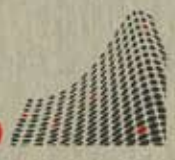
Sustainability Investment Report

November 2010

WATER & WASTEWATER

Profiting from the Next Big Wave



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The Clean Water Act (CWA) was passed on October 18, 1972 over the veto of Richard Nixon. On October 18, 2010, the 38th anniversary of this important event, Paul Schwartz commemorated the occasion with the following:

> *"Water is the heart of all life. It is embedded in all life forms, in all economic, social and spiritual practices across the globe. Disaggregating and disconnecting water from this essential nature is what has led us to chop it up into pieces, think of it as something that can be owned and led to laws and practices that encourage its waste, overuse, pollution and that reinforces class, race and gender inequity because of lack of access.*
>
> *We live on a water planet that has one global water cycle. That water cycle is broken and is contributing to and being affected by chemical pollution, unheard of and accelerated biodiversity loss, nutrient issues (nitrogen and phosphate cycle is broken), the hardening of the landscape and desertification, stratospheric ozone depletion, ocean acidification, estuary and freshwater ecosystem collapse and climate change.*
>
> *Because we have sought to solve water, disease, waste and transportation problems as they have come upon us, we have siloed and stove piped our solutions. We have created drinking water, wastewater, storm water, huge storage, conveyance, irrigation and flood control measures that are predicated on large subsidies and that are making economic distortions that are contributing to the degradation of the places we live, our food supply and are putting basic survival at risk.*
>
> *Nothing less than a new water paradigm is necessary to turn this picture into a rosy one. It is clear that we have to re-think our footprint on the global systems including how we build and re-build our cities and towns, how we produce food, how we get around, where jobs come from and how we deal with waste. Pollution prevention, efficiency, conservation, reuse, doing things locally and in a distributed and decentralized manner are all core principles for moving forward with water and other natural resources. Integrated and holistic thinking will reveal an abundance of resources and capacity that we are currently treating as waste. Working with and mimicking nature will support new solutions that will be characterized by their 'simplexity'."*
>
> Paul Schwartz, National Policy Coordinator
> Clean Water Action

About Equilibrium Capital Group

Equilibrium Capital Group is an investment firm that is building a portfolio of asset managers who focus on real asset sectors impacted by resource constraints and sustainability. Our asset managers generate superior returns due to their operating expertise and unique investment strategies, including:

- Sustainable real estate
- Integrated land management
- Water and wastewater
- Energy resource management

We believe that **financial innovation** is a key catalyst to the scaling of sustainability solutions and impact. Bringing together more than 20 years of innovative investment experience, we leverage our collective expertise, passion, and connections in the world of impact investing to affect change on a global scale. For more information, please visit eq-cap.com or contact info@eq-cap.com.

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Acknowledgements

We would like to thank our co-author, Dan Heagerty, a water strategist with 40 years experience. Most recently, Dan was the Chief Strategic Officer for David Evans Enterprises, Inc. (DEEI). His contributions have been instrumental in developing our thinking on water and wastewater challenges and opportunities. DEEI is a national leader in sustainable design and management solutions, and has consistently provided its clients with award-winning approaches to water resources, transportation, energy, and land development design, planning, and management.

We also collaborated extensively with Natural Systems Utilities (NSU) — a firm with leading experience developing and operating innovative, sustainable water and wastewater solutions over the past 20 years. For this report, we supplemented NSU's and Dan Heagerty's deep expertise and on-going dialogues with customers and other industry experts by researching hundreds of sources.

Summary and Conclusions

There is plenty of fresh water in the world, just not in the right place or at the right price. In the next decade, water, along with energy, will become one of the most sought after basic commodities.

The United States' water security is threatened by over-demand, under-pricing, inefficient delivery systems, arcane water rights, infrastructure neglect, poor water resource management, pollution, contamination, and precipitation shifts associated with climate change. The American Society of Civil Engineers (ASCE) gave the U.S. drinking water and wastewater systems D- ratings in 2009. ASCE estimates that the infrastructure will require over $255 billion in near term investment.[1] Furthermore, the water infrastructure is based on arcane, centuries old design principles. The country's aging infrastructure is capital-, chemical-, and energy-intensive, and fails to utilize the valuable by-products, such as energy, heat, grey water, and biosolids, that could be inputs for energy or agricultural systems. Water scarcity, quality, and funding challenges are driving the need for innovative, highly profitable, and sustainable solutions.

In this next decade, we expect the water industry to be transformed through new approaches to distribution and treatment infrastructure, as well as innovations in technology and finance to implement these approaches.

Innovative sustainable technologies and systems optimize the entire water solution to deliver productivity gains and water conservation. These solutions are modeled on: natural processes and distributed systems; restoration of water health and balance; reduction of energy, carbon, and costs required for water treatment and transport; and regeneration of water resources, habitats, and biodiversity. The most effective solutions integrate water, energy, and biological efficiencies.

Rethinking infrastructure: moving away from centralized facilities, towards decentralized water-wastewater supply, treatment, and reuse systems. In response to the high cost of transporting and treating water in conventional centralized facilities, and the lack of capacity in many municipal systems, we will move to more efficient distributed and scalable water treatment and reuse systems to meet future water demands in most regions of the United States. Technologies and processes that conserve and reuse water also provide numerous environmental benefits. More efficient water delivery and use also significantly: reduce energy demands associated with transporting and treating water supplies; reduce agricultural production costs (energy, transmission, fertilizers); and benefit aquatic and upland wildlife habitats. The most cost-effective and sustainable of these alternatives incorporate natural or biomimetic wastewater treatment systems, such as combinations of bio-regenerative wetlands and biomembrane technologies, and integrate with onsite rainwater capture, stormwater management, and water reuse systems to meet various community demands for water with appropriate supplies and recharge aquifers.

Companies are executing these new processes & technologies. Natural Systems Utilities (NSU), John Todd Ecological Design, CH2M Hill, David Evans Enterprises, Inc. (DEEI), Whole Water Systems, Alliance Environmental, and **Naturally Wallace Consulting** are some of the innovators focused on designing, building, and/or operating sustainable water and wastewater systems. There are several technologies which are critical components for sustainable systems. In addition to treatment wetlands, existing mature technologies such as membrane bioreactors (MBRs), are important for increasing the quality of treated and recycled water. Many of the major players, such as **GE Water, Siemens Water,** and **ITT Advanced Water Treatment** have developed and sell MBRs.

Unlocking new business models and revenue streams: reclamation; residual value; and local redistribution – creating economic value in water reuse. Grey water and stormwater will become valuable commodities. Energy capture of the waste will enable the wastewater to be energy self sufficient and become a power generator back to the grid. By-products of heat, non-potable water, and nutrients will generate new cash flows that can make water one of the most lucrative industries.

Barriers: Today's water utility and regulatory ecosystem is misaligned with the goals of an efficient, productive, and sustainable integrated solution. It is liability or crisis driven, focused only on safety and affordability. U.S. water and wastewater systems are very siloed and fragmented, as are their respective regulatory processes.

The investment opportunity – Water has very attractive investment characteristics:

- **A large and growing market:** Water in 2010 is a global market total of ~$500 billion worldwide and ~$125 billion in the United States. These markets are driven by essential needs, maintain steady growth, and depend on intrinsic hard assets. Even during tough economic downturns, water and wastewater utilities provide consistent returns and reliable cash flows.
- **Consistent cash flow generation:** U.S. water rates increase over 7% per year, more than double the average Consumer Price Index (CPI) of 3%.[2] Water assets are capable of producing strong current income and inflation hedging characteristics.

- **Undervalued assets:** Water treatment and sewage treatment have several embedded value streams (both income streams and asset appreciation opportunities) that are unrealized in current investment strategies. These assets including wastewater, grey water, and their by-products of non-potable water, energy, and nutrients, will escalate in value, adding to the attractiveness of one of the biggest emerging industries in the world. Grey water is waste-water generated from domestic activities, such as laundry and bathing.
- **Executed appropriately, investing in water presents the opportunity for asset appreciation, stable earnings, and environmental/social impact.**

The investors' challenge is finding the right strategy and investment vehicles that will allow them to most directly access these characteristics and opportunities. The next wave of water managers will be asset managers who think holistically and profitably. The designers, developers, and owners of the asset will need to embrace these trends and take responsibility for the entire asset potential. These holistic solutions will optimize the complete water life cycle, driving long term operating efficiency, optimal economics, and environmental stewardship for all stakeholders.

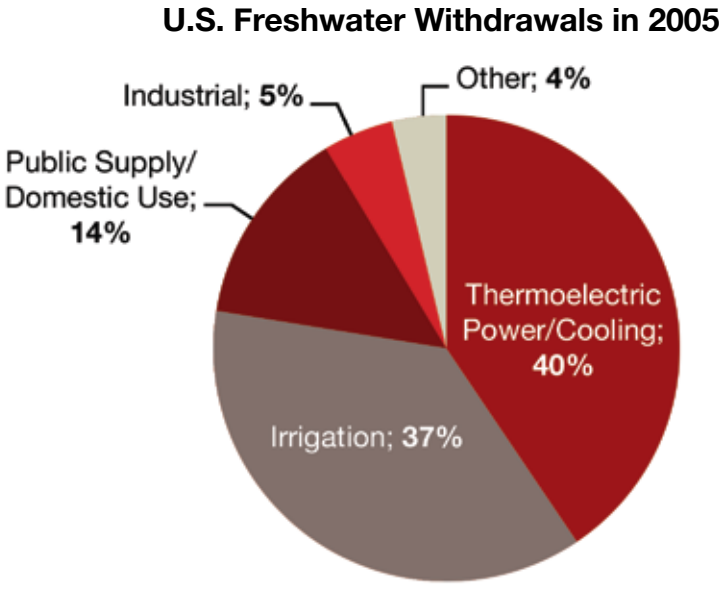
As innovative firms continue to prove that integrated, natural solutions solve multiple environmental problems while meeting water quality standards at a lower cost, the sustainable segment will take market share from the traditional, siloed approaches to water and wastewater challenges. **We forecast that the U.S. addressable market for sustainable solutions will more than triple from ~$4 billion, or 3% of the total water and wastewater market in 2010, to ~$15 billion, or 8% of the total U.S. market in 2020.** These innovations have great potential globally, but this report is focused on the large U.S. market, because issues and opportunities vary significantly in different parts of the world.

Superior performance, higher profitability, and long term stewardship impact will become the new norm.

Introduction to the U.S. Water and Wastewater Landscape

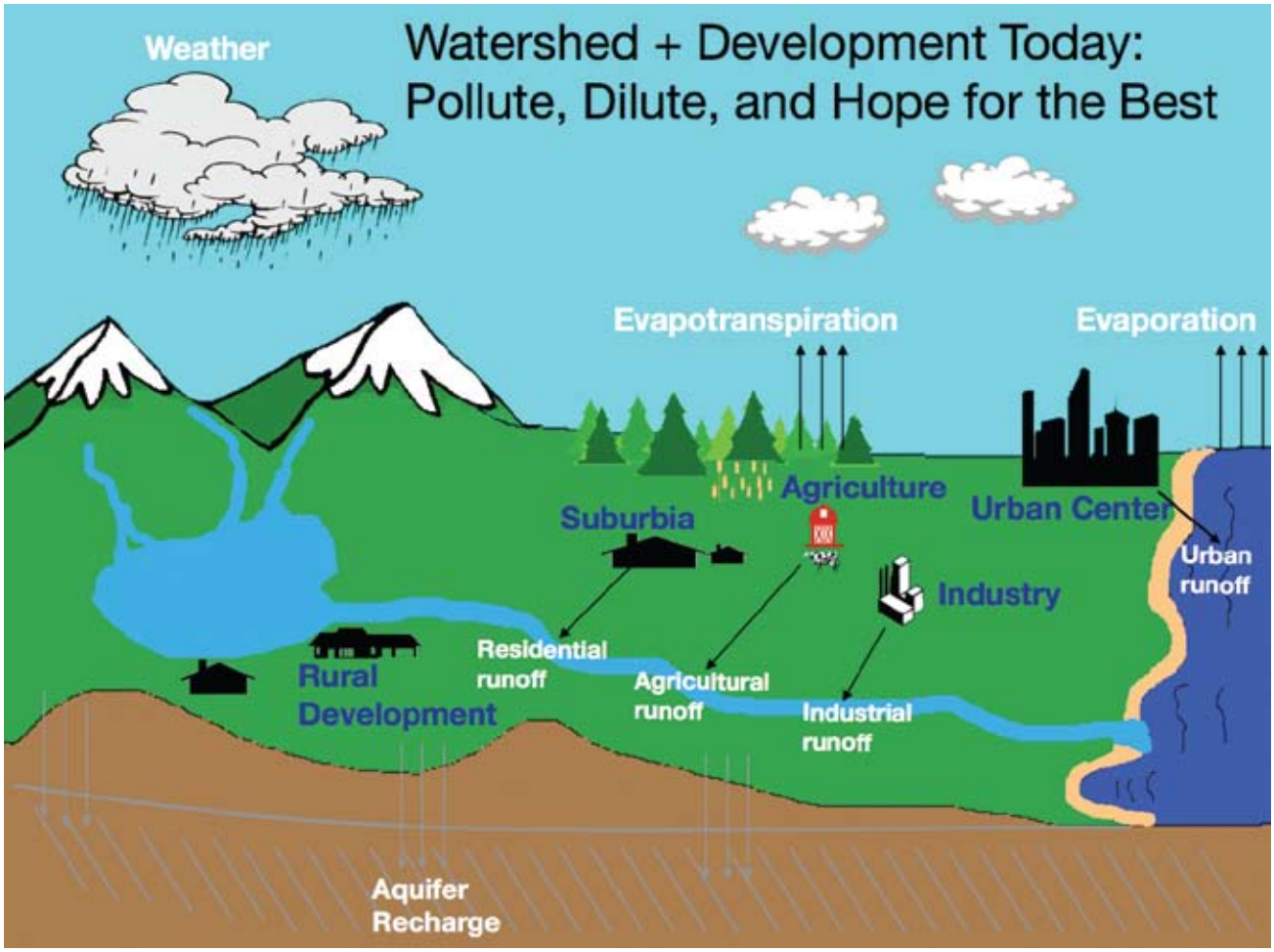
Freshwater is an essential natural resource with no substitute, regardless of price. 97% of the world's water is seawater and non-drinkable in current form, 2.5% is frozen freshwater in the Arctic, Antarctic, and glaciers, and only 0.5% is available freshwater. Although the looming water crisis is not as dire in the United States as in many other countries, the U.S. is facing serious water shortages in several regions, such as Southern California, Texas, and the Southwest where water withdrawals are already greater than available precipitation. In addition to droughts and arid conditions in many states, during the past 30 years, water usage has tripled, even though population growth has only increased by 50%.[3]

In 2005, ~40% of freshwater withdrawals in the U.S. were for thermoelectric power, which requires large quantities of water for cooling and steam-driven turbines, but most of this use is not consumptive. Irrigation represented ~37% of the freshwater usage, followed by ~14% for public supply/domestic use, and ~5% for industrial use.[4] These ratios hold largely constant today.



Source: U.S. Department of Interior[4]

In most parts of the United States, water management can be best described as a large-scale, flow downhill system. Take your clean water up high and discharge downstream. It is as old as Rome. What we have added to that notion is isolated management practices, starting with the Water Treatment Plants (WTPs) that collect water upstream from reservoirs and other sources, treat the water so that it meets EPA standards, and then distribute it to residential, industrial, and institutional customers. Then wastewater is collected and treated by Sewage Treatment Plants (STPs), septic systems, or Community Onsite Waste Systems (COWS). After being treated, almost all of the wastewater is discharged downstream without additional utilization. Water and wastewater treatment are almost exclusively siloed functions, managed by different entities. Current systems are measured or regulated by only two criteria – safety and affordability. Both of these criteria are important, and not necessarily easy, but provide little path to innovation.



Source: Natural Systems Utilities

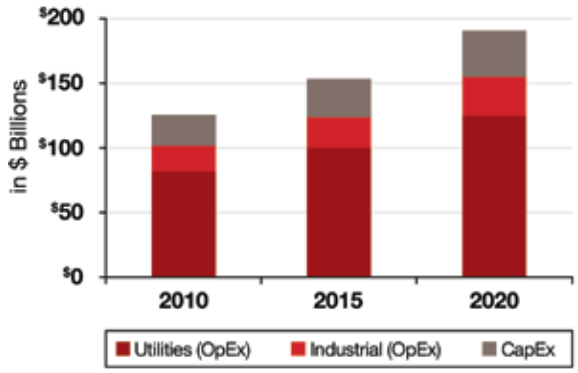
Stormwater overflows also create environment problems and systematic vulnerabilities in many communities. The growing trend and need for urban redevelopment is often stymied by old sewers which overflow routinely during rainfall events. Combined Sewer Overflows (CSO) and Sanitary Sewer Overflows (SSO) plague our cities. More than 27 billion gallons of raw sewage and polluted stormwater discharge out of 460 CSOs into New York Harbor alone each year.[5] This problem is prolific, underscores the seriousness of the current state of wastewater infrastructure in the United States, and is one reason why the D- grade was recently assigned by the ASCE.

In the United States, the majority of the utilities are government entities – 84% or ~52,000 publicly-owned water systems and 98% or ~16,600 publicly-owned wastewater treatment facilities. Most of these facilities serve small communities. For example, 83% of the drinking water systems serve 3,300 or fewer people.[6] There are numerous companies who design, build, and/or operate municipal systems, but the U.S. has been more resistant to privatization than the U.K., France, and Spain, where most of the water and wastewater systems are owned and operated by companies, not government entities. As more municipalities struggle to upgrade their infrastructure and incorporate more sustainable practices cost effectively, we predict that the number of public-private partnerships (PPPs) will continue to grow in the U.S., with a gradual increase in the percentage of water and wastewater assets owned by private firms.

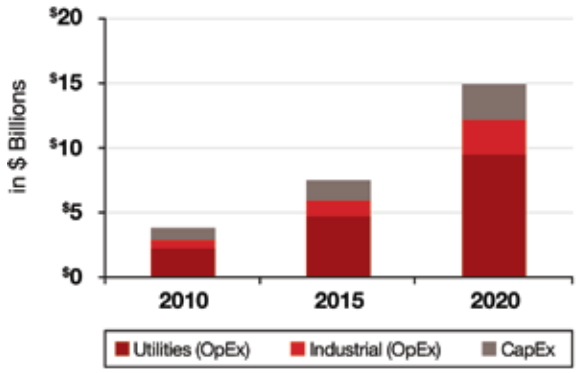
The U.S. Water and Wastewater Market

The total U.S. water and wastewater market currently is ~$125 billion, including municipal utilities' and the industrial sectors' operating expenses and capital expenses. We estimate that the addressable market for just sustainable solutions is ~$4 billion, or 3% of the total market in 2010. We forecast that the total U.S. market will be ~$190 billion by 2020, and the addressable market for sustainable solutions will more than triple to ~$15 billion, or 8% of the total market in 2020. The ramp-up rate will be tempered by regulatory requirements at the federal and state level, but the sustainable market segment will continue to gain market share of the total market long after 2020.

Total U.S. Water & Wastewater Market



Total Sustainable Addressable Market for U.S. Water & Wastewater



Source: Equilibrium Capital Group LLC

One of the biggest market opportunities is providing decentralized, sustainable systems that encompass the entire lifecycle on a local level, integrating water, wastewater, and related services. In the United States, about 25% of existing households and 37% of new developments already are served by onsite or decentralized wastewater treatment, making these ideal targets for next generation solutions.[7] This market dynamic, coupled with a growing interest in more environmentally-friendly alternatives in our communities, are fueling demand for sustainable water and wastewater solutions. McGraw Hill Construction's 2008 green building survey showed that penetration of water-efficient practices and methods is expected to dramatically increase over the next five years. 85% of survey respondents ranked water efficiency as a very important part of green buildings in 2013, up from 69% in 2008, including onsite wastewater management and grey water collection.[8]

Green building is just one of many promising market segments. Other early and scalable opportunities are: retrofits of existing, high-density office and residential buildings; new residential and mixed-use communities; urban infill projects; educational institutions; commercial businesses, such as "big box retailers;" agriculture; some government institutions, such as prisons; and several industrial/manufacturing sub-sectors. There is a compelling market opportunity for firms which are able to build and operate sustainable solutions at a lower cost (particularly over full lifecycle) than traditional water and wastewater systems. In addition, water management has become a critical business strategy for industries that are large water users, such as agriculture, food and beverage processing, semiconductors, and mining.

The market laggards will be publicly-owned utilities. These government entities are slow to change and risk adverse, reacting to regulatory requirements with limited incentive to proactively look for alternative solutions. Today, only about 6% of U.S. municipal wastewater is reused.[9] During the next twenty years, though, there are several regions where state policy makers will have no choice but to establish new regulations for recycling this precious resource. Arizona and California are already promoting water reuse strategies. The municipal utilities will gradually incorporate more proven, sustainable technologies by retrofitting their infrastructure for water reuse, as well as adding on wastewater-to-energy capabilities.

New Approaches and Technologies of Water and Wastewater Treatment

The transmission and treatment of water and wastewater require a wide array of equipment, such as pipes, pumps, valves, filtration and purification systems, control systems, and testing equipment. All of these product categories are mature, major market sub-segments with steady growth. But the new methodologies and approaches to water and wastewater host a number of innovative technologies that are particularly important for developing sustainable solutions, both in the new build and retrofit markets.

Membrane Bioreactors (MBRs)
Demand for advanced filtration and disinfection has expanded significantly in recent years. The filtration products which are most widely adopted in decentralized wastewater treatment and sustainable systems design approaches are membrane bioreactors. MBRs combine a membrane process like micro- or ultrafiltration with suspended growth bioreactors, which support a biologically active environment. Although energy intensive, they play a key role in purifying wastewater locally so that it can be reused for landscape irrigation and other non-potable uses.

Biomimicry
Biomimicry methods and technologies, such as constructed wetlands, can be integral to creating decentralized, sustainable systems for an expanding range of wastewater treatment and reuse. These natural systems are designed to mimic nature's process of filtration and are mechanically simple, yet biologically complex. Biomimicry solutions are ultra water and energy efficient, operating mainly on ambient solar energy, and require less capital investment and operating costs than traditional treatment systems.

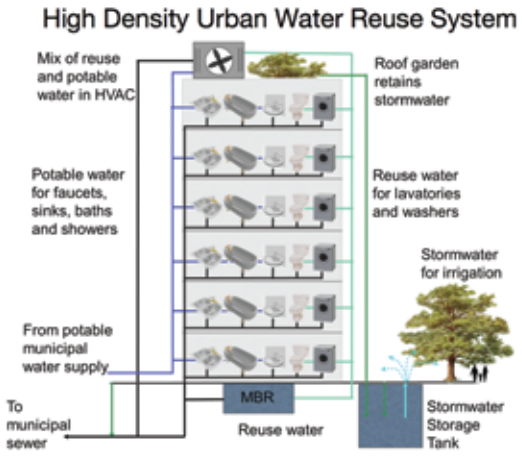
Wastewater to Energy
Converting wastewater to energy is an important technological opportunity. Water and energy are mutually dependent – rivers generate hydroelectric power, and energy is required to store, transmit, and treat water. The transport and treatment of water and wastewater account for over 3% of electricity demand in the United States.[10] The potential energy generated from industrial and municipal wastewater (converted from gases and solids, and exchanged from effluent water itself) can be approximately two times the energy required for treatment. Converting waste to energy, the system reduces energy consumption, converts water pollution to energy supply, and reduces carbon emissions.

Wastewater Nutrient and Organic Matter Recovery
Wastewater nutrient recovery is another technology moving into the stage of viable market performance. Technologies such as biodigesters, biogas, and nutrient processors recover valuable resources and nutrients from wastewater, including nitrogen, phosphates, potassium (or "NPK") and other by-products for agricultural, forestry, and landscaping uses. Currently, land application and water discharge represent mounting expenses and pollution control liabilities. Alternatively, wastewater separation and reuse creates marketable energy and organic product options from biosolids and kitchen influent, and NPK from sewage water – addressing both treatment compliance and essential commodity product needs.

Automated Water Metering
Automated water metering devices and "smart control systems" also will see rapid growth, especially to reduce water requirements for agricultural and landscape irrigation, to build more integrated and reliable supply-demand systems, and to manage stormwater for both water supply and regulatory compliance purposes. Water consumption can be lowered and water-centric resource allocation increased significantly with just-in-time and just-what's-needed water delivery.

Remote Imagery
Emerging technology for remote imagery is being applied to identify historical wetland and aquifer resources that can be re-established for stormwater and reuse water storage, wastewater treatment, and water supply integration. Utilizing historical water resource conditions can reduce design and construction costs of these systems by 50% or more, and typically perform substantially better than "constructed" wetlands (wetlands built in non-wetland conditions).

Geomimicry Solutions
The state of the art of designing holistic solutions analyzes the hydrological flow of the entire watershed and accounts for the interdependence of natural systems and constructed development within that local area. Sustainable master planning geomimics a closed-loop system. It hydrologically balances water flows, incorporating human-made and natural solutions, while managing the water lifecycle from extraction of water to recharge and discharge that can revitalize itself.



Source: Natural Systems Utilities and Natural Systems International

Key Players in the U.S. Water and Wastewater Ecosystem

There are four major types of players in the water and wastewater ecosystem:

- **Design and build firms –** consulting, engineering, and construction companies
- **Utilities and other treatment operators**
- **Water and wastewater equipment vendors**
- **Water and wastewater funding sources**

It is a complex ecosystem with several waves of merger and acquisition activity during the past 20 years, as large companies have tried to capture market share in these huge markets. Several roll-ups have failed and others have had lackluster results. The water and wastewater industries are highly regulated and difficult to change and reshape. The ecosystem also is fragmented, with many small players providing specialized services at a local level. In each market segment, there are innovators providing sustainable solutions to water and wastewater challenges. The long-term winners will be the firms with deep industry expertise and extensive experience with the regulatory environments at the federal, state, and local levels.

Major Players and Innovators in the U.S. Water and Wastewater Ecosystem

Design		*Build*	*Operate - Ops. & Mtce. (O&M)*	Water & Wastewater Equipment Vendors		
Consulting Firms	**Engineering Firms**	**Construction Firms**	**Utilities and Other Treatment Operators**	**Infrastructure & Treatment Equipment & Chemicals**	**Key Sustainable Technologies**	**Water & Wastewater Funding Sources**
					Membrane Bioreactor (MBR) Technologies	***85-90% of funding from Utilities***
GE Water has a small DBO undertaking in the Industrial Sector.				GE Water & Process Technologies		GE Capital
Black & Veatch Corporation			US Filter (acquired by Siemens)		Siemens Water Technologies	
MWH Global			Danaher			
URS Corporation				ITT Advanced Water Treatment		
HDR				Kubota		***Project Financing***
Parsons				Pall Corporation		Hannon Armstrong Capital
CDM				Dow Water & Process Solutions		Poseidon Resources
AECOM			Tyco International		Koch	***Loans & Technical Assistance***
Brown and Caldwell				3M	Mitsubishi Rayon	The World Bank
Malcolm Pirnie				Pentair		
TetraTech				Nalco - *Chemicals*		
Veolia Water						
SUEZ ENVIRONNEMENT						
American Water Works						American Water Works
			Aqua America			Aqua America
	Severn		Severn Trent Services			Severn Trent
SYNAGRO - *Nutrient Recovery (but a more mainstream vs. sustainable approach)*						
Many Regional & Local Firms	***Many Regional & Local Firms***	***Many Regional & Local Firms***	***~52,000 Water & ~16,600 Waste-water publicly-owned utilities***	***& Many More Equip. Vendors***		
Innovators with Sustainable Water & Wastewater Solutions					***Biomimicry Solutions***	
Natural Systems Utilities (including EcoCheck acquisition)					Natural Systems Utilities	
	Adenus					***Private Equity Firms***
			Arcata Wastewater Treatment Plant			The Carlyle Group
			Utilities, Inc. (acquired by AIG)			Clayton Dubilier & Rice
					Other Sustainable Techs.	AIG Highstar Capital
EnerTech					EnerTech - *Energy Recovery*	Macquarie
Ostara					Ostara - *Nutrient Recovery*	Generation Investment Mgmt.
SYNAGRO Technologies					SYNAGRO - *Nutrient Recovery*	Global Environment Fund
CH2M Hill			OMI (CH2M Hill subsidiary)		Orenco Systems	Earth Capital Partners
David Evans Enterprises, Inc. (DEEI)						NewWorld Capital Group
John Todd Ecological Design (Eco-Machine)					Eco-Machine - *Biomicry*	
Alliance Environmental LLC						
Whole Water Systems						
Natural Systems International						***Major Real Estate Developers***
Naturally Wallace Consulting						

Primary Business Model:

- **Design &/or Build Firm** -- Consulting, Engineering &/or Construction
- **Water & Wastewater Treatment Player (O&M)**
- **Water & Wastewater Equipment Vendor**
- **Water & Wastewater Funding Source**

Source: Equilibrium Capital Group LLC

Design and Build Firms
This segment includes consulting, engineering, and construction companies which design and build water and wastewater systems. They are key players, driving many of the major decisions and overall direction in these markets. There are 20 top firms, including well known companies such as **Black & Veatch, MWH Global, URS, HDR, Parsons,** and **CDM,** which provide the full-spectrum of design and build services. In each region, there are also many local consulting, engineering, and construction firms.

In the sustainability sub-category, **CH2M Hill, David Evans Enterprises Inc. (DEEI),** and fewer than twelve boutique design firms, such as **John Todd Ecological Design, Alliance Environmental,** and **Whole Water Systems,** have a primary business focus of designing and building integrated systems which maximize water reuse and minimize environmental impact. **Natural Systems International (NSI)** and **Naturally Wallace Consulting** are pure plan/design firms in sustainable water, wastewater, stormwater, and reuse infrastructure. These companies are developing innovative, natural water and wastewater systems, but most lack the financing to scale, because they just have a professional services business model and do not own and/or operate assets. Some sustainable treatment operators also master plan, design, and build water and wastewater infrastructure.

Utilities and Other Treatment Operators
Most of the water and wastewater treatment facilities in the United States are owned and operated by publicly-owned utilities. But there also are privately-owned firms, which are regulated by utility commissions and have public-private partnership (PPP) business models, providing treatment services to utilities. Major traditional players, such as **Veolia Water, SUEZ ENVIRONNEMENT, American Water Works,** and **Aqua America** offer the full range of build-design-operate (DBO) services and get a large percentage of their revenues from operations and maintenance (O&M) contracts. A few of these companies own a small percentage of the U.S. water and wastewater facilities – the design-build-own-operate (DBOO) business model. The market leaders, **Veolia Water** and **SUEZ ENVIRONNEMENT**, also sell equipment and offer financing, providing one-stop-shop solutions for their customers.

There is an emerging sub-category of innovators who operate sustainable water and wastewater utilities. **Natural Systems Utilities (NSU)** and **Adenus** offer sustainable DBO services.

Water and Wastewater Equipment Vendors
There is a wide diversity of water and wastewater technologies, each of which has its own "sweet spot" in terms of size, cost effectiveness, scale, and treatment standards. **GE Water & Process Technologies** and **Siemens Water Technologies** have aggressively acquired firms and expanded their offerings to include desalination and new filtrations technologies, such as MBRs. Siemens also entered the industrial water and wastewater treatment services market through their acquisition of U.S. Filter. Some of the other major equipment players are **Danaher, ITT Advanced Water Treatment, Kubota, Pall, Dow Water & Process Solutions, Tyco International, 3M,** and **Pentair.**

Several of these companies have acquired one of the first distributed technologies to gain widespread market traction – membrane bioreactors (MBRs). **GE Water, Siemens Water, ITT Advanced Water Treatment, Kubota, Pall, Dow Water, Koch, Mitsubishi Rayon, Veolia Water, and SUEZ ENVIRONNEMENT** have added MBRs to their product lines.

In the sub-sector of key sustainable technologies, **Natural Systems Utilities** and **John Todd Ecological Design** offer biomimicry solutions. **Orenco Systems** sells a variety of sustainable equipment, and **EnerTech Environmental** has developed an energy recovery solution. Two players in the nutrient recovery space are **Ostara** and **SYNAGRO Technologies,** although SYNAGRO has a lot of technologies that would not be characterized as sustainable. EnerTech, Ostara, and SYNAGRO also offer design-build-operate (DBO) services to their customers. During the next ten years, more companies will enter this important sustainability sub-sector.

Water and Wastewater Funding Sources
In the United States, utilities provide 85-90% of the funding for municipal water and wastewater infrastructure projects. Federal subsidies have declined significantly and in most cases, these utilities are municipal governments issuing tax-exempt debt. The American Water Works Association's estimates for the 2009 utility sources of capital were: 22% bonds; 16% loans; 16% rate increases; 15% operational savings; 10% grants; & 21% other.[11] Most of the large firms which provide operations and maintenance treatment services also offer financing on a project basis. For decentralized onsite systems for new residential or urban communities, real estate developers currently are the main source of project financing.

All of the other funding players shown on the ecosystem map only account for a small percentage of the total water and wastewater financing in the United States. **GE Water, Siemens Water, Hannon Armstrong Capital,** and **Poseidon Resources** offer project financing. Some of the private equity firms in this space are **The Carlyle Group, Clayton Dubilier & Rice, AIG Highstar Capital, Macquarie, Generation Investment Management, Global Environment Fund, Earth Capital Partners,** and **NewWorld Capital.**

Issues and Opportunities

The growing competition for water resources poses environmental, business, and economic risks. Several of the fastest growing states have a scarcity of usable freshwater – Nevada, Arizona, Florida, and Texas.[12] Throughout the country there are serious problems with our water and wastewater infrastructure. Approximately 60% of the water pipes will be classified as substandard by 2020, and in some areas water loss during distribution due to leakages already exceeds 50%. Lack of funding is one of the biggest challenges. Near-term, the ASCE forecasts funding requirements of $255 billion over the next 5 years. Estimates for the capital expenditures required to repair our country's water and wastewater systems over the next 20 years range from $500 billion to $1 trillion.[13]

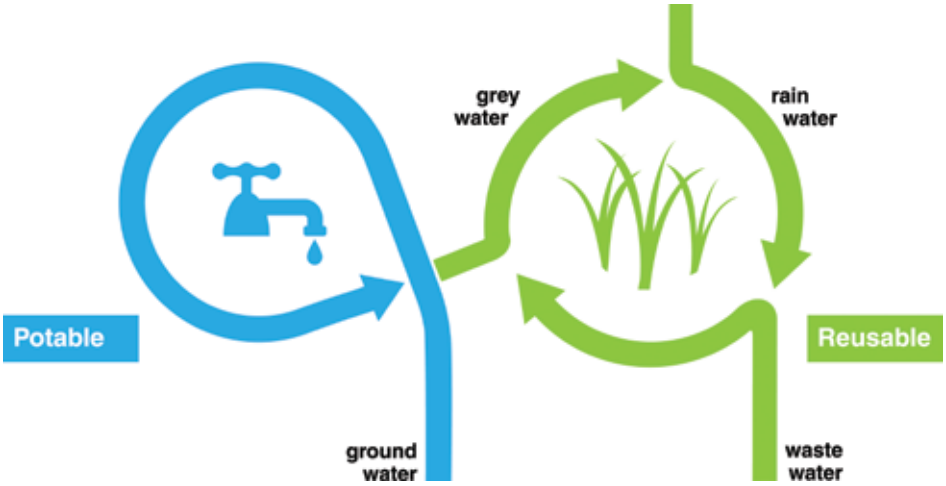
A critical element of the funding challenge is due to the fact that water and sewer prices only cover about 50% of the true costs of delivering water and wastewater services.[14] There is strong public resistance to rate increases, even though water is typically the lowest-cost utility and the most essential. However, with the continuing decline of water infrastructure in every state, innovations in funding capital and operations can create substantial market opportunities. Consumer and political understanding of the growing risks to society, the economy, and the environment posed by deficient and unsustainable water systems has not yet risen to the point where large-scale action will take place. Focused efforts on "ripe" locations for change will provide the models that can then create the greater shifts throughout the United States.

Regulatory agencies and policies compound the environmental, financing, and new technology deployment problems. There is no national policy framework for water reuse or integrated water-energy utilities. Over 20 federal agencies deal with water, and policies are rarely coordinated at a regional or national level. Many utilities continually operate out of compliance with environmental laws, and regulations are either ignored or are not strictly enforced. For most publicly-owned utilities, change is driven by regulatory requirements, not market forces. Utilities and regulators are also slow to adopt new technologies, mostly because of the government's and utilities' risk-adverse cultures. Movement will occur, however, either through third-party lawsuits, which the *Clean Water Act* is encouraging, or through innovations in financing that cash-strapped utilities can not ignore.

Movement is beginning in "ripe" locations like Arizona and California; both states are trying to tackle their water crisis by promoting limited water reuse programs. And there are many examples at the local level of communities, such as the Baltimore Chapter for Sustainable Water Solutions and Battery Park City's decentralized urban water reuse project with micro-watersheds in New York.

One major opportunity is developing water lifecycle solutions at a local level, integrating natural water, wastewater, and reuse systems. Biomimicry systems also can provide sustainable alternatives for dense suburban communities and high-rise buildings. Despite the fact that change will be slow in the municipal sector, there are private developers, small communities, institutions, and businesses looking for sustainable alternatives to reduce their water usage, carbon footprints, and operating costs.

Local Water Lifecycle



Source: Natural Systems Utilities

More affordable solutions to CSO & SSO problems also are now orienting towards decentralized natural solutions that defy the infrastructure deployment and operating capability of most existing municipal entities opening a new water quality service sector. Sustainable Stormwater Management Plans have been publicly announced in New York, Philadelphia, Portland, Seattle, and other cities faced with billions of dollars in infrastructure improvements and rapidly rising costs.

Alliance Environmental and **Natural Systems Utilities (NSU)** are innovators in this promising investment area. Alliance designs/builds and NSU designs, builds, and operates decentralized, integrated water-energy systems across a variety of market segments and scales, from single buildings to whole communities. These firms manage the water lifecycle from potable supply, to wastewater treatment, through stormwater management, to total reuse of water at the local level. This approach enables them to meet 100% of water safety standards, while cutting water and energy consumption by ~50%.

Natural Systems International (NSI) and **Naturally Wallace Consulting** are other innovators in designing and building sustainable water and wastewater systems. Like NSU, they have expertise in developing biomimicry and other natural approaches for wastewater treatment and reuse.

Water reuse in the industrial segment also will increase steadily during the next ten years. Reuse can effectively increase water supplies by an order of magnitude, because approximately 80% to 90% of industrial and domestic use wastewater can be reclaimed.[15] Companies which can offer water recycling capabilities coupled with waste-to-energy solutions will be in high demand for industries with high water use requirements. But water reuse for domestic water supply purposes will be slow to emerge, as the public perception of intimate reuse of wastewater retains the highest levels of skepticism.

Converting wastewater to energy is a reclamation and local redistribution opportunity, already advanced in Europe, that has great potential in the United States. This sub-segment is getting national-level attention as a creative way to reduce energy and water consumption. **EnerTech Environmental** is a promising start-up in this market segment. Their proprietary SlurryCarb™ process converts wastewater into a high-grade renewable fuel, with significant cost savings over alternative options. Over time, there will be many other companies pursuing the wastewater to energy opportunity.

Another important emerging sub-segment in the reclamation space is wastewater nutrient recovery, which extracts valuable by-products from blackwater (sewage with human waste). **SYNAGRO Technologies** provides organic residuals management services to municipal and industrial treatment facilities, and **Ostara** extracts nutrients from liquid sewage and recycles them into an environmentally-friendly fertilizer. As start-ups and researchers develop new capabilities, treatment and waste-to-energy players may incorporate wastewater resource recovery capabilities as a natural extension to their product offerings.

In the future, the valuing of grey water and stormwater will be major market opportunities. Sustainability will become a common theme and accelerate growth in many segments of the water and wastewater industries.

The Big Unmet Need and Opportunity in Water and Wastewater

The big unmet need lies at the intersection of providing decentralized, sustainable, low-cost systems and new financing alternatives. These natural, closed-loop solutions encompass the entire water lifecycle, including water, wastewater, and water reuse to significantly reduce water and energy consumption. **NSU, Alliance Environmental, CH2M Hill, NSI, John Todd Ecological Design,** and **Naturally Wallace Consulting** are at the forefront of designing, building, and operating sustainable water and wastewater solutions. The firms with the greatest revenue and earnings potential create and operate onsite biomimicry systems at significantly lower up-front and on-going costs, plus have the capacity to finance and hold the assets.

The old model is inefficient and costly, driven by a series of one-off transactions. Planning, permitting, design, construction, and operations are typically separate decisions and contracts are paid with government subsidies, loans, grants, and fees, with little incentive for performance certainty, cost efficiency, and innovation. The new financial and project development model collapses the delivery chain and improves operating profits so that equity and debt investment vehicles achieve true market attractiveness.

As next generation solutions are proven to be more cost effective, very profitable, and better for our environment, more entities will expand their delivery services or affiliations from the traditional design and build to include operating and financing business models. Over time, the U.S. market will rely more on sustainable solution providers owning assets, either permanently or over 10-20 years and then transferring the assets back to the customers. The design-build-own-operate (DBOO) and design-build-own-operate-transfer (DBOOT) water and wastewater business models are profitable investment vehicles with steady, predictable income streams and cash flows. **Public-private partnership (PPP) opportunities will expand for companies who can cut water and energy demand by 30% to 50%, reduce costs significantly, meet 100% of the water quality standards, and improve habitats and biodiversity.**

The opportunity for very profitable, innovative financing of total water solutions will begin at the local level with retrofits of existing, high-density office and residential buildings, private residential developments, and small community systems. Institutions and companies in water-intensive industries also will need financing to adopt closed-loop, biomimicry methods for treating and reusing their grey water and stormwater, And finally, the value of the wastewater by-products of grey water, energy, and nutrients will generate new cash flows that can make the water and wastewater industry one of the most lucrative markets.

The other promising investment area with major growth potential is investing along side municipalities to accelerate their shift to more sustainable practices by adding these complementary, unregulated technologies to their existing infrastructure. Over time, the decentralized systems will become integrated with municipal systems' "big pipes," as public utilities retrofit their infrastructure for water reuse and redistribute recycled water locally.

The next wave of water managers will be asset managers who think holistically and profitably, taking responsibility for the asset potential of the entire water life cycle, including reclamation and local redistribution. The new norm will be superior output, stronger performance, and higher profitability. As awareness increases about the threats to our health, environment, and economy, policy makers, regulators, and communities will take a more active role in preserving our most precious natural resource – water. In the coming decades, sustainable water solutions, coupled with the valuable commodities derived from reclamation and local distribution, will become one of the biggest emerging industries in the United States and the World.

Glossary

ASCE American Society of Civil Engineers
COWS Community Onsite Wastewater Systems
CSO Combined Sewer Overflow
DBO Design-Build-Operate
DBOO Design-Build-Own-Operate
DBOOT Design-Build-Own-Operate-Transfer
MBR Membrane Bioreactor
NPK Nitrogen, Phosphates, Potassium
NSU Natural Systems Utilities
O&M Operations and Maintenance
PPP Public-Private Partnership
SSO Sanitary Sewer Overflow
STP Sewage Treatment Plant
WC Water Collection
WTP Water Treatment Plant
WWT Wastewater Treatment

Endnotes

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Equilibrium Capital Group is an investment firm that is building a portfolio of asset managers who focus on real asset sectors impacted by resource constraints and sustainability. Our asset managers generate superior returns due to their operating expertise and unique investment strategies, including: sustainable real estate; integrated land management; water and wastewater; energy resource management.

We believe that **financial innovation** is a key catalyst to the scaling of sustainability solutions and impact. Bringing together more than 20 years of innovative investment experience, we leverage our collective expertise, passion, and connections in the world of impact investing to affect change on a global scale.

equilibrium capital group

1331 NW Lovejoy St., Suite 850
Portland, OR 97209

p: 503 889 7980
f: 503 889 7975

w: eq-cap.com
e: info@eq-cap.com