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International
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Contact: Sharon McCarter
Phone: (202) 691-4016
sharon.mccarter@wilsoncenter.org

News Release
Embargoed 12:01 a.m.

Release No. 26-07
March 20, 2007

Life Cycle Assessment Essential to Nanotech Commercial Development *Current Methods Adequate But Toxicity Data Lacking*

WASHINGTON, DC—Life cycle assessment (LCA)—a cradle-to-grave look at the health and environmental impact of a material, chemical, or product—is an essential tool for ensuring the safe, responsible, and sustainable commercialization of nanotechnology, U.S. and European experts conclude in a new report issued today.

With the number of nanotechnology-enabled products entering the market expected to grow dramatically—from \$30 billion in 2005 to \$2.6 trillion in global manufactured goods using nanotechnology by 2014—“numerous uncertainties exist regarding possible impacts on the environment and human health,” the international authors observe in *Nanotechnology and Life Cycle Assessment: A Systems Approach to Nanotechnology and the Environment*.

According to the report, wisely implemented assessment tools such as LCA can help corporations and researchers determine likely environmental impacts at various stages in a new nanotechnology product’s life cycle. It also enables governments, industry and consumers to compare the environmental performance of a novel nanotech product with that of conventional products already on the market.

Based on discussions among 27 international nanotechnology and LCA experts at a two-day workshop held in October 2006, the report is being simultaneously released by the European Commission (EC) and the Project on Emerging Nanotechnologies, an initiative of the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts. The workshop was organized by the Project in cooperation with the EC, with assistance from the U.S. Environmental Protection Agency’s Office of Research & Development and International Society for Industrial Ecology. Barbara Karn, Project on Emerging Nanotechnologies visiting scientist, and Maria Pilar Aguar, from the EC’s Research Directorate-General (DG RTD), planned and organized the workshop.

The report concludes that the existing International Organization for Standardization (ISO) and other widely used frameworks for LCA are fully applicable to nanomaterials and nanoproducts.

However, according to the report, the specificity of LCA results for nanotechnology products will be limited by the “lack of data and understanding” in areas central to the accurate assessment of the environmental, human health, and safety effects of a particular nanomaterial or process.

“The lack of toxicity data specific to nanomaterials is a repeating theme in this and in other studies related to nanotech environmental, health, and safety concerns,” says Andrew Maynard, chief scientist for the Project on Emerging Nanotechnologies. “Nanotechnology is no longer a scientific curiosity. Its products are in the workplace, the environment, and home. But if people are to realize nanotechnology’s benefits—in electronics, medicine, sustainable energy, and better materials for building, clothing and packaging—the federal government needs an effective risk research strategy and sufficient funding in agencies responsible for oversight to do the job.”

“The report calls for international cooperation and coordination—among governments, university researchers, corporations, and consumer and other groups—to help address critical data needs,” according to Project visiting scientist Barbara Karn. “It also highlights the need for nano-specific protocols and practical methodologies for toxicology studies, fate and transport studies, and scaling approaches.”

Despite incomplete information, according to the report, LCA can be useful now, as long as uncertainties and data gaps are clearly stated. Results can help to focus attention on high-priority products and issues with the aim of eliminating critical unknowns and encouraging life-cycle thinking during the first wave of nanotechnology innovation.

“It is important that nanotechnology, which has the potential to improve the quality of life in all parts of the world, is developed in a responsible way. This includes conducting the research and development needed to take into account the impact of nanomaterials and products throughout their whole life cycle,” noted Renzo Tomellini, head of the Nano- and Converging Sciences and Technologies Unit in the EC’s DG RTD and chair of the European Commission Interservice Group on Nanotechnology. “The European Commission is committed to working together with international partners to ensure that this critical work takes place. This report is a useful step toward fulfilling that goal.”

The report is available online at: <http://www.nanotechproject.org> and <http://cordis.europa.eu/nanotechnology>.

About Nanotechnology

Nanotechnology is the ability to measure, see, manipulate and manufacture things usually between 1 and 100 nanometers. A nanometer is one billionth of a meter; a human hair is roughly 100,000 nanometers wide.

The **Project on Emerging Nanotechnologies** is an initiative launched by the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts in 2005. It is dedicated to helping business, government and the public anticipate and manage possible health and environmental implications of nanotechnology. For more information about the project, log on to www.nanotechproject.org.

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