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ENVIRONMENTAL Science & Technology

Anticipating Environmental Tradeoffs

ON THE COVER: Consideration of environmental impacts early in technology development and adoption can guide future advancements towards reduced burdens. This issue's Feature article presents an anticipatory life cycle assessment framework that integrates technology forecasting, risk research, social engagement, and decision analysis to inform the development of future technologies. Acknowledgment: Still Image from Phoenix 2050 Video, Produced by Master of Architecture + Urban Design Studio, The Design School, Arizona State University. 2013

Comment

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Ocean Acidification: The Other Problem with CO₂
Jerald L. Schnoor*

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Illustrating Anticipatory Life Cycle Assessment for Emerging Photovoltaic Technologies

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Current research policy and strategy documents recommend applying life cycle assessment (LCA) early in research and development (R&D) to guide emerging technologies toward decreased environmental burden. However, existing LCA practices are ill-suited to support these recommendations. Barriers related to data availability, rapid technology change, and isolation of environmental from technical research inhibit application of LCA to developing technologies. Overcoming these challenges requires methodological advances that help identify environmental opportunities prior to large R&D investments. Such an *anticipatory* approach to LCA requires synthesis of social, environmental, and technical knowledge beyond the capabilities of current practices. This paper introduces a novel framework for anticipatory LCA that incorporates technology forecasting, risk research, social engagement, and comparative impact assessment, then applies this framework to photovoltaic (PV) technologies. These examples illustrate the potential for anticipatory LCA to prioritize research questions and help guide environmentally responsible innovation of emerging technologies.


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Investigation on the Evolution of N-Containing Organic Compounds during Pyrolysis of Sewage Sludge

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Bioaccumulation and Toxicity of CuO Nanoparticles by a Freshwater Invertebrate after Waterborne and Dietborne Exposures

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Stormwater Chemical Contamination Caused by Cured-in-Place Pipe (CIPP) Infrastructure Rehabilitation Activities


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Electron Microscopic Study of Soot Particulate Matter Emissions from Aircraft Turbine Engines

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Discussion of the Influence of CO and CH₄ in CO₂ Transport, Injection, and Storage for CCS Technology
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Molecular Characterization of Organosulfates in Organic Aerosols from Shanghai and Los Angeles Urban Areas by Nanospray-Desorption Electrospray Ionization High-Resolution Mass Spectrometry
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Comparison of Energy Efficiency and Power Density in Pressure Retarded Osmosis and Reverse Electrodialysis
Ngai Yin Yip and Menachem Elimelech*

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Comment on "Profiling Oil Sands Mixtures from Industrial Developments and Natural Groundwaters for Source Identification"
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Response to Comment on "Profiling Oil Sands Mixtures from Industrial Developments and Natural Groundwaters for Source Identification"
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Additions and Corrections

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Correction to Simulation of the Landfall of the Deepwater Horizon Oil on the Shorelines of the Gulf of Mexico
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