# Austria in a 2050 Global Emissions Equity (GEE) World

## Contribution of WP2 to ClimTrans2050: Austria's Emission Requirements in a Global Context

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## WP2: National Emission Requirements in a Global Context

ClimTrans2050 makes use of IIASA's **Emissions-Temperature-Uncertainty (ETU)** framework (Jonas et al., 2014) to provide **emission target paths** for Austria that are compatible with global warming targets for 2050, e.g., 2 °C. The ETU framework allows reconciling short-term GHG emission commitments with long-term efforts to meet global temperature targets in 2050 and beyond; and understanding uncertainty across temporal scales. **In a nutshell, the ETU framework can be used to monitor a country's performance – past as well as projected achievements – in complying with a future warming target in a quantified uncertainty-risk context**.

## The Scientific Pillar of the ETU Framework

The ETU framework follows a **Contraction & Convergence (C&C)** approach (GCI, 2012), **while constraining cumulative GHG emissions** in the future (Meinshausen et al., 2009). Cumulative emissions until 2050 are a good predictor for the expected temperature rise in 2050 and beyond. **The ETU framework expands this approach by considering additionally diagnostic and prognostic uncertainty.**

## Austria in a 2050 2 °C GEE World

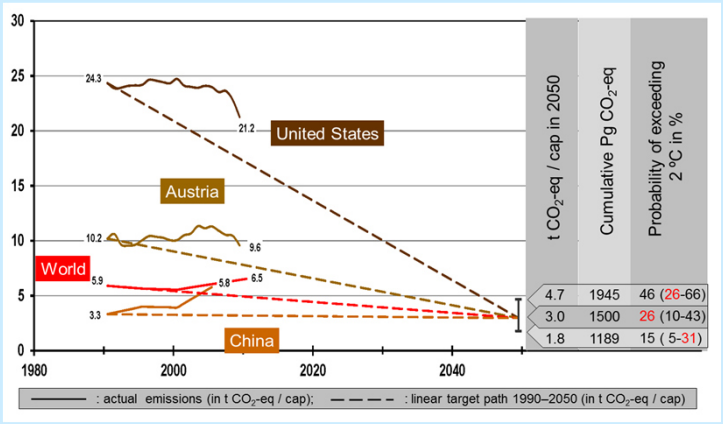


**Fig. 1:** For illustration, setting a target for global convergence to a **universal** per capita value of GHG emissions, and **limiting cumulative emissions** sufficiently to hold the increase in global temperature to 2 °C as of 2050. The central target path here is that limiting global emissions to 1500 Pg $CO_2$-eq between 2000 to 2050 will require limiting per-capita emissions globally to 3.0 t $CO_2$-eq.

## Austria in a 2050 2–4 °C GEE World

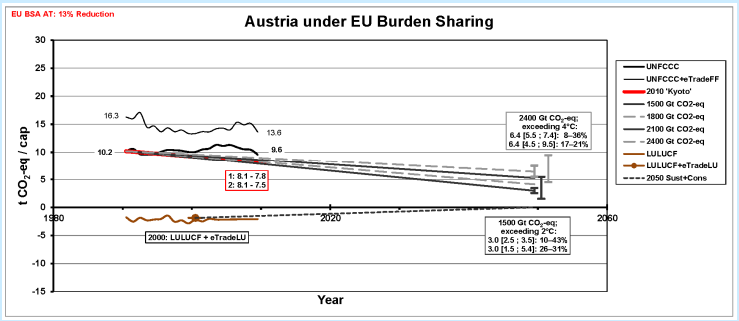


**Fig. 2:** Austria (1990–2050) in greater detail: Austria's GHG emissions **and** removals, without **and** with emissions embodied in trade, in the globally consistent and long-term GHG emissions-temperature-uncertainty context illustrated in Fig. 1. Technospheric emissions are budget-constrained globally for 2000–2050 to 1500, 1800, 2100 and 2400 Pg $CO_2$-eq, which translate (assuming linear target paths) to equal per-capita emissions of 3.0, 4.1, 5.2 and 6.4 t $CO_2$-eq in 2050, to meet global temperature targets of / in the order of 2, 3, 3–4 and ≥4 °C. The imperative followed for emissions from land use and land-use change (**LULUCF**) is that these reduce linearly to zero. Compliance with an agreed 2050 global temperature target is uncertain and entails a risk of exceedance (reported as interval; cf. Fig. 1). In the boxes the min/max and max/min uncertainty combinations for cumulative emissions and risk of exceedance are specified for the lowest (1500 Pg $CO_2$-eq: appropriate for meeting 2 °C) and highest (2400 Pg $CO_2$-eq: appropriate for meeting ≥4 °C) target path.

## The New Accounting

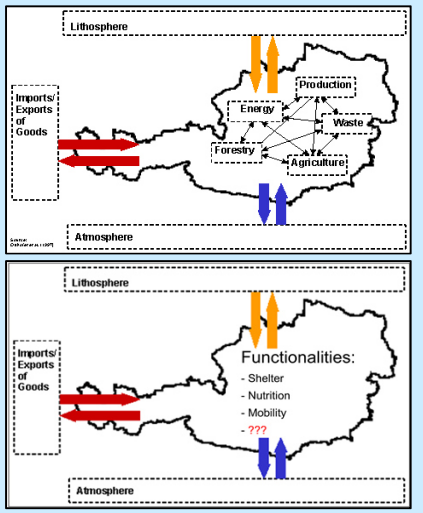


**Fig. 3:** Functionalities: The new way of grasping GHG emissions, while boundary conditions are unchanged.

## ClimTrans2050 Take-home Messages

- In combination with an agreed global temperature target for 2050, linear target paths serve as reference for countries' – including Austria's – past and future emission reduction achievements which must comply, for any target path, with its two boundary conditions: (1) its **budget constraint** (area below target path) and (2) its **2050 GEE target**.
- A linear target path is **the steeper** the later emission reductions are achieved, and **the lower** is its 2050 GEE target. For instance, Austria's 2000–2050 target path to comply with a global temperature increase of 2 °C as of 2050 is steeper than its 1990–2050 target path; while the two paths' 2050 GEE targets are 3.0 and 2.3 t $CO_2$-eq, respectively.
- Austria's emission reductions until 2009 are **not** sufficient, neither as of 1990 (shown in Fig. 4) nor as 2000, to limit the increase in global temperature to below **4 °C** as of 2050. This situation does **not** consider Austria's fossil-fuel related $CO_2$ emissions embodied in trade (Austria is a net importer).
- The underlying imperative followed is that Austria's LULUCF emissions "zero-balance" in 2050. Currently, Austria's LULUCF emissions are negative and seem to compensate, at least in 2000, emissions embodied in traded biomass needed to satisfy consumption. **The crucial question remaining is how this LULUC balance will look like in 2050?**
- Additional boundary conditions are: that **(i)** the remainder of the biosphere (including oceans) stays in or returns to an emissions balance—which must be questioned (Canadell et al., 2007); **(ii)** this return, which refers to $CO_2$-C, implies in turn that emissions and removals of $CH_4$, $N_2O$, etc. also return to an emissions balance; and **(iii)** these returns happen without systemic surprises of the terrestrial biosphere.

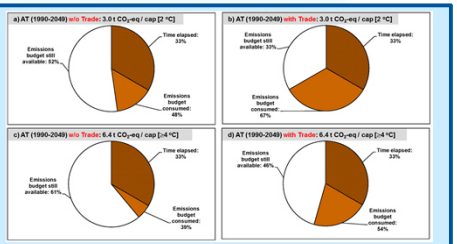

**Fig. 4:** Austria (1990–2050) in the context of a 2 and ≥4 °C world as of 2050, without and with trade.

**Sources:** **Jonas, M. et al**. *Clim. Change* 124(3): 459-476 (2014); **GCI** *Global Commons Institute*: www.gci.org.uk/Documents/ECOSOCIALIST.pdf; **Meinshausen M. et al**. *Nature* 458(7242): 1158-1162 (2009); **Orthofer R**. Austrian Research Center Seibersdorf, Report OEFZS-A-4195 (1997); **Canadell, JG. et al**. *PNAS* 104(47): 18866-18870 (2007)

MJ & PZ; 25 April 2015