

2008 Winner

Comprehensive Design for a Carbon Neutral World:

The Challenge of Appalachia

There are over one and a half million acres of strip-mined lands in Appalachia. Fifty percent of the USA's electricity comes from burning coal. However, coal combustion is creating increasing levels of carbon dioxide, triggering climate change and threatening the ecological integrity of the planet. John Todd draws on his approach to wastewater remediation to suggest steps toward a carbon neutral Appalachian economy.

STAGE 1 COAL SLURRY DETOXIFICATION

Design eco-machines which will detoxify the trillions of gallons of coal slurry in reservoirs throughout the region, rendering the coal slurry harmless to the environment and local inhabitants and that creates environmentally beneficial products from the treated slurry solids.

SOIL REMEDIATION

Integrate ancient and modern soil building techniques from around the world to remediate the soil at a scale unprecedented in the region.

STAGE 2 SUCCESSFUL FOREST GROWTH

Regional reforestation initiative, planting new forests, agro-forests and short rotation woody crops for biomass production for subsequent conversion to energy sources. The longer-lived forests and orchards and healthy soil establish long-term carbon sequestration in the heavily polluted region.

STAGE 3 CREATING A RENEWABLE ENERGY FUTURE

Suitable Appalachian wind sites have been discovered that can provide competitive sources of energy. If wind energy is paired with another renewable energy source like woody biomass from willows and poplars, a viable consistent energy system can be developed.

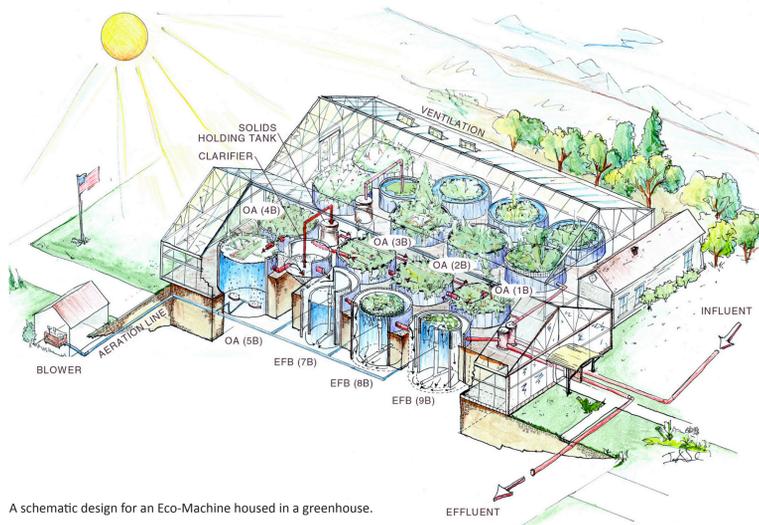
STAGE 4 INSTITUTIONS FOR A CULTURE OF SHARED OWNERSHIP

Research suggests that after stages one through three, multi-phase institutional model. They can be designed at scales ranging from a watershed to an entire region.



Testing the water at the Omega Institute for Sustainable Living.

John Todd's Work Prior to the 2008 Proposal



A schematic design for an Eco-Machine housed in a greenhouse.

John Todd is an internationally recognized inventor and a pioneer in the design and construction of ecological wastewater treatment systems. Much of his work is on natural wastewater treatment with "Eco-Machines" designed to function and resemble, a baffled "river" through the creation of eddies, countercurrents, and contact zones in which a diversity of life will arise.

A robust ecosystem is created between the plants, microbial species and distinct treatment zones. Within the Eco-Machine, all the major groups of life are represented, from microscopic algae, fungi, bacteria, protozoa, and zooplankton, on upward to snails, clams, and fishes. Higher plants, including shrubs and trees, are grown on racks suspended within the system. The result is an efficient and refined wastewater treatment system that is capable of cleaning water without hazardous chemicals.

An Eco-Machine in action

Fuzhou, a city of 6 million people, empties its commercial wastewater and sewage into the Baima canal that runs throughout the city. The polluted canal is a health risk to the city and threatens the livelihood of fishing communities downstream.



In 2002, John Todd designed a Restorer on the Baima Canal using a collection of 12,000 plants composed of 20 native species. Built with a walkway down the center, the Restorer has met water quality goals and created a desired recreation area for the city's residents.

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