

**LEM ETHIOPIA,
ENVIRONMENT AND DEVELOPMENT
SOCIETY COLLOQUIUM ON ZERO EMISSIONS
RESEARCH INITIATIVES**

INVITATION AND AIDE MEMOIRE

**PRESIDING:
HE GIRMA WOLDE GIORGIS,
PRESIDENT OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA**



Lem Ethiopia, the environment and development society is hosting a 90-minute colloquium on December 4, 2004 at 16:00 hours in the presence of HE Girma Wolde Giorgis, President of Ethiopia to introduce the concept of **Zero Emissions Research Initiatives, ZERI**.

ZERI is a practical approach to satisfying humanity's needs for water, food, energy, jobs, shelter and more, in an environmentally sustainable manner, by applying science and technology and involving government, business and academia. **The concept of Zero Emissions** represents a shift in our concept of industry away from linear models in which wastes are considered the norm, to integrated systems in which everything has its use. It heralds the start of the next industrial revolution in which industry mimics nature's sustainable cycles and humanity, rather than expecting the earth to produce more, learns to do more with what the earth produces.

Zero Emissions envisages all industrial inputs being used in the final products or converted into value-added inputs for other industries or processes. In this way, industries will reorganise into "clusters" such that each industry's wastes / by-products are fully matched with others' input requirements, and the integrated whole produces no waste of any kind.

Zero Emissions Research and Initiatives combines the depth of science with the impatience of the entrepreneur. Zero Emissions is the clustering of production and consumption whereby all matter and energy transforms and flows in a never ending cycle at ambient temperature and energy. A decade of research, trials and errors, projects and policy developments in the four corners of the world, lead to the crystallization of a new business model - A model whereby society is able to respond to the basic needs of all, in co-evolution with nature. As the emerging business model becomes clearer, the skills that are needed to implement this model are becoming obvious as well. The challenge to industry and policy makers today is that they are mesmerized on a core business strategy, based on

core competences. This does not permit them to see the vast opportunities right before them.

We believe that the introduction of the concept is pertinent to Ethiopia and hence we have invited the ZERI foundation to present its concept and findings of research over the past ten years. We will also explore ways and means of developing the research potential within Ethiopia so we can be beneficiaries of this research.

The programme will be as follows:

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| 1. Welcome Address (5 Min) | HE President Girma Wodle Giorgis
President of Ethiopia |
| 2. The Ethiopian Environment (10 Min) | Dr. Tewelde G. Egziabher, Director General
Ethiopian Environmental Protection Agency
Dr. Costantinos B. Tesfu, President Lem |
| 3. Environmental Resources and Food
Security (5 Min) | |
| 4. ZERI History and Global Project Review
(25 Min) | Dr. Gunter Pauli, Executive Director, ZERI |
| 5. Discussions – Moderator (45 Min) | Mr. Anders Wijkman: Member of EU
Parliament and Board Member ZERI |
| 6. Concluding Remarks (10 Min) | Mr. Anders Wijkman |

The seminar will be attended by government officials, members of the international community, non-governmental organisations and scholars in the field of environmental research.

Costantinos B Tesfu, PhD
President
Lem, Environment and Development
Society of Ethiopia

**AIDE MEMOIRE
ZERO EMISSIONS RESEARCH INITIATIVES
ZERI**



I Backgrounder

The ZERI Foundation is a non-profit organisation, established under Swiss law, with a multinational network of academics, businesspeople, bureaucrats, and educators finding creative solutions to the most pressing challenges of our times: i.e. responding to the needs of all on Earth in terms of water, food, housing, health care, energy and jobs. The ZERI Foundation was established in October 9, 1996 in response to the need to translate ideas, visions and scientific knowledge into concrete projects. ZERI is a practical approach to satisfying humanity's needs for water, food, energy, jobs, shelter and more, in an environmentally sustainable manner, by applying science and technology and involving government, business and academia.

- 1. ZERI Perspectives:** From an environmental perspective, the elimination of waste represents the ultimate solution to pollution problems that threaten ecosystems at both local and global levels. In addition, full use of raw materials, accompanied by a shift towards renewable sources, means that utilisation of the earth's resources can be brought back to sustainable levels. For industry, Zero Emissions means greater competitiveness and represents a continuation of its inevitable drive towards efficiency. First came productivity of labour and capital, and now comes the complete use of raw materials - producing more from less. Zero Emissions can therefore be viewed as a standard of efficiency, much like Total Quality Management (zero defects) and Just-In-Time (zero inventory). For governments, the full use of raw materials creates new industries and generates jobs even as it raises productivity. Moreover, it provides the means to feed clothe and house their populations without destroying the ability of future generations to do the same.
- 2. Goal of the ZERI Foundation:** The ZERI Foundation's goal is the efficient production of all the goods and services society needs without any form of waste - no liquid waste, no gaseous waste, and no solid waste. This goal is the basis of a new Zero Emissions production and consumption model, which imitates nature (the output from one becomes the input for another), and is more competitive, and more productive. By eliminating waste, we can respond to the pressing need of all humanity for water, food, health care, shelter, energy, and jobs, without destroying the ecosystem. This is not just theory, but is being implemented, and serves as a basis for inspiration and hope. Dedicated to putting theory into action, the ZERI Foundation "fast tracks" the implementation of Zero Emissions research (theory) into sustainable development and education projects (action) around the world. **To do so it initiates international research efforts into the necessary technologies, industrial designs and policy options; work together with industry and government to implement pilot projects on the basis of this research; develop multidisciplinary centres of excellence in Zero Emissions together with the leading universities, and share experience and know-how with policy makers and corporate leaders: and collaborate with development institutions**

and funding agencies to stimulate local and regional initiatives across industrial sectors world-wide.

3. Seven showcase projects featuring innovative applications of scientific research have already been achieved and were showcased at the World Expo 2000 in Hanover, Germany. In all ZERI Foundation has supported some 50 projects worldwide. Corporate training and school education programs complement all ZERI Foundation projects. There are over 100 universities teaching the ZERI concept. High school programs have been started in Africa, Latin America, Japan, and Europe.¹

II. ZERI Methodology

ZERI started by developing its theoretical concept of Zero Emissions into a methodology that can be applied to any industry. This can be summarised as follows: **Total Throughput** (A review of the industry identifies opportunities to minimise inputs and maximise outputs. The target is full use of inputs; i.e. total throughput. If this cannot be achieved, the next step of the methodology is applied.) **Output - Input**

Models (An inventory is made of all "wastes", i.e. outputs not consumed in the final product or its process of manufacture. An active search is then initiated to identify industries which could use the outputs, or modified versions of them, as inputs) **Industrial Clusters:** (The Output - Input models are used to determine potential candidates for clustering. The next step is to identify optimal clusters in

terms of size and number of participating industries.) **Breakthrough Technologies:** In cases where present engineering know-how, product and process technologies are not yet able to secure effective and economical coupling of outputs and inputs, research into breakthrough technologies or system designs is initiated. **Industrial Policy:** (Identification of clusters and isolation of the breakthroughs required must be accompanied by the design of appropriate government policies. As sectors with no previous tradition of working together are combined, collaborative efforts involving policy makers, industry representatives and academia are launched.) **The Global Information Economy** (The rapid spread of the Internet opens up an additional information channel for ZERI design dialogues. We can now publish our existing models online and invite the world to critique and improve them through a global dialogue about Zero Emissions - which is the ultimate function of this website.)

ZERI's mission

ZERI seeks to create a new paradigm of sustainable industry by targeting zero gaseous, liquid and solid emissions, and by making Zero Emissions a world-wide industry standard...

III. Original Concepts and Terminology

Zero Emissions has become a definite term. In the Japanese language, it has not been translated, but maintained as a precise expression of the reuse of all components as value added, so that no waste is discarded. Zero Emissions is increasingly used as a continuation of management concepts such as zero defects (TQM), zero inventory (just-in-time), zero

¹ The ZERI Foundation Head Office is located in the UNDP European Headquarters in Geneva Switzerland. There are regional field offices in Porto Alegre and Curitiba, Brazil; Bogota and Manizales, Colombia; Windhoek, Namibia; the Basque Country; and Tokyo, Japan; Hannover and Munich, Germany; Mutare, Zimbabwe; Bauchi, Nigeria Tokyo (Kamata), and Kamakura, Japan. The ZERI Foundation is headed by its Scientific Advisory Board. Prof. Dr. Heitor Gurgulino de Souza, former Rector of the United Nations University and Special Advisor to the Director General of UNESCO, chairs the Scientific Advisory Board. Other members include: Prof. Dr. Carl-Göran Heden member of the Royal Academy of Sciences of Sweden, Anders Wijkman, member of the European Parliament, Prof. Dr. Keto Mshigeni, Pro Vice Chancellor of the University of Namibia, Prof. Dr. Mohammed Hassan, President of the African Academy of Sciences, Shu Ting Chang, Prof. Em. of the Chinese University in Hong Kong and Gunter Pauli, Director ZERI Foundation. the Foundation was started through private donations. Ongoing funding is secured through royalties on books, seminars, training programs and speaker fees, plus contributions from the United Nations. Projects are self-funded, mainly through private and public partnerships.

defections (total customer loyalty), and zero conflicts (consensus decision making). The five zeros is a concept designed by ZERI. The innovative approach of ZERI is to have designed a methodology that permits the clustering of industries which were previously considered unrelated. It is only when industry mimics nature that it can achieve the same levels of material productivity.

UpSizing: how to build up economic activity through the clustering of industries which reuse the waste of one as value-added input for another; **Second Green Revolution.** ("Mankind cannot expect the Earth to produce more. Mankind must do more with what the Earth produces." **Total Productivity:** productivity cannot be limited to labour and capital only, but must include all three core input factors in the economy and therefore must include the productivity of raw materials. With less than 10 percent of the raw materials presently being used, this leaves tremendous room for improvement; blend the impatience of the entrepreneur with the depth of science: ZERI's approach is unconventional and pragmatic, while based on research, experience and scientific knowledge; **output/input tables.** ZERI designed output/input tables, permitting a creative identification of a cluster of industries based on the available resources which remain unused in a specific production process; **Zero Emissions Due Diligence:** while companies undertake a due diligence prior to proceeding to an investment, ZERI has promoted raw materials due diligence—the realisation that maximum value cannot be generated with exclusive focus of one ingredient in the input factors. This due diligence process identifies hidden values which can be exploited commercially; and **Immunity Management:** the management system for the future depends on a highly decentralised system which has a well distributed intelligence.

ZERI Systems

There are more and more ZERI systems being developed around the world, and they are also working on featuring them on the website. The systems are complex and non-linear, that is part of the answer behind their success.

- **Cement factory goes organic:** How a defunct cement plant South of Stockholm, Sweden becomes Europe's largest composting plant, where fertilizer (plus humus) is manufactured, and using 80% of the old cement unit. The compost is sold in pellets, and is used to fertilise native northern forests.
- **Beer bakes bread and feeds fish:** How breweries in Namibia, Sweden, Canada and Japan are converting the waste protein and fibre from the brewing process into valuable products, generating additional income and jobs.
- **Reforestation finances drinking water:** The story of Las Gaviotas in Colombia where the largest reforestation initiative of the country secures the regeneration of biodiversity and improvement of the soil, thus permitting the production of safe drinking water.
- **Grow your own house:** The story of the ZERI Pavilion and the translation of this extraordinary construction model into projects for sustainable social housing, funded by the United Nations Development Programme (UNDP) in Africa and Latin America. [Pictures.](#)
- **Water hyacinth fights AIDS:** How researchers of Africa University in Mutare, Zimbabwe, teach AIDS orphans to grow mushrooms on water hyacinth substrates, thus enabling them to secure sustainable livelihoods. (26% of the Zimbabwean adult population suffers from AIDS).
- **Learning to work in systems:** How the Montfort Boys' Town from Fiji converted its vocational training school into a centre for sustainable living, assisting all the students to know, before graduation, how to secure food and energy.

- **Mushroom farming on coffee wastes:** How the 99.8% of the coffee tree, which is not used in the brewing of coffee, can be used to farm shiitake mushrooms. How the waste from the mushroom is then used as cattle feed; and how the cattle manure is used to produce biogas with which the substrate is pasteurised. The program started in Colombia and is now being extended to Brazil and Africa.
- **Bamboo preserves itself:** How a traditional Japanese technology is converted into a modern day treatment system, whereby the bio chemicals from the bamboo are extracted and re-applied to the whole bamboo in order to make it immune against attacks from insects / fungi.
- **Maggots secure hygiene:** How a peri-urban agricultural program at the Songhai Centre in Benin, succeeds in producing up to 7 tons of maggots per month, converting the most uncomfortable waste from slaughter houses into protein-rich feed for fish and quails.

ZERI Foundation Charter

1. The members of the ZERI Foundation realise that there is an urgent need to design corporate strategies and industrial policies based on the principle of sustainable social and economic development. The members believe that the creation of value added benefits for society are best supported through market mechanisms where competitive forces stimulate industry to eliminate all forms of waste. The members accept that industry will only have reached its full potential when all waste has been eliminated. The quest for the elimination of waste (zero emissions) is in line with the corporate drive for total quality (zero defects) and just-in-time (zero inventory).
2. Therefore, the members will target the elimination all waste. In a case where all inputs are not completely used, consumed or integrated into the product or production process, these residues will become value added inputs for other industries. The members will search for solutions based on innovative technologies and supported by the appropriate industrial policies. Industry must combine cost reduction schemes with environmental investment. The members undertake joint research, working with the centres of excellence, and are committed to set an example. If research is successful, then pilot projects will be established, followed by the dissemination of the technologies. The members recognise that the ZERI Foundation will question established ways of manufacturing. The present product formulations, processing systems, engineering and applied technologies will be reassessed with zero emissions as a target. The members support multidisciplinary research at pre-competitive level as a methodology.
3. The members are committed to a long term process. The members will commit for a minimum of 5 years, combining their corporate strategic interests with a vision on how to secure competitiveness in the future. The members are aware that the public at large needs a broader understanding of the complex issues at stake. A special effort will be undertaken to inform and educate the consumers and the public on the opportunities to TARGET ZERO EMISSIONS.