

Goldemberg Wins 2010 Ernesto Illy Trieste Science Prize

The Prize, which includes a USD100,000 cash award, is given to eminent scientists from the developing world who have made significant contributions to science and science-based development.

José Goldemberg, a world-renowned energy expert who helped lay the scientific foundation for Brazil's biofuels programme and who subsequently became a leading advocate for the adoption of "leapfrog" technologies to promote economic development in the developing world, has won the 2010 Ernesto Illy Trieste Science Prize.

The **Ernesto Illy Trieste Science Prize**, co-sponsored by illycaffè, TWAS and the Ernesto Illy Foundation, is an annual prize given to a renowned researcher in a developing country or country with an emerging economy who has made significant contributions to science and scientific innovation. The prize, now in its sixth year, includes a cash award of USD100,000.

In a seminal article published in *Science* magazine in 1978, Goldemberg and his colleagues presented compelling scientific evidence showing that biofuels derived from sugarcane could reduce the use of fossil fuels in Brazil while rendering substantially less harm to the environment.

"At the time," Goldemberg says, "efforts to develop biofuels in Brazil were justified largely on the basis of energy security. Our research demonstrated that biofuels production in Brazil would not only significantly decrease the use of fossil fuels use but also help curtail air pollution and greenhouse gas emissions."

Goldemberg's findings bolstered the efforts of the Brazilian government, which had launched a biofuels programme in 1975 in response to the international

oil crisis. In the early 1970s, the government's primary goal was to overcome possible supply disruptions from abroad by developing domestic sources of fuel.

By verifying biofuel's positive energy balance and adding an environmental dimension to the argument, Goldemberg strengthened support for Brazil's biofuels programme, helping to ensure its long-term viability.

Today, Brazil produces 30 billion litres of sugar-based ethanol each year, which replaces 50% of the petrol used in the country. Ethanol production and distribution generates USD30 billion each year in revenues (about 5% of Brazil's gross domestic product) and accounts for one million jobs in Brazil.

Goldemberg has spent a lifetime bridging the world of research and policy, and has long been a passionate advocate of renewable energy. He contends that, by relying on renewable sources of energy, developing countries can "leapfrog" fossil fuel dependent developed countries and "chart a more viable path for sustainable development."

He first outlined this paradigm for economic development in a book, *Energy for a Sustainable World*, which he co-authored with Thomas B. Johannsson, Amulya K.N. Reddy and Robert Williams in 1988. The book helped to redirect discussions on the relationship between energy and economic development, convincing policy-makers of the important role that innovative technologies could play in providing adequate, environmentally sound supplies of energy to meet the developing world's growing energy needs.

In recent years, he has led scientific discussions concerning biofuels' potential impact on food security and forest and agricultural land. Goldemberg's studies have shown that only a small amount of additional land will be needed to meet the projected demand for biofuels over the next decade (an estimated 4% of the total 1.5 billion hectares available on a global scale).

Together with the development of second-generation technologies and access to marginal pasturelands, he says, there is good reason to believe that "additional lands could be cultivated for biofuels without placing other worthy environmental and land use goals at risk."

"Biofuels," Goldemberg notes, "were the primary source of energy from the dawn of civilization until the



19th century when their use was eclipsed first by coal and then oil and gas production." Today, biofuels represent about 10% of primary energy consumption.

"In a world increasingly concerned about future energy supplies and the spectre of global warming, the continued development of biofuels will likely prove an essential ingredient of sustainable economic growth," Goldemberg says.

As the Brazilian experience shows, biofuels can help nations gain prosperity, security and sustained growth without jeopardizing the environment. And, as the path breaking research of Goldemberg illustrates, the success of such efforts often depends on the quality and depth of the science that drives and shapes the policy debate.



EDITOR'S NOTES

The **Ernesto Illy Trieste Science Prize**, instituted by TWAS and illycaffè and supported by the Ernesto Illy Foundation, and now in its sixth year, is designed to bring recognition and distinction to the developing world's most eminent scientists. The award, bestowed under the High Patronage of the Presidency of the Republic of Italy, is dedicated to Trieste, a city in northeast Italy that has made significant contributions to the promotion of science in the developing world. The prize, also named for the long-time chairman of illycaffè, Ernesto Illy, rotates among the following fields: climate change and its impact on agriculture in developing countries (2009), energy (2010), materials science (2011) and human health (2012). See www.twas.org.

TWAS, the academy of sciences for the developing world, is the world's foremost academy for scientists from the developing world. Its membership currently consists of 942 eminent scientists, more than 80 percent of whom live and work in the developing world. Based in Trieste, Italy, TWAS sponsors a large number of research and training programmes for scientists from the developing world. See www.twas.org.

The **Ernesto Illy Foundation** – created by illycaffè and open to other supporting members – aims to develop and increase the rich heritage of ideas, projects and activities that Ernesto Illy left as his legacy. Its mission consists in fostering knowledge, ethics and sustainability not only as absolute values but also as business pursuits in ways that promote research as the principal way to attain the truth and human progress. The Foundation's activities mainly focus on ethics, sustainability, scientific research and coffee culture. Anna Rossi Illy, widow of the late Ernesto and honorary president of illycaffè, chairs the Foundation. See www.fondazionernestoilly.org/fondazione.

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José Goldemberg

A Life of Scholarship, Leadership and Impact



José Goldemberg, the winner of the 2010 Ernesto Illy Trieste Science Prize, received his undergraduate degree in physics from the University of São Paulo in 1950. He pursued postgraduate training in Canada and the United States before returning to his alma mater in the mid 1950s, where he earned a Ph.D. degree in physics in 1954 and

became a professor and later rector. In the early 1990s, he served as the federal secretary of state of science and technology and minister of education in Brazil.

In 1992, during his appointment as the interim minister of the environment, Goldemberg was Brazil's high-level representative at the "Earth Summit" held in Rio de Janeiro. From 2002 to 2006, he served as secretary of state for the environment in the state of São Paulo, Brazil's most populous state and largest producer of biofuels.

In 1978, Goldemberg co-authored a seminal article on *Science* magazine, which contended that biofuels production in Brazil, on a lifecycle basis, would reduce the use of fossil fuels for transportation while generating substantially less pollution. The article helped move his nation's ambitious biofuels programme forward by strengthening the government's call for more secure energy supplies.

In 1986, Goldemberg, together with colleagues Thomas B. Johansson, Amulya K.N. Reddy and Robert W. Williams, published the groundbreaking book, *Energy for a Sustainable World*, which established a new paradigm for the use of energy in the developing world. Instead of embracing existing fossil-fuel based production strategies to generate additional energy supplies, which was the prevailing thinking at the time, the authors focused on the role that conservation and new energy technologies could play in promoting sustainable development. *Energy for a Sustainable World* helped raise support for "leapfrog" energy technologies to improve living conditions in more environmentally sound ways.

Over the past four decades, Goldemberg has published influential articles in, for example, *Ambio*, *Energy Policy* and *Environment*, which have been instrumental in shaping global energy discussions, particularly discussions focusing on energy and development in developing countries. In 2007, he co-chaired the InterAcademy Council (IAC) study panel of global energy experts that produced the report *Lighting the Way: Towards a Sustainable Energy Future*. He chaired both the United Nations Development Programme's (UNDP) *World Energy Assessment* in 2000 and its update in 2004. He is currently co-chairing the International Institute of Applied System Analysis' (IIASA) *Global Energy Assessment*, scheduled for publication in 2011.

Goldemberg won the Volvo Environment Prize in 2000 and the Asahi Glass Foundation's Blue Planet Prize in 2008. *Time* magazine named him one of the "heroes of the environment" in 2007.