Poplar-based Phytoremediation Processes

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This presentation is divided into two segments:

1. A historical perspective in developing phytoremediation as a major pollution cleanup and treatment technique
2. A potential phyto future that contributes to a real potential challenge for good.

Poplar- and willow-based phytoremediation technology that focused on regulated environmental pollution control started in 1988 and has evolved to global application with full-scale field applications, over 300 Ph.D. and M.S. theses awarded.

Many of the modern phytoremediation projects started with poplar (*Populus spp*.). Fundamentally, poplar physiology allowed root placement to a specific subsurface depth. With a defined a root zone 'reactor' volume, the plant dynamics, soil physics and microbial activity has pollutant treatment properties.

As trees and the associated rhizosphere mature, this predictable reactor volume had treatment capacity that improved with time – essential to regulated sites. Treatment is accomplished by in-soil properties and plant-derived exudates requiring less capital construction cost, less refined chemical cost and less electrical energy for pumps and aeration.

The poplar genetic pool was selected for fast fiber growth over a large fraction of the earth's surface - thus a commercially harvested crop that is safe and renewable added to the phyto attraction. Because it is a plant system, the skilled labor and maintenance equipment are normally available – creating honest 'green collar' jobs for the community.

On mature poplar, it is possible to remove 25 metric tons of carbon dioxide per hectare per year, which improves the 'carbon footprint' for waste water and pollutant treatment. There has been a shift in phytoremediation acceptance due to several factors relating to a broader concern for global warming, river and estuary water quality, damaged wildlife habitat, and poor commercial economics.

These poplar traits improve the efficacy and economics of long-term pollution management programs for industry and communities.