# Powering Intelligence: Data Centers and Spatial Welfare

H. Ron Chan[1], Sungwan Hong[2], and Akshaya Jha[3]

[1] University of Manchester [2] University of Pittsburgh

[3] Carnegie Mellon University and National Bureau of Economic Research

## Abstract

Data-center growth is creating large, geographically concentrated increases in U.S. electricity demand. We study how these loads affect regions connected through the power grid, goods trade, input-output linkages, and migration. We link an hourly electricity-market model to a multi-sector spatial general-equilibrium model of U.S. commuting zones. The electricity block dispatches heterogeneous generators subject to transmission constraints and determines balancing-authority prices, while the spatial block maps those prices into household expenditure and sectoral production costs. We construct post-2022 demand shocks from facility-level data on recently completed and under-construction data centers. We separately model a potential AI-productivity channel, allocating productivity gains across sectors and locations according to industry exposure rather than the location of computing capacity. This structure separates the geography of electricity-system costs from that of AI-driven productivity gains and provides a basis for evaluating data-center siting, generation expansion, and grid-cost allocation.