Sustainability Challenges: The Need for a Holistic View

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In this talk, I will outline some interdependencies that exist between the energy sector and other sectors like manufacturing, transportation, and housing. If the goal is to have a truly sustainable energy infrastructure, then we have to take a holistic systems based approach in order to avoid some unintended consequences. For example, from an environmental perspective, if reduction of greenhouse gas emissions is a goal, then coal is clearly not a good choice for electricity generation and one might argue that nuclear and hydro are preferable. But if we consider the emerging issue of water consumption, then we may need different solutions because electricity generation is a major water consumer and may be responsible for the majority of the water consumption in the life cycle of many consumer products. In automotive manufacturing, the indirect water consumption due to electricity generation is about the same as the direct water consumption. In the manufacturing industry, serious challenges also exist for a "smart" grid because most manufacturers have trouble assessing the energy consumption (and its cost) for individual processes. A similar problem exists when one considers the integration of plug-in hybrid electric vehicles in the home energy system. Whereas personal transportation and housing have been designed and treated independently in the past, electric vehicles now link the two through the shared energy source. As I will show, time-of-use rates have a smaller effect on annual utility and fuel costs than integrating a PV system and an electric vehicle.

Speaker Bio:

Dr. Bert Bras is a Professor at the George W. Woodruff School of Mechanical Engineering at the Georgia Institute of Technology since September 1992. His research focus is on sustainable design and manufacturing, including design for recycling and remanufacture, bio-inspired design, and life-cycle analysis. He has authored and co-authored over a 150 publications. He was named the 1996 Engineer of the Year in Education by the Georgia Society of Professional Engineers and received the 2007 Georgia Tech Outstanding Interdisciplinary Activities Award. In 1999-2000, he was part of a group of experts charged by the National Science Foundation and Department of Energy with evaluating the state-of-the-art in environmentally benign manufacturing. From 2001-2004 he served as Director of Georgia Tech's Institute for Sustainable Development.