

Environmental Science Seminar
School of Public and Environmental Affairs
Thursday, February 16, at 4:00 p.m. in SPEA Rm 278

Presentation by:

Christopher Weber, PhD

Candidate for the Industrial Ecology/Life Cycle Analysis Faculty
Position in the School of Public and Environmental Affairs

Uncertainty and Variability in Product
Carbon Footprinting: Case Study of an Electronic Server

Abstract:

Recent years have seen increasing interest in life-cycle greenhouse gas emissions accounting, aka carbon footprinting, due to drivers such as transportation fuels policy and climate-related eco-labels, aka carbon labels. However, it remains unclear whether applications of greenhouse gas accounting, such as carbon labels, are supportable given the level of precision that is possible with current methodology and data. The goal of this work is to further the understanding of quantitative uncertainty assessment in carbon footprinting through a case study of a rackmount electronic server. Production phase uncertainty was found to be moderate (+15%), though with a high likelihood of being significantly underestimated given limitations in available data in assessing uncertainty associated with temporal variability and technological specificity. The use phase displayed a considerably higher uncertainty (+50%) than production due to uncertainty in the useful lifetime of the server, variability in electricity mixes in different market regions, and use profile uncertainty. Overall model uncertainty was found to be $\pm 35\%$ for the whole life cycle, a substantial amount given that the method is already being used to set policy and make comparative environmental product declarations. Future work should continue to combine the increasing volume of available data to ensure consistency and maximize the credibility of the methods of LCA and carbon footprinting. However, for some energy-using products it may make more sense to increase focus on energy efficiency and use phase emissions reductions rather than attempting to quantify and reduce the uncertainty of the relatively small production phase.

BIO: Christopher Weber is a research staff member at the Science and Technology Policy Institute in Washington, DC, where he advises the Office of Science and Technology Policy and other Federal agencies on energy, environmental, and innovation issues. Previously he served as a Research Assistant Professor of Civil and Environmental Engineering and member of the Green Design Institute at Carnegie Mellon University in Pittsburgh, PA, USA. His doctoral research, funded by the US EPA STAR Fellowship program, explored the connections between international trade, climate change, life cycle assessment (LCA), household consumption, and industrial competitiveness in the U.S. and China. His current research interests involve climate change policy, food and agriculture, LCA, energy efficiency policy, and green buildings.