

**LIFE CYCLE ASSESSMENT: A FRAMEWORK FOR DESIGN OF NEXT GENERATION  
ENVIRONMENTALLY RESPONSIBLE ELECTRONICS**

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**Abstract:** Sustainability is in the spotlight across many industries, including the electronics industry. Therefore an opportunity exists to rethink how sensors are made including their raw materials, manufacturing methods, use, and end-of-life phases. For example, metals used in sensors can seem to have inconsequential environmental effects on a single sensor basis, but when scaled across all the electronics that are increasingly deployed in the marketplace, the cumulative demand for metals can have notable environmental consequences. Can we rethink how we use these metals or design sensors to make metals more easily recoverable? Can we turn to biomass for electronics components? If we do so, are there appreciable land use or water consumption effects? Electronics require well-controlled manufacturing environments, often using clean and/or dry rooms. What are opportunities to reduce energy consumption for these technologies? This discussion will review the strengths and weaknesses of life cycle assessment as a tool to help guide researchers through these considerations, including at very early stages of research

**Bio:** Jennifer studies emerging technologies, their energy and environmental impacts, and their potential to influence greenhouse gas and air pollutant emissions, water consumption, and energy consumption at the economy-wide level. Particular technologies of interest include biofuels and bioproducts, automotive lithium-ion batteries, waste plastics recycling and utilization, advanced manufacturing, and fuels and chemicals made from natural gas liquids. Techno-economic, life cycle, and material flow analyses are primary tools in her research. Jennifer holds a Ph.D. in Chemical Engineering from the University of Michigan where she was introduced to life cycle analysis through earning her Master's degree in Sustainable Chemical Engineering Systems. Her undergraduate degree in Chemical Engineering is from Purdue University. Prior to joining Northwestern, she led the Biofuels Analysis group at Argonne National Laboratory. Jennifer directs Northwestern's Center for Engineering Sustainability and Resilience.