EDITORIAL

6 Bringing a life cycle perspective to emerging technology development
Joule Bergerson, Stefano Cucurachi, and Thomas P. Seager

METHODS, TOOLS, AND SOFTWARE

11 Life cycle assessment of emerging technologies: Evaluation techniques at different stages of market and technical maturity
Joule A. Bergerson, Adam Brandt, Joe Cresko, Michael Carbajales-Dale, Heather L. MacLean, H. Scott Matthews, Sean McCoy, Marcelle McManus, Sheli A. Miller, William R. Morrow III, I. Daniel Posen, Thomas Seager, Timothy Skone, and Sylvia Sleep

26 LiSET: A Framework for Early-Stage Life Cycle Screening of Emerging Technologies
Christine Roxanne Hung, Linda Ager-Wick Ellingsen, and Guillaume Majeau-Bettez

38 Prospective Environmental Analyses of Emerging Technology: A Critique, a Proposed Methodology, and a Case Study on Incremental Sheet Forming
Daniel R. Cooper and Timothy G. Gutowski

RESEARCH AND ANALYSIS

52 Life cycle assessment of emerging technologies: A review
Sheikh Moniruzzaman Moni, Roksana Mahmud, Karen High, and Michael Carbajales-Dale

64 When the Background Matters: Using Scenarios from Integrated Assessment Models in Prospective Life Cycle Assessment
Angelica Mendoza Beltran, Brian Cox, Chris Mutel, Detlef P. van Vuuren, David Font Vivanco, Sebastiaan Deetman, Oreane Y. Edelenbosch, Jeroen Guinée, and Arnold Tukker

80 Understanding the future of lithium: Part 1, resource model
Hanjiro Ambrose and Alissa Kendall

90 Understanding the future of lithium: Part 2, temporally and spatially resolved life-cycle assessment modeling
Hanjiro Ambrose and Alissa Kendall

101 Life cycle assessment of emerging environmental technologies in the early stage of development: A case study on nanostructured materials
Irene Bartolozzi, Tiberio Daddi, Carlo Punta, Andrea Fiorati, and Fabio Iraldo

116 Life cycle assessment of 3D printing geo-polymer concrete: An ex-ante study
Yue Yao, Mingming Hu, Francesco Di Maio, and Stefano Cucurachi
| Page | Title                                                                 | Authors                                                                                   |
|------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 128  | Economic assessment and carbon footprint of recycling rare earths from magnets: Evaluation at lab scale paving the way toward industrialization | Antoine Beylot, Nour-Eddine Ménad, Alain Seron, Michel Delain, Alice Bizouard, Yannick Ménard, and Jacques Villeneuve |
| 138  | Life cycle assessment to quantify the impact of technology improvements in bike-sharing systems | Ricardo Javier Bonilla-Alicea, Bryan C. Watson, Ziheng Shen, Laura Tamayo, and Cassandra Telenko |
| 149  | Life cycle sustainability assessment of autonomous heavy-duty trucks | Burak Sen, Murat Kucukvar, Nuri C. Onat, and Omer Tatari                                        |
| 165  | Technoecological analysis of energy carriers for long-haul transportation | Sebastian Wolff, Michael Fries, and Markus Lienkamp                                           |
| 178  | Using anticipatory life cycle assessment to enable future sustainable construction | Verena Göswein, Carla Rodrigues, José D. Silvestre, Fausto Freire, Guillaume Habert, and Jakob König |
| 193  | Life cycle assessment of emerging technologies at the lab scale: The case of nanowire-based solar cells | Georgios Pallas, Martina G. Vijver, Willie J. G. M. Peijnenburg, and Jeroen Guinée              |
| 205  | Environmental impacts and limitations of third-generation biobutanol: Life cycle assessment of n-butanol produced by genetically engineered cyanobacteria | Astrid Nilsson, Kiyan Shabestary, Miguel Brandão, and Elton P. Hudson                        |
| 217  | A region-specific environmental analysis of technology implementation of hydrogen energy in Japan based on life cycle assessment | Teruyuki Shimizu, Kei Hasegawa, Manabu Ihara, and Yasunori Kikuchi                            |
| 234  | Environmental and economic impacts of solar-powered integrated greenhouses | Joseph A. Hollingsworth, Eshwar Ravishankar, Brendan O’Connor, Jeremiah X. Johnson, and Joseph F. DeCarolis |
| 248  | Site-specific life cycle assessment of a pilot floating offshore wind farm based on suppliers’ data and geo-located wind data | Baptiste Poujol, Anne Prieur-Vernat, Jean Dubranna, Romain Besseau, Isabelle Blanc, and Paula Pérez-López |
Cover Image

The cover image, designed by Peter Hirsch and Yanin Kramsky, evokes a Sankey diagram, a type of flow chart widely used in industrial ecology in which the width of the arrows is proportional to the magnitude of material and energy flows. For a description of the history and methodology of Sankey diagrams, see the work of Mario Schmidt.

The Journal of Industrial Ecology is owned by Yale University and headquartered at the Center for Industrial Ecology of the School of Forestry & Environmental Studies.
