American Water

Water Reuse and Recycling 15 Years of Experience That Begins In New Jersey

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V.P. Strategy – American Water

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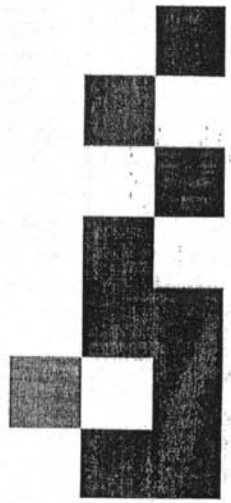

Why New Jersey Should Be The Leader in Water Reuse

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- One of the wealthiest States of the wealthiest Nation in the World
- The most densely populated State in the USA
- The State with the most progressive Watershed Management initiatives in the USA

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Q –With all this water, why is there a water problem?

A - There is plenty of water, but not very much is potable, demand exceeds sustainable supply in many areas and current practices of consumption and use are depletive and destructive.

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The Challenge
Achieve Balance

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- Understand the drivers of water use
  - Economic – What is the true cost to society for subsidized alternatives? What economics underlie conservation? Is water too cheap to conserve?
  - Cultural - Why do the people who live in the desert in Arizona insist on having irrigated lawns? Why must we use water as a means of waste disposal?
  - Regulatory – Assess regulation vs. incentive driven management. Why would we have regulatory disincentives to reuse?
  - Environmental – Understand integrated water resource management fully and act accordingly.
- Change the drivers - Impose regulations and implement incentives to shift the economics and cultural patterns to better match the environmental constraints.
- Plan creatively and appropriately - Address all stakeholders needs and build innovation into environmental stewardship.

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The Various Configurations And Natural Drivers Of Water Reuse That Exist Today

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- Urban Areas
  - California, Arizona, Nevada, New Mexico & Texas – Where large wastewater infrastructure existed, it is logically expanded to incorporate reuse to address water supply shortages due to arid climates.
  - Florida – Over extraction of groundwater due to population growth coupled with heavy irrigation and lack of surface water supplies has caused salt water intrusion and falling water tables.
  - New Jersey, Massachusetts, Connecticut, Long Island - Large wastewater infrastructure discharges fresh water into the ocean. Shore communities that depend on groundwater supplies are experiencing salt water intrusion. Other areas experience periodic water supply shortages due to population growth without development of new sources. Similar in most developed areas of Eastern Seaboard.
  - In General - Regional reservoirs and dams are not being expanded and storage capacities are routinely reaching limits during drought periods. Water demand growth is outpacing supply.

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The Various Configurations And Natural Drivers Of Water Reuse That Exist Today

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- Suburban and Rural Areas
  - **California, Arizona, Nevada, New Mexico & Texas –** Development in arid rural and suburban areas without access to adequate **water rights** requires innovative water management.
  - **New Jersey, Massachusetts and Connecticut** -During the 80's and 90's, development in rural and suburban areas without wastewater facilities required innovative wastewater treatment and reuse to fulfill **environmental impact concerns.** Sewer bans in 1984 led to first recycling system in NJ. Now, the lack of reservoir storage capacity to keep up with growth will become a problem with regards to potable water supply, particularly during drought periods.

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The Various Configurations And Drivers Of Water Reuse That Exist Today

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- Industrial Systems
  - More advanced and flexible than municipal or utility based systems.
  - Conservation has stronger economic drivers because system costs are not subsidized by grants and low interest loans.
  - SIU (Significant Industrial User) program requires significant pretreatment prior to discharge to municipal systems. Reuse benefits the economics for both the water supply and wastewater treatment aspects.
  - Direct benefits are greater because there are more readily available applications for reuse water. Industrial washing, cooling and process water often do not require potable standards, or require specific treatment characteristics that can readily utilize recycled water as feed source.

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Special Drivers of Water Reuse

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- Lack of Water Allocation Permits Or Rights – Sometimes the most dependable source of additional capacity is conservation or reuse.
- Inability To Obtain Discharge Permits - Surface water discharge permits are becoming more and more difficult to obtain in many states. Where this is occurring, it is driving innovative considerations for conservation and reuse as a means of creating additional capacity in new and existing wastewater systems.
- Financial Incentives – Special tax incentives are adopted in NJ to foster more reuse projects in industry. By obtaining a Determination of Environmental Benefit (DEB), an industry can obtain a 50% tax credit on the project CAPEX. This is relatively new and is a significant economic driver. Why not do the same for residential development?

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Making New Headway

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- Many industrial customers are now showing interest in participating in regional, community and individual reuse applications.
- New England Patriots project came on-line in April of 2002 and provides excellent reference for the community model of water reuse.
- Battery Park New York - Residential direct reuse project in very high end real estate market will establish new possibilities for urban and residential applications of water reuse. Project is scheduled to be complete by June 2003.

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FACILITY	REUSE GPD	REUSE MGPY
Oakwood Village	175,000	63.9
Country Oaks	50,000	18.3
Beacon Hill	105,000	38.3
Sturbridge	25,000	9.1
Mansfield Farms	350,000	127.8
Village Square	10,000	3.7
Ames Plaza	3,600	1.3
Chester Mall	9,000	3.3
Crossroads @ Oldwick	22,500	8.2
Franklin Lakes	20,000	7.3
Four Seasons @ Chester	28,000	10.2
Hawk Point	82,000	29.9
Jefferson Village	120,000	43.9
Knowlton	100,000	36.5
Cape May	95,000	34.7
Wildon	2,000	0.7
Brass Castle	22,000	8.0
Nashoba High School	12,000	4.4
Salisbury Prep School	27,000	9.9
Court Street Company	10,000	3.7
Wyndham Point	30,000	11.0
	1,298,000	474.1

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Present AWM Indirect Reuse Facilities

First system on-line in 1986

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Existing AWM MBR's With Direct Reuse Plus Groundwater Recharge

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Project Name	Capacity (gpd)	Indirect Reuse (gpd)	Direct Reuse %	Direct Reuse (gpd)	Yearly Total (gal.)
Gillette Field	250,000	75,000	70	175,000	91,250,000
Wrentham	57,000	11,400	80	45,600	20,805,000
Clinton Crossings	15,000	3,750	75	11,250	5,475,000
Westbrook	19,000	5,320	72	13,680	6,935,000
Pohalcong Plaza	10,000	1,000	90	9,000	3,650,000
Arsene	2,500	875	65	1,625	912,500
Copper Hill School	1,500	345	77	1,155	547,500
Dutch Country Market	2,000	1,140	43	860	730,000
Franklin Mutual Insurance Co.	1,200	540	55	660	438,000
Bloomberg	15,000	5,100	66	9,900	5,475,000
Conwaltec	4,000	1,040	74	2,960	1,460,000
Jefferson	3,000	690	77	2,310	1,095,000
Princeton Montessori School	3,000	990	67	2,010	1,095,000
Skylands Park	10,000	2,000	80	8,000	3,650,000
Telecommunications	2,000	140	93	1,860	730,000
Trap Rock Industries	3,000	840	72	2,160	1,095,000
Toys R Us	4,000	680	83	3,320	1,460,000
Cokk Neck Elementary	10,000	1,000	90	9,000	3,650,000
Cokk Neck High	16,000	1,600	91	14,400	5,840,000
Windby School	4,000	400	89	3,600	1,460,000
Sub-Total Direct	432,200	114,450	74%	318,350	157,753,000

First System On Line in 1987

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Facts About Current Status

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- Interest level is at all time peak due to recent water shortages and lack of secure alternatives
- Adequate reference sites exist to build confidence and understanding
- Incentive programs are just now appearing and will help shift some drivers.
- A lot could be done by government to improve regulatory drivers and enhance incentives further.
- Economics are still not in favor of reuse. Water supply and wastewater treatment are still very cheap and heavily subsidized.

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Westbrook, CT.
Westbrook Factory Outlet Mall

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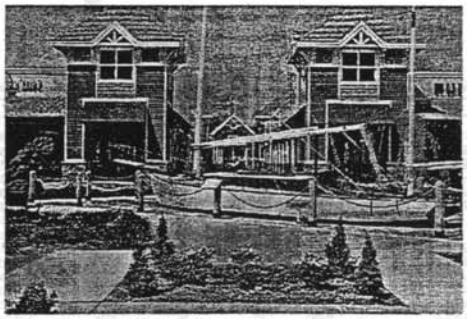

Multiple reuse reference sites exist where long term performance demonstrates regulatory, public and commercial acceptability.

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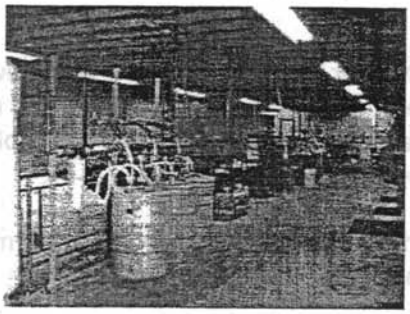
Water Recycling Equipment at Wrentham Mall,Wrentham, MA.



Clean, odor free, standardized treatment systems demonstrate desirability of reuse alternatives. Performance is not an issue.

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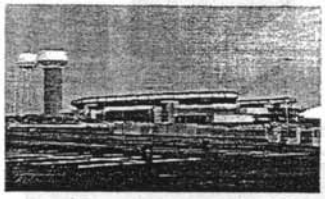
Gillette Stadium, Foxboro Massachusetts

- Applications of reuse are growing in size and commercial status.
- 68,000 Seat Stadium represents beneficial reuse at prime public and institutional sites.
- System provides reuse capacity to entire commercial zone within Town of Foxboro.



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Residential Reuse Is Happening In New York City

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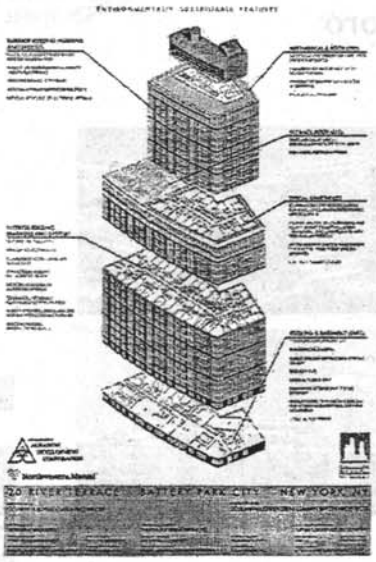
- 20 River Terrace, Battery Park, New York City will demonstrate that even in high end residential markets, reuse is possible, desirable and completely acceptable.
- Urban applications of wastewater mining are very possible.

City & State worked together.



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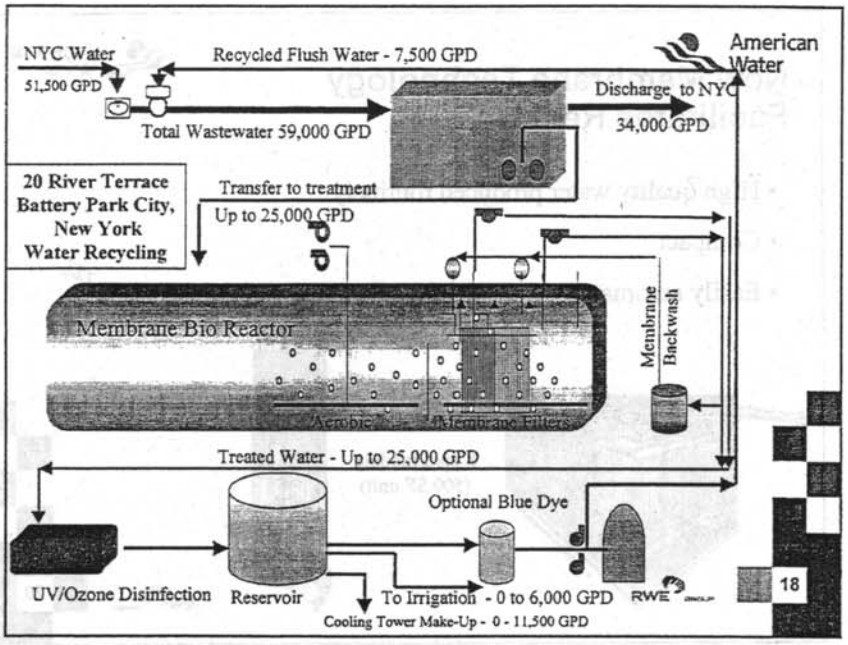
"America's First Green Residential Tower"

Building 18A at Battery Park City - NYC

- Water recycling for toilets, cooling and irrigation
- Collection and reuse of rooftop water (gardens / PKs)
- Recycled building materials – no landfill
- Photovoltaic power generation
- Special windows to improve energy efficiency



(looks like our skin)

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Regulatory Changes Needed To Improve Water Balance

- Treat water reuse projects with preference – have easier permitting to create non-economic incentives
- Open new areas and ways to achieve reuse in NJ, i.e. residential reuse
- Create economic incentives via tax rebates, reuse trading credits and other methods to improve the financial rewards and ability to achieve goals simply and effectively.
- Fully integrate all aspects of water resource management into permitting programs, i.e. recharging aquifer should offset lack of direct reuse – to allow creative solutions
- Regulate for performance and let the free market determine the best alternatives and systems.

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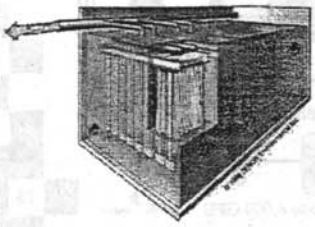
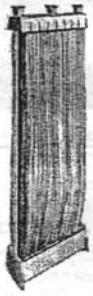
New Membrane Technology Facilitates Reuse

- High quality water produced routinely
- Compact
- Easily automated

#9 Spaghetti



8 gpm/module
(500 SF unit)



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Things We Would Pursue Presently If Environmental Agencies and NGO's Provide Support

- Direct residential reuse for flush water. (RW now on)
- Direct residential reuse for laundry water.
- Direct residential reuse for irrigation.
- Regional industrial reuse programs (water Supply)
- Stormwater recharge – help support over supply
- Effluent aquifer recharge into potable source
- Wastewater mining (Battery Pk.)

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