

SYSTEMAGINATION

The ZERI Foundation's Monthly Newsletter

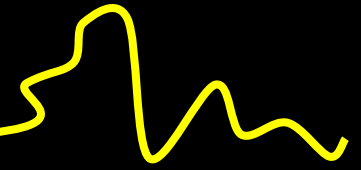


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The ZERI BRAZIL initiative for Microalgae Biofixation

By Lúcio Bruschi

Sometimes when we, Prof. Jorge Costa and I, try to explain to people what we are doing here in Brazil, I sometimes feel that people do not really understand. Why? From my point of view, it is because of the mental models that control the conceptual framework of many people. The usual mental model demands them to separate organic and inorganic issues as two different worlds. We don't do this.

We have begun a project producing algae from the smoke that is produced in a coal powered Thermoelectric Power Plant. Our pilot experiment is running in the city of Candiota, in Rio Grande do Sul, Brazil.

Simply put, the objective of the project is to use the opportunity given to us with the 12% concentration of CO₂ from the smoke stacks. This high concentration of CO₂ comes from the power station, compared with the 0.03 % in the air. Instead of seeing it as waste, we see it as a resource. That is it. This approach gives us the best of the linear world as we are creating wealth using a problem as a source of gain, economical and environmental. It is the most basic ZERI idea, even so reasonable and clear.

In addition, it is an engineering challenge: to get the CO₂ in pipes, diminish the temperature, mix it with water, and then offer it as feed for microalgae. And



finally, and most importantly, how to cultivate microalgae in a good way, obtaining all products like protein, lipids, sugar, and many other biologically active elements.

It is difficult to explain the economical viability of our project only considering the environmental benefits by recovering the CO₂ from fossil fuels as part of a scenario to mitigate climate change. This fixation of CO₂ is good for consultants, engaged in Kyoto protocol, and so on, but we need a broader vision that goes beyond the dominating thesis and proposals. We need to change the mental model.

First: even if climate change will occur, or it is not occurring, the use of CO₂ is important, as a source of life, and human solutions should try to optimize natural cycles with engineering solutions. We need to imagine a systemic solution that is viable for everyone involved, not just the consultants of climate change.



What is ZERI? By Nirmala Nair - Director of ZERI South Africa (SA)

I see ZERI as a systems inspired school of thought continually evolving and perfecting the solutions oriented approach for real sustainability allowing me to blend the much needed work on the inner sustainable living (life style) and outer sustainable practices (business, industries, government policies, etc.). The ZERI philosophy of working and learning with nature makes it possible for solutions never to become permanent allowing the move from the current development practice of confusing solutions with permanent technological fix to an ever- evolving -adapting solutions that must change as context changes.

A thermo-electric plant is a combustion system that uses fuel to burn. The best choice for most people is coal. Why? Mainly it is the cheapest fuel, easiest to transport, and there are sufficient reserves for another 400 years.

What are the problems? The first one is: the pollutants like NO_x and SO_x, particulates in the air and a lot of CO₂. Fortunately engineering technology is today, and day by day, more efficiently able to capture everything in a good way. The second one is: the use of a fossil fuels and big quantities of coal.

We really believe in the ZERI approach: the Five Design Principles and the Twelve Axioms of Economics. The question is how to introduce, step by step, the ZERI concepts converting these ideas into pragmatic decisions understood by engineers and economists.

First of all it is necessary to assure the presence of the five kingdoms in the power plant. I need to share a basic idea to go ahead. What do we need to maintain a living system? We need at least five things: water, heat, light, CO₂ and salt. This is what the earth makes available to us and to any living organism. Well, we need this in the power plant to assure the presence of the five kingdoms of nature. Moreover, it will be better if we could find an organism that could enjoy the environment, reproduce itself, and be healthy.

Who is the best? The photosynthetic bacteria and microalgae are the best. They are resistant to stress, survive and grow in different and severe environments, and are also very good producers of many bio-actives. Why not? What is necessary? Improve the

productivity of the algae cultivation and increase the quantity of CO₂ used to feed the algae.

How many years will we need for that? Well, we need to begin right now; there is no time to waste. Now it is necessary to imagine lasting solutions and design plans for implementation. In a big power plant perhaps we could produce algae from 10% of CO₂ generated. From this result we will produce some lipids, around 15% of the biomass, and from it 50% will be Biofuel. Right now is just the beginning. We will have to continue to improve the system to make it more efficient. But it is possible, that is important. It is a non linear result. It is a leverage point to solve the problem in the future.

More than informing the reader, I want to stimulate you about searching for other non linear leverage points to reach sustainability. What axioms do we need to use to go to the solution? We need scope and local economy. Think about it!!

What is our vision for the future? It is an integrated system that produces energy and food, using local biomass as fuel, capturing all the CO₂ and producing algae that come again as a fuel, feeding people with proteins and extracting many of the elements we need for life, including pharmaceuticals, chemicals and so on.

We are in the journey.
Come along with us.

Lucio Bruschi
President ZERI Brazil Foundation



Latest News:

In Cleveland, Ohio Great Lakes Brewery now makes its own bio-fuel, uses recycled six pack cartons and strives for a zero-waste operation (not to mention making a fine Dortmund) all influenced by the ZERI Project from EXPO2000.

20 teachers from the Los Angeles area went through a detailed training on how to use the fables during a 5 day training with Gunter Pauli at the end of July.

The Mandarin edition of the fables has been guaranteed through an agreement with the Hsin-Yi Foundation.

The ZERI Germany office has confirmed that it wishes to reconstruct the ZERI Pavilion. A pavilion now stands in Manizales as a regional symbol for bamboo that became the most popular pavilion at the world expo in Germany in 2000. A lack of parking space urged the Hannover Expo to destroy the structure ... but now a new one is up coming!

Cambridge College and ZERI Foundation reached an agreement to bring the ZERI Learning online for a Masters of Education in June 2008.

The ZERI Farm Zimbabwe under the leadership of Margaret Tagwira is moving forward. The 5 orphans learned how to build and operate the biosystem over the past 6 months. Now George Chan has announced he is prepared to visit and guide them in the scaling up of their operations.

Yusuke Saraya is putting his money where his mouth is. He as president of ZERI Japan published the book of Janine Benyus on Biomimicry in Japanese. Now his company is bringing the seaweed inspired technology to control bacteria to the Japanese market.

The secretariat of the Convention on Biodiversity (www.cbd.int) made a strategic partnership with the ZERI Foundation and the Biomimicry Guild to bring the Nature's 100 Best™ to the policy makers who will meet next year.

Innovative Sciences

By: Ralph Otterpohl

Let me introduce myself first: My main job is university professor and director of the research institute of wastewater management and water protection at TUHH, Hamburg University of Technology, Germany (www.tuhh.de/aww). Before this job I founded the consultancy Otterwasser GmbH Lübeck that deals with computer-simulation of wastewater treatment plants and innovative sanitation concepts (www.otterwasser.de). The consultancy is today mainly managed by Dr.-Ing. Martin Oldenburg.

For more than 10 years I have worked on wastewater systems, which do not generate waste, but where all the components become new products. It turned out that the common flush sanitation is a disaster with respect to resources efficiency. Ecological Sanitation is mainly based on source separation of toilet 'waste' or wastewater. I have developed a system with vacuum-toilets that are connected to a biogas plant where, together with the bio-waste, liquid fertiliser and energy is produced. Another development is the LooLoop® System of Intaqua AG, my institute did the research for this. This project will be shortly installed for the first time worldwide in a real application in Zeche Ahlen, the place where ZERI Germany has its office.

On the other hand there are many low-cost approaches with modern dry toilets with urine diversion. We do extensive research in this field, too. The ideas were mainly developed at SEI (Stockholm Environment Institute), lots of information is on www.ecosanres.org. My institute is working mainly in East Africa (Ethiopia) and Eastern European countries with applied research. I became chair of the IWA (International Water Association) specialist group 'resources oriented sanitation.' Lots of info can be found on www.ecosan.org. This year I took part in the launching of ZERI Germany in Ahlen near Dortmund, at the former coal mine, Zeche Westfalen, which is reactivated as a centre of sustainability and innovation. ZERI in this context has a lot of potential and it is a stunning group of mighty buildings. Now new projects are planned and we hope to go forward with implementing ZERI with a brewery now.

Prof. Bernd Heins also in co-operation with ZERI Southern Africa (Nirmala Nair). We plan to bring together good city planning, Ecological Sanitation, Rainwater Harvesting, Permaculture, Ecovillage knowledge, innovative preventive healthcare and of course ZERI concepts. Two students of city planning from Hamburg are starting with this work to find a way for designing a settlement with lots of added value activities in a socially intact newly built village structure.

Finally a personal statement: Working on ecological issues and on different types of water management I have realised that the key to real solutions lies in the identification of the root causes. It is not mainly a lack of technical knowledge, although this is part of many ecological disasters. From my point of view there is a dramatic lack of personal development in all levels of society. Most people, to different degrees in different cultures, are getting stuck on the level of assuring the material bases of their lives. Money, wealth and the power connected to possession are strongly addictive and can prevent us from finding to our real purpose. There is really enough for the needs of all as we know from ZERI, but there will never be enough if greed is so much encouraged and even adored. Assuring the material basis is for sure important to a certain degree, but then other steps of personal development can be started. This requires everyone to look inside and resolve trauma and routines. There are some excellent new tools and there is a wonderful book for an additional pathway, too: Eckhart Tolle's 'A New Earth'. It suggests to really be present in this very moment, where we are, and not always be carried away by our brains. Take a conscious breath. Let us work on ourselves in order to improve our own work and our societies!

Univ. Prof. Dr.-Ing. Ralf Otterpohl, Founding member and scientific advisory board member of ZERI Germany



Update from the Founder

By: Gunter Pauli

Nature's 100 Best™ enters into a new phase. This partnership between Biomimicry Guild and the ZERI Foundation with the support of the Restoration Group first identified, on the basis of peer group reviewed articles published in scientific journals, the best technologies from Nature. When I formulated the zero emissions concept first back in 1991 (with a publication in Korea and a factory in Belgium) the main argument of crystallizing this way of producing and consuming is that: "The only species capable of producing something no one desires is the human species. The only species that actually wastes waste is us." Janine Benyus, the author of this epochal book "Biomimicry," had been researching for decades the wonder of nature and thus our look at the world is complementary and exciting.

By the end of August 2007, the team directed by Janine, has identified over 1,200 technologies that meet the rigid standards we have self-imposed. On the basis of this massive amount of scientific information, we are very motivated to note that not only have the scholars studied critters, plants, algae and bacteria in great detail but that about one hundred technologies have already inspired entrepreneurs to the point of bringing products inspired by nature to market.

Over the next 12 months, Nature's 100 Best™ will bring our first insights to forums as diverse as: venture capital funds in California, USA; heads of state from the European Union in Lisbon, Portugal; NGO's in Barcelona, Spain; scientists in Bangkok, Thailand; United Nations policy platforms like COP 9 on Biodiversity in Bonn, Germany; and the Governing Council of UNEP in Monaco reaching out to the financing community.

The fact is that Biodiversity can now be viewed with a positive eye. Nature holds so much inspiration and technology that

responds to our immediate needs to reverse the ignorant approach. Humanity has simply not had the opportunity to see Nature through the eyes of a child. Everything in Nature gets done at ambient temperature and pressure with what is locally available. This is not a direct critique to the globalization movement; this is simply a way of sharing how efficient Natural systems have used the basic principles of physics, chemistry, and biology in order to convert "perceived" scarcity into sufficiency and even abundance.

Nature's 100 Best™ will calculate the dramatic impact these new technologies entail for business. The present business model for many sectors will undergo a fundamental review, from pharmaceutical products and fine chemicals, to energy and plastics, to ceramics and water purification. Imagine a seaweed that can block the communication amongst bacteria and thus prevent a biofilm to form. Imagine plastics made from carbon dioxide. Imagine water purification thanks to hydrophilic and hydrophobic surfaces. We can go on.

The beauty of this approach is that we are evolving from our stress and disappointment symbolized by the over 30,000 species on the Red List of Endangered Species to a Green List of Species that hold the solutions to the challenges humanity is facing.

We hope that our first presentation to the public at Bioneers by the Bay in Marion, MA, USA, organized by the Marion Institute, will offer just a glimpse of what we at the ZERI Foundation had formulated as a strategic long term project: learning from Nature, understanding the technologies so that we can live without waste ... as Nature has shown us for millennia.

Will you join us in this endeavor?

Upcoming ZERI Events:

Updated UpSizing Book Launch in Paris, France
.....October 6

Launch of Gunter's Fables in Santiago, Chile
.....October 17 & 18

Bioneers by the Bay in Marion, MA, USA with the launch of Nature's 100 Best™
.....October 19 to 21

The Peace Museum Chicago, IL, USA
.....November 7 & 8

International Congress on Slow Food Conference in Puebla, Mexico
.....November 9 to 11

4th International Conference on Environmental Education in Ahmedabad, India
.....November 26 to 28