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### In Search of Ecosan Architecture

#### Introduction

A new generation of natural architects share a reawakening for design and building that is geared towards establishing a reconnection between the earth and ourselves. By incorporating ethnic and ecological building traditions with natural local materials into the existing ecosan model, a basis for developing new products and methods is emerging. This presentation focuses on the pioneering work that is forging the new agenda for an architecture that responds to the ecosan challenge. This emergent architecture is synchronized with natural cycles: firstly, by correctly applying passive solar principles, such as orienting the building accordingly, and secondly, by responding to the human needs.

In order to make ecosan happen, it needs willing people, on the one hand, and, on the other, a place, which by definition takes shape through architecture. The focus here is being given to an architecture that puts us in touch again with the primeval forms of life -- sun, earth, wind and water— one that responds to local economy, materials and landscape. The renaissance of vernacular architecture together with the application of highly efficient ecological technologies makes a perfect match with ecosan. A road has been started, whereby the application of ecosan principles is bearing results in different shapes within a Latin American context, and specifically within the TepozEco Urban Ecological Sanitation Pilot Project in Morelos, Mexico.

#### On how ecosan influences architecture

Natural architecture and ecosan is a genuine match, since both disciplines respond to and blend with the local ecosystem, supporting life and health. Their fusion becomes of utmost relevance in the evolution and application of ecosan systems in human settlements. Furthermore, the rapid increase and growth of urban settlements demands a more efficient and sustainable use of resources, making the ecosan system one of the most appropriate and holistic solutions that contributes to the reduction of the environmental impact of urban areas.

The TepozEco Project recognizes that it is important to design and offer a range of user-friendly ecological dry toilet options for a variety of social tastes and economic capacity. There is a need to upgrade and retrofit existing sanitation infrastructure, as well as build entirely new facilities. But local contexts of developing nations often reflect enormous wealth disparity, low environmental educational standards, harbouring the aspiration to increase the quality of life. Insecure or underpaid jobs seriously inhibit family economies

generating social conditions that demand easily adopted solutions that support a better living environment.

### **On new product development**

The need to create easily replicable and dignified dry toilets solutions has inspired the TepozEco team to come up with a range of options to respond to a variety of different economic, social and environmental factors that the families are in. Exploration of the acceptability of these options, including the traditional elevated chamber dry toilet option, portable public urine modules, as well as the *fossa alterna* and the *arborloo*, have provided proof of the replicability of these alternatives for disposing of human excreta.. This path has allowed us to offer a variety of potential solutions that cater for human sanitation requirements, including the development of highly innovative architectural solutions for dry toilet prototypes.

The dry toilet models are continuously evolving. New components that have proved to be acceptable include: attaching the dry toilet to the house, as opposed to building the structure independent and far away from the house; construction of one large chamber that houses two large plastic containers on top of wooden platforms with wheels; installation of male urinal and washbasin in every toilet; a modular design with the possibility to include a shower; and sending greywater to a biofilter or reed bed system before use for irrigation.

The result of this search has led us to create options that aesthetically embrace the application of ecosan technologies, a quality that has helped in opening up people's attitudes towards the closed loop sanitation approach. The current construction techniques applied by TepozEco involves: a traditional stone foundation, fired brick walls and concrete roof; use of woven bamboo panels that work as lightweight movable walls; and stone foundations with innovative *pajareque* self-building technique (a bamboo frame with a mix of loose straw and mud woven between them, with nopal --prickly pear-- earthen plaster finish).

Furthermore, the recent partnership between SANUT (national NGO promoting community-based eco-technologies) and TepozEco has kindled a promising building construction method that makes use of prefabricated steel plate wall and roof moulds, which come in corner, T and straight shapes, similar to a full size "erector set". The thick thermal walls are built out of a mix of mostly earth, a small amount of cement stabilizers and filled with inorganic solid waste, such as PET bottles, tin cans, and other recycled trash. This system facilitates the building of beautiful, reliable and enduring dry toilets, equipped with an urine diverting toilet, a urinal, washbasin and all other accessories, , in less than five days for about 1,000 USD per unit. The set of moulds, financed by TepozEco, will permit easy replication of the prototype models in different communities. Recent work carried out in the mountain town of San Juan Tlacotenco is providing the setting for pioneering this self-help building technique, which allows for gender equitable family involvement,

We can only conclude that further attention and research needs to be given to the architecture surrounding the ecosan system, in order to offer, not only practical and user-friendly ecological designs which can be adapted according to the economic situation and socio-cultural tastes -- but also, aesthetically pleasing and culturally acceptable spaces that continue to respond to the ever growing demand generated by the world's water and sanitation crises.