

# Climate Mitigation amid Increased Energy Intensity following AI Adoption: An Analytic Analysis

The labor share of global production has been shown to fall consistently over the recent past decades due to labor displacing shifts such as automation and digitalization (Karabarbounis and Neiman, 2014; Dao, Das and Koczan, 2019). Adoption of artificial intelligence is feared to exacerbate this trend, leading to further increases in energy (capital) intensity of production. This development may pose a serious challenge to climate mitigation measures. In particular, the increase in energy demand may delay fossil fuel decoupling. On the other hand, potential mass labor displacement following AI adoption as part of the process of creative destruction, may also reduce household demand for consumption goods, thus reducing the energy demand. The net effect is ambiguous.

In this project, we design an analytic integrated assessment model with heterogeneous agents, to investigate these complex dynamics in a tractable manner. This model needs to integrate a task-based framework of production (cf. e.g. Acemoglu and Restrepo, 2018; Santini, 2022; Ali Akbari, 2025) which endogenizes the capital and labor shares, together with an analytic integrated assessment model with heterogeneous agents (cf. e.g. Traeger, 2023; Ali Akbari and Traeger, 2025). The main ingredients are a carbon cycle, a task-based production sector (including energy), and individuals supplying labor and demanding final goods.

**Keywords:** Artificial intelligence, energy (capital) intensity, analytic integrated assessment, climate mitigation.

## References

- Acemoglu, Daron and Pascual Restrepo. 2018. “The race between machine and man: Implications of technology for growth, factor shares and employment.” *American Economic Review* 108(6):1488–1542.
- Ali Akbari, Danial. 2025. “Technology Adoption and Human Capital Accumulation.” Working Paper.
- Ali Akbari, Danial and Christian Traeger. 2025. “Heterogeneous Agent Analytic Climate Climate Economy (HAACE).” Mimeo.
- Dao, Mai Chi, Mitali Das and Zsoka Koczan. 2019. “Why is labour receiving a smaller share of global income?” *Economic Policy* 34(100):723–759.
- Karabarbounis, Loukas and Brent Neiman. 2014. “The global decline of the labor share.” *The Quarterly journal of economics* 129(1):61–103.
- Santini, Tommaso. 2022. Automation with heterogeneous agents: the effect on consumption inequality. Technical report IWH Discussion Papers.

- Traeger, Christian P. 2023. “ACE—Analytic climate economy.” *American Economic Journal: Economic Policy* 15(3):372–406.