insight somewhere hidden, but it seems to have been drowned by equations. There are no comparisons of the equations or of the results to observations, so the model represents some form of speculation, I guess. In any case, I do not think that this manuscript would need a complete rewrite to make it more accessible, which is why I recommend its rejection.

We thank the Reviewer for their comments. Earth System Dynamics is an interdisciplinary journal that is heavy in analytical descriptions of the Earth system and its dynamics, necessarily relying heavily on equations. It is for this reason that the paper was submitted to ESD because of the reader familiarity with analytical treatments as well as with physics. The article includes extensive comparisons of observations with the model, particularly in Sections 4 and 5.

Nonetheless, we appreciate that the Reviewer might prefer a treatment that is less reliant on equations so we have added to the manuscript the following figures to help clarify the document. We have also tried to rewrite the most visible sections such as the title and abstract so that they are more accessible to a reader with a non-mathematical background.

The title is now: *Climate change, economic decay, and the risk of global inflation*

The abstract is:

> Regional climate anomalies have historically been associated, in turn, with price increases, social conflict, and economic decline. Integrated Assessment Models (IAMs) used to estimate future climate damages generally describe losses to real, inflation-adjusted GDP, while offering little guidance on the inflationary response. Here, we introduce a highly aggregated framework for world economic growth in which inflation is treated as an intrinsic property rather than an exogenous forcing. The framework builds from the definition of a new quantity termed civilization “Wealth" as the historical accumulation of global real output. Over an accounting interval, normally one year, nominal production is decomposed into a real addition to Wealth and a period-averaged decay or devaluation term. Inflation then reflects a changing gap between nominal production and real additions to Wealth. We show that standard IAM climate damage formulations translate into faster decay of Wealth, but that, even for high-end damage estimates and global mean temperature increases, the annual inflation increment remains small, less than about 0.3% per year. Nevertheless, larger global inflationary shocks cannot be ruled out. Empirically, Wealth is linked to global primary energy consumption through a constant scaling factor. If climate change or other stresses accelerate decay so that production is redirected from expansion toward maintenance, then the growth of energy use and Wealth could slow towards stagnation. In this limit, the gap between nominal and real production widens rapidly, and stagflation or even hyperinflation may emerge as key signatures of global economic distress. These results suggest that assessments of climate damages should track not only damages to real GDP, but also the risk for a widening gap between nominal activity and real accumulation.

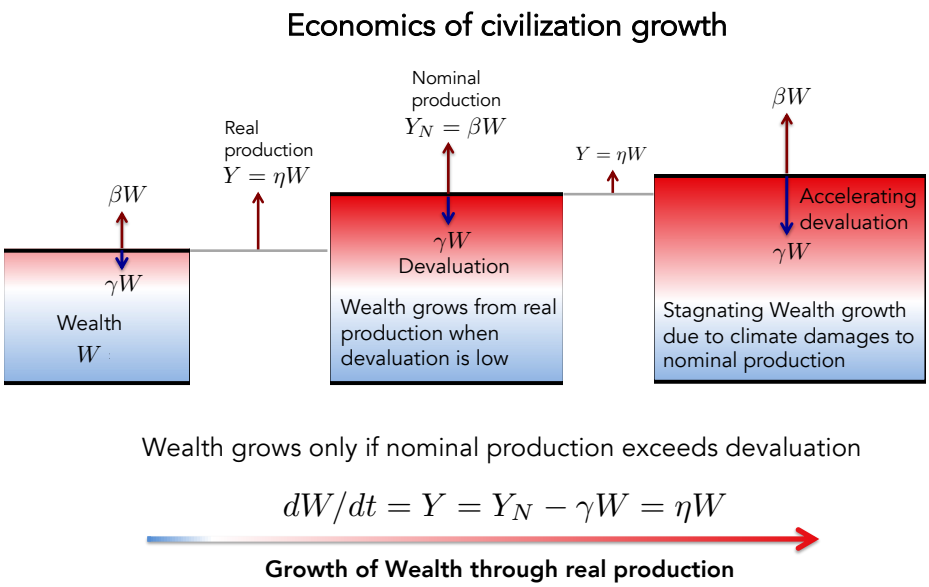

Figure 1. Illustration of the economic growth of civilization expressed in terms of its Wealth W as defined by Eq. **??**. Wealth is the global historical accumulation of real production Y. It grows due to nominal production $Y_N = \beta W$ opposed by devaluation γW where β and γ are variable coefficients. When γ approaches β, perhaps due to climate damages, growth in W at rate $\eta = \beta - \gamma$ declines due to a drop in Y.

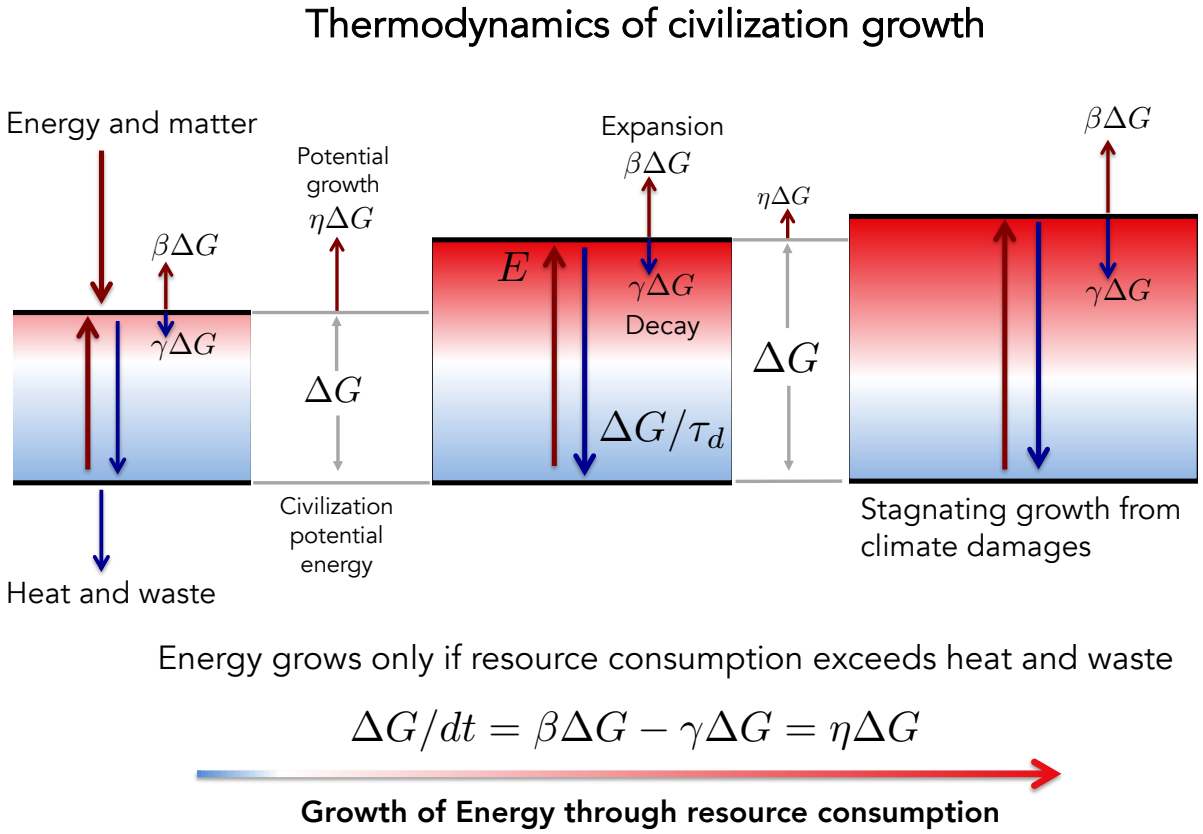

Figure 2. Illustration of the thermodynamic growth of civilization defined by a potential energy relative to an uncivilized state ΔG, that is continuously powered by dissipation of primary energy at rate E as the potential relaxes to $\Delta G = 0$ as waste heat is transferred to the environment. Growth at rate $\beta\Delta G$ requires a surplus of energy and matter beyond decay at rate $\gamma\Delta G$ for a net growth rate $\eta = \beta - \gamma$. Climate damages, accelerate decay slowing growth ΔG and E.

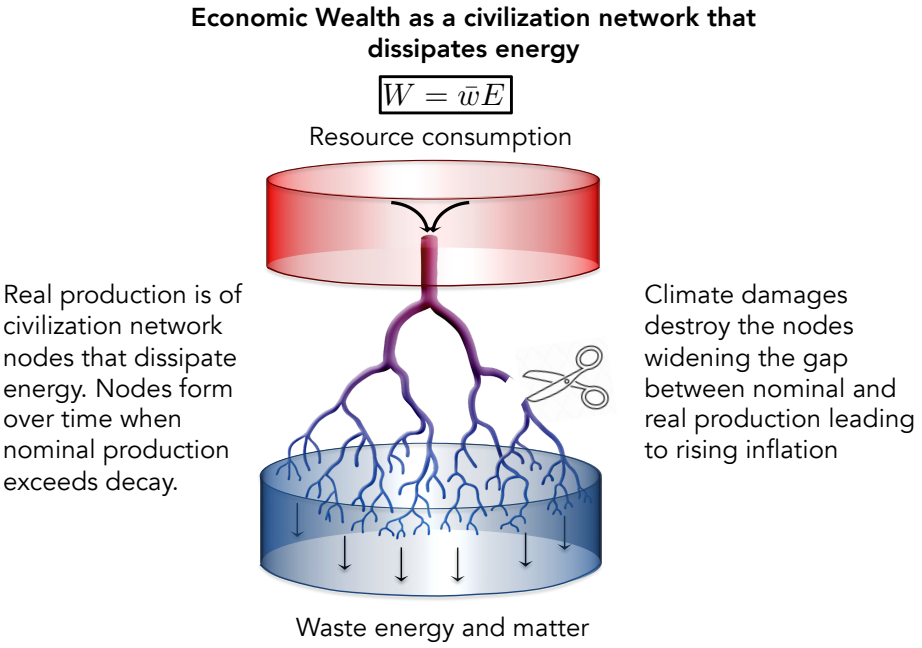

Figure 3. The correspondence between the economic growth and thermodynamic growth of civilization (Figs. 1 and 2 the constant relating energy consumption E to global, historically accumulated economic real economic production W through $\bar{w} = E/W$ as it is subject to devaluation and decay accelerated by climate damages.