

Eco-Toilet Summit - II



**HUMAN WASTE
AND WHY IT
MATTERS.**

Moderator: Matt Patrick
State Rep 2001-2010

Keynote Speaker:
Jamie Eldridge, MA Senator

"Overview of Waste Water Issues
and Opportunities"
Matt Patrick

"How We Got Hooked on Sewage
and How We Can Break the Habit"
Don Mills

"Following the Water, Nutrient &
Energy Streams"
**Earle Barnhart, Eileen Gunn,
Ron Zweig**

Demo-Workshops on Eco-Toilets:
- Urine Diverting (UD) Toilets
- Composting Toilets: Phoenix
Clivus Multrum
Carousel
- Packaging Toilets: Pacto

Sat. July 16, 2011 - 9:00-2:00pm
ALL WELCOME! REFRESHMENTS

East Falmouth Elementary School

Sponsor: **The Green Center - 508-563-3101** capecodalchemists@gmail.com
Co-sponsors: Citizens for Economic & Ecological Sustainability (CEES) of Falmouth, Clean Water Action,
Falmouth Climate Action Team (FCAT), GreenCAPE, Sierra Club Cape&Islands Group, Water Alliance

Next Steps for Falmouth

Establish a "Water & Nutrient Audit" program, similar to the energy audit program available to homeowners. An audit would assess a home-owner's current water use and nutrient management, and provide information on ways to save water and options of how to manage nutrients generated by the household in the most cost effective way.

If widely used, the audits would provide town planners with detailed information about existing water & nutrient conditions.

The Town should perform a financial/regulatory/energy analysis and comparison of the various options for coastal pond remediation and wastewater/nutrient management.

An analysis of the shellfish culture option is already underway.

Research the break down of micro pollutants in composting processes, domestic graywater treatment systems and soil.

Energy and Environmental Conservation, Coastal Restoration and Preservation, Cost Reduction and Job Creation, Social Justice for a Sustainable Community

Save and Protect Water, Create Less Waste: Improving Falmouth Sanitation Systems with Waterless Toilets

Why? Prices are rising, supplies are dwindling, and the climate is changing! Temperatures are rising and sources of freshwater are becoming increasingly unpredictable. Climate change is expected to lead to more floods and more droughts, both of which reduce the availability of safe, clean freshwater for drinking, sanitation, irrigation, and other basic needs. At the same time, population growth, changes in food diets and higher use of pharmaceuticals contributes to higher pollution rates in estuaries, freshwater ponds and groundwater in Falmouth and across Cape Cod.

Ecological technologies offer the best long-term solution, resulting in water and energy conservation, nutrient recycling, permanent-jobs creation, and *adaptability* to future population changes. Household-level systems provide immediate remediation and immediate local employment, eg. waterless, nutrient-recovering composting toilets, urine-diverting toilets, waterless urinals, combined with local composting services, can recover the nutrients and make them into safe, highly valuable commercial products.

Waterless Eco-Toilets

Waterless urine-diverting or composting toilets can look like a traditional seated toilet but rather than using water to flush human waste down a pipe to a treatment plant, the waste is diverted into separate liquid and solid storage tanks for reuse. Waterless composting toilet systems are permitted in the Commonwealth of Massachusetts.

FALMOUTH FACTS

These simple ecological technologies can eliminate 70-100% of a household's nitrogen output, depending on the degree of removal of food wastes and gray-water treatment. The removal requirement for nitrogen in local estuaries is based on estimates established by the Mass Estuaries Project and has an accuracy range of 20-30%.

The simplest technology (urine diversion) can be installed in 8000 residences for about \$14 million, which is about the same cost of the design and engineering phase of the conventional sewer system. This takes out 70% of the total nitrogen load, reduces water use by 40% and provide jobs and produces fertilizers purer than any on the market today.

These installations and recycling facilities can be established immediately and be operational within 2 to 5 years, while avoiding huge costs and years or even decades of disruption of town's streets, highways and private properties. The planned conventional sewer system will take 5 years for design and 20 years for construction. By installing UD toilets within 5 years, millions of pounds of Nitrogen can be diverted from going into the waste stream and into the estuaries.

The recovered nitrogen, phosphorus, magnesium, calcium and several other minerals can be made into commercially valuable fertilizer and/or compost with simple technologies. Local contractors can be employed installing these systems and transporting materials to local conversion areas, where the processed products can be commercially distributed and sold.

Many pharmaceuticals and PPCPs that now pass through sewer plants will be contained and biologically degraded or destroyed by these ecological technologies and processes. Scientific studies show biological composting results in a higher degree of removal of PPCP's than the anaerobic digestion or aerated water processes in central sewer systems.

Turning Waste Into Water, Fertilizer, and Jobs

By converting waste products into usable resources, waterless toilets can bring a number of benefits to local communities:

- Nutrient-recovering toilet systems avoid contaminating groundwater wells and other freshwater sources;
- Both liquid and solid waste can be reused as safe, environmentally-friendly, slow-release fertilizers, helping to avoid harmful chemical fertilizers that are highly soluble and can contaminate water and food;
- Reuse and processing of waste materials creates jobs and strengthens local economies.

THE BEST RESULT

If widely adopted, these ecological, affordable, low-tech solutions will enable people to live sustainable lives in healthy, productive communities which are resilient to external economic, social and environmental changes and disruptions now and into the future.

FALMOUTH FACTS AND FIGURES

There are four polluted estuaries: Little Pond, Bournes Pond, Green Pond and Great Pond
Approximate 8000 homes with an average of 2.6 person per home

Urine:

Urine contributes 80% of all Nitrogen in a septic tank.

Average person excretes 17 gN/day = 6205 gN/year = 13.68 lbN/year

Average home excretes $2.6 \times 13.68 = 35.57$ lbs N/year

8000 homes excrete $\times 35.57 = 284,560$ lbs N/year

Phosphorus:

Average person 1 gr/day or 0.803 lbs P/year

Average home $2.6 \times 0.803 = 2.08$ lbs P/year

8000 homes $\times 2.08 = 16,702$ lbs P/year

Costs for urine diverting toilets:

Engineering/design costs: \$0.--

2 UD toilets+ 2 waterless urinals would cost between \$1500-3000/per home.

Cost for 8000 homes between \$12 - 24 million.

Energy cost per home: \$0.-

Water saving per home: 26 gal/day $\times 365 = 9490$ gal/year

Water saving for 8000 homes: approx 76 million gal/year = \$.....?

Removal of urine 2xyear = \$ 175/year

8000 homes $\times \$175 = \1.4 million/year

O&M for urine transport and processing into fertilizer = private enterprise/jobs/products

Total costs over 10 years: \$ 26 – 38 million

Cost for composting toilets:

Engineering/design costs: \$0.--

2 composting toilets would cost between \$7000 and \$20,000/per home.

Cost for 8000 homes between \$ 56 -160 million

Energy cost per home: 5-10 watts/hr = 43-86 KW/year $\times \$0.28 = \$12-24.--/year$

Energy cost for 8000 homes = \$96-192,000/year

Water savings per home: 30 gal/day $\times 365 = 10,950$ gal/year

Water savings for 8000 homes: approx 88 million gal/year = \$...?

Removal of compost 1xyear = \$ 150/year

8000 homes $\times \$150 = \$ 1.2$ million

O&M for transport & processing into agricultural compost = private enterprise/jobs/products

Total costs over 10 years: \$ 70-173 million

Costs for central sewer:

Design: \$12-\$15 million

Central sewer installation for 8000 homes \$ 400-\$500 million

Connection fees for each house \$ 2000-\$5000.

Connection fees for 8000 homes \$ 16-\$40 million.

O&M for central sewer \$500/home/year; for 8000 homes = \$ 4 million/year

Total costs over 10 years: \$ 468-595 million

(These data were collected by a Falmouth citizen from many sources and should be confirmed by a formal analysis.)

Books recommended by

Ecovita

The Composting Toilet System Book

Liquid Gold: The Lore & Logic of Using Urine to Grow Plants. Steinfeld

Reusing the Resource: Adventures in Ecological Wastewater Recycling

Small Flows Clearinghouse

www.decentralizedwater.org <<http://www.decentralizedwater.org>>

Ecological Nutrient Management: Grow with the Flow (and Glow with the Flow): Capturing resources in wastewater

Phoenix Composting Systems

Water Consciousness: How We All Have To Change To Protect Our Most Critical Resource.

Essays, Edited by Tara Lohan

The Big Necessity, The Unmentionable World Of Human Waste And Why It Matters. Rose George

Liquid Gold: The Lore & Logic of Using Urine to Grow Plants. Steinfeld

Ecological Engineering

The Composting Toilet System book

Reusing the Resource: Adventures in Ecological Wastewater Recycling

Clivus Multrum

Toxic Sludge is Good for You: Lies, Damn Lies and the Public Relations

Industry, by John Stauber and Sheldon Rampton, 1995, Common Courage Press

Soil and Civilization, Edward Hyams, 1952, Harper and Row

Omnivore's Dilemma, Michael Pollan, 2006, Penguin Press

Pacto Waterless Toilet

Aqua Shock...The Water Crisis in America by Susan J. Marks

Cadillac Desert....American West by Marc Reisner

Water Use & Conservation by Amy Vickers

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ADVANCED COMPOSTING SYSTEMS

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