

The State of the Water Industry 2007



Rules of Thumb and Strategic Insights For the Water Executive

Winter 2007

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"Forecasting the Future - More Questions than Answers?"

A Comprehensive Overview of the Water Market

by Steve Maxwell

Introduction: Imagine that an international commission of astronomers discovers that a massive asteroid is hurtling directly towards us, and is certain to destroy the earth in ten years. With an immediate and coordinated international effort, however, the scientists say there is a decent chance that we can develop the technology to redirect or explode the asteroid before it destroys us. Given that doing nothing means sure annihilation, the peoples of the world drop their religious and political quarrels, and agree to throw all of their resources and energy together to find a way for the human race to survive.

We need to start to develop this kind of mindset with respect to impending world water problems. There simply is no substance more critical to life than water - we cannot live without it for more than a few days. Ultrapure processed water has made possible our advanced industrial economy and increased standards of living for the world's people. Modern

irrigation techniques have allowed us to feed our expanding population, and to turn deserts into shining oases. Yet we continue to deplete and pollute our limited water resources at an alarming rate, and we steadfastly look the other way while our water treatment and distribution infrastructure continues to crumble. The twin challenges of water quantity and water quality represent an inexorable planetary crisis - and unfortunately, one that is still not really on the radar screen. This impending crisis may not have the sudden impact of the asteroid, but its ultimate effect may be just as dire.

Much of our population still seems to believe that water should be essentially free, forgetting that it costs money - lots of it - to collect, clean, store and distribute the stuff. Many of our treatment plants and distribution pipelines were built fifty to a hundred years ago and are rapidly decaying, with leakage rates as high as 50% in some older cities. More ominously, many of our underground and surface water sources are ir-

reversibly contaminated, or are drying up from decades of overuse. Yet, mayors are rewarded for keeping spending down, not for insuring that their communities will have vital water resources in the future. City councils are loath to raise rates, even though big percentage increases in water rates would amount to no more than ten or fifteen dollars a month for most of us.

The main reason for our nonchalance is that water remains absurdly cheap relative to its real value. Americans today pay an average of a quarter of a penny per gallon for the clean drinking water that magically comes out of

The Water Business In a Nutshell

Key Drivers Behind the Market
- water quality and water scarcity problems are truly reaching crisis proportions, worldwide
- more significantly, public awareness and understanding of water problems is increasing
- regulation and enforcement are increasing , and new policies and approaches are emerging
- huge economic (and human) capital investments are required – and much more focus is needed
Resultant Trends and Developments
- out-sourcing or “privatization” continues – but remains controversial, particularly in the U.S.
- “musical chairs” in the industry – ownership rearrangement and consolidation continues
- a strong surge of public and private equity investment interest in the industry
- greater efficiency – more focus on “reducing demand to increase supply”
- increased focus on water recycling and re-use – technologies and attitudes
- incremental but continuing technological advance will help address some of the problems
- consumers and residential users increasingly vote with their pocketbooks
- new paradoxes and new questions continue to emerge and confuse the situation
Inescapable Conclusions
- water prices bear little relationship to the actual cost of delivery or the true value of water
- interest in water may be high – but we still lack mechanisms to connect dollars with needs
- delivered water prices must – and will – rise to higher and higher levels
- we must find new ways to manage water as an economic commodity, while providing it for all

Source: TechKNOWLEDGEy Strategic Group

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our taps - about \$20 a month for the typical family. One simply cannot find another product whose real value so far exceeds its price - or for that matter, one whose price is often so unrelated to its true cost. Eventually, we must all pay to correct the water pollution problems that we have created, and to rebuild the infrastructure that we have allowed to fall into decay - huge costs that current water prices do not properly reflect. Serious water problems are indeed hurtling towards us in the near future, and we need to take more dramatic steps now to begin addressing these problems.

Fortunately, as each year passes, more countries, institutions and individuals are realizing that we *don't just have a water problem - we have an impending water crisis*. However, and disconcertingly, it appears that this growing attention and focus on water problems is so far presenting us with more questions than answers. The issues are perhaps becoming clearer and better understood, but solutions are still elusive - and in too many cases we still aren't doing much to really address or begin to correct the problems. And as we increasingly realize that the phenomenon of global warming is real, it is becoming clear that this phenomenon may further affect rainfall patterns and water availability in various and complex ways that we don't yet really understand - but which will certainly exacerbate an already dire water situation.

However, as our water problems grow, so do the opportunities for the broader commercial water industry to provide solutions. These opportunities, and the forces that are shaping the commercial water industry, are the focus of this report. From an investment perspective, the "water business" is booming. Valuations of publicly traded water stocks remain at high levels, countless strategic and financial investors are seeking to enter the business, and the wave of mergers and acquisitions continues unabated - and at stratospheric valuation levels. Water-related investment funds grew an average of almost 40% during the year versus overall market growth of only 10% to 12%, with some individual funds up more.

At the same time, the commercial water industry continues to undergo rapid and tumultuous change. Given the dramatic growth in regulation, extensive ownership changes, growing public awareness and concern, and inexorably rising prices - change is likely to be the one constant in this business into the foreseeable future.

In this annual review, we try to delineate and make sense out of all of these rapid and sometimes paradoxical developments - to distill the key trends and drivers (see below) which characterize the \$400 billion world market, and to succinctly highlight the critical issues which we believe will shape the future of the water business. We first highlight the nature of world water challenges and then talk a little about the size and definition of the water market. This is followed by a section which describes the key industry drivers behind the current growth in the market. The body of the report is contained in the section, beginning on page 9, which discusses in more detail the key trends and developments that characterize the business today - trends which we believe will be important determinants of success in the future. Finally, an outlook sec-

tion reviews the opinions and prognostications of various industry leaders, followed by a brief conclusion.

The World Water Challenge: How Bad Is It? Over the course of human development, and particularly during the last several hundred years, man has severely altered and damaged the earth's natural hydrologic cycle. The water dilemma in which we find ourselves today has resulted from centuries of unfettered industrial expansion, exploding population *growth*, population *shifts* to more arid regions - and perhaps worst - a nonchalant, uninformed, and unfortunately continuing belief that our standard of living can continue to increase forever, while environmental impacts will somehow take care of themselves. The impact on water resources comes from all corners of our modern society - our industrial economy has caused vast chemical pollution of most of the world's natural waterways; tens of thousands of dams have changed the course of natural waterways for flood control and irrigation purposes; extensive irrigation programs have turned arid regions into arable farmland; and double-cropping practices to maximize agricultural yield have drawn down natural aquifers at accelerated rates. Perhaps most significantly, the increasing combustion of fossil fuels is inexorably leading to the warming of the planet - and we are only beginning to understand the potential long-run effects on the hydrologic cycle and other natural systems.

Widespread recognition and understanding of our impact on the natural hydrologic system has been slow to develop. However, the past decade has seen a plethora of reports and "doomsday" forecasts for future water availability - *TEBS* has cited many of these reports as they have poured forth from the Federal government, trade associations, and international think tanks. And the prognosis continues to get worse. For example, a recent World Bank report suggested that India will essentially run out of sufficient water within two decades. In 2005, the EPA produced perhaps the most widely cited study in terms of the U.S. situation - the Drinking Water Infrastructure Needs Survey and Assessment - which called for the investment of \$277 billion over the next twenty years, simply to maintain our drinking water infrastructure at acceptable levels. Stories about water quality and quantity problems appear increasingly on the front pages of the mainstream media as well.

To briefly summarize the depth and magnitude of the world's water problems, consider a few simple facts:

- many of the world's cities still dump their untreated sewage directly into the natural waterways or the ocean. A visit to coastal mega-cities like Lagos or Sao Paulo makes one marvel at the natural treatment capacity of our oceans - given the amount of raw sewage that is discharged directly into the oceans, it is remarkable that they are still relatively clean in many areas.
- the United Nations estimates that more than 10 million people a year die from drinking unsanitary water. This is obviously a difficult statistic to accurately measure, since so many diseases can be transmitted, one way or the other, through unsanitary water conditions. However, there can be no doubt that millions and millions continue to die as a direct result of dirty water.

- two and a half billion people around the world have no access to basic sanitation
- 45,000 dams around the world are estimated to have displaced some 80 million people. The vast recent dam constructions in China are only the most visible such projects. The ecological or social impacts of these large dams are long-lasting, while their economically useful lives may be relatively short.
- there are some 79,000 dams in the U.S. which are categorized as "large" - many of which are no longer functional or safe. It is increasingly realized that it will be a lot cheaper to remove these rather than to try to fix them. However, dam decommissioning and removal is an infant field - only some 500, mostly much smaller, dams have actually been removed.
- natural wetlands - ecologically designed to regulate and clean our surface waterways - are being lost at a record rate.
- underground aquifers around the world are being depleted at a much higher rate than natural processes can replenish them - and the long-term impact for agriculture and world food supplies is potentially catastrophic. We "eat" a lot more water than we drink - the contained water content of different types of food may suggest radically different agricultural and international trade patterns in the future. (Indeed, this concept of comparative advantage in agriculture - growing more water-intensive crops in wetter regions and more water-efficient crops in drier regions - is a macroeconomic concept of growing interest, but it would obviously require massive shifts in internal trade, and is well beyond the scope of our discussion here.)
- there are also numerous secondary effects of growing water shortages. For example, as aquifers run dry, not only do inhabitants above run out of water, but the ground they live on may also begin to collapse - this is becoming a significant problem in certain cities around the world; and finally,
- finally, as a grim summary of the various points listed above, it is now widely predicted that about half of the world's population will live with chronic water shortages by the year 2050.

In short, we are rapidly creating a situation of severe "water stress" in many parts of the world. And it goes without saying that water stress will inevitably lead to political stress - it already *is* in many parts of the world.

As opposed to other broad environmental problems like air pollution and global warming, water problems - and solutions - tend to be regional in nature, and in many cases are specific to individual watershed basins. If China burns less coal, air pollution problems in Japan may improve; however, better water conservation practices in the western U.S. are not going to do much to alleviate water shortages in southern India. There are 260 major river basins in the world that cross 145 national boundaries. Some sixty percent of the world's population lives within those 260 basins. This simple fact makes it pretty clear that we are facing serious political problems in the water arena in the future. Pondering how to deal with the world's water problems brings to mind the old political bumper sticker - "think globally, act locally."

And its not as if political conflicts over water are some sort of phenomena perhaps waiting to happen in the future; they have been going on for thousands of years already, and there

40 Publicly Traded Companies With Interests in the Water Industry

Company	Symbol	Revenues	Income	Market Cap.
		\$(mil's)	\$(mil's)	\$(mil's)
American States	awr	254	22.3	639
Ameron	amn	748	52	692
Aqua America	wtr	520	88	2934
Artesian Resources	artna	47	6.2	117
Badger Meter	bmi	237	9.5	388
Basin Water	bwtr	18	-3	144
Calgon Carbon	ccc	308	-7	221
California Water	cwt	332	24.8	848
Clarcor	clc	913	81	1729
Clorox	clx	4700	447	9792
Danaher	dhr	9200	1050	23340
Dionex	dnex	296	35.4	1092
FlowServe	fls	2920	94	2953
Fluor	flr	14410	248	6892
Franklin Electric	fele	554	56.3	1135
Gorman-Rupp	grc	270	20	543
Insituform Tech.	insu	588	18.5	746
ITT Industries	itt	7990	286	11008
Layne Christenson	layn	676	23	514
Lindsay Mfg.	lnn	238	13	358
Metpro	mpr	91.5	7.4	163
Middlesex Water	msex	81	10	224
Millipore	mil	1130	80	3649
Mueller Water	mwa	1930	10	1615
Nalco Holding	nlc	3520	86	3166
Northwest Pipe	nwp	326	17.4	233
Pall	pll	2080	145	4211
Pentair	pnr	3140	184	3029
PW Eagle	pwei	791	97	395
Robbins & Myers	rnb	641	21	734
SJW Corporation	sjw	188	24	696
Southwest Water	swwc	218	8	300
Suez SA	sze	58530	4110	62230
Tetra Tech	ttek	959	36.5	994
Thermo Fisher	tmo	2860	197	7750
URS	urs	4220	113	2191
Valmont Industries	vmi	1260	57	1340
Vermont Pure Hldgs.	vps	62	2	38
Veolia Environne.	ve	35410	918	27093
Watts Water Tech.	wts	1140	74	1342

are a number of "hot spots" around the world that could explode today. For example, India has strained relations with both its eastern and western neighbors - Bangladesh and Pakistan - over the two key watersheds that flow into those countries, the Ganges and the Indus. The Jordan River arises on the Syrian-Lebanese border and is used by Jordan, Israel, and the Palestinian territories - not much more needs to be said in that regard. Nine often contentious countries depend upon the Nile for most of their water.

In this context, it is worth underlining the fact that the more pervasive problem of global warming is likely to have significant effects on water availability, and the natural hydrologic

system around the world. We have all heard the old saying - "everyone is always complaining about the weather, but no one ever does anything about it." Well, it's beginning to appear that indeed we have done something about the weather - we're making it warmer. Today, we don't even begin to understand the breadth and severity of the potential impacts of significant global warming on the hydrologic cycle, and the extent of possible long-term impacts on the world's water supply. If global warming continues, as seems virtually unavoidable over at least the next several decades, we face a whole range of poorly understood - and possibly, currently unforeseen - new challenges.

So, are we finally facing the real "revenge of Malthus?" The infamous Club of Rome report *The Limits to Growth* in the early 1970s focused the world's attention on the issues of depleting natural resources, and caused a huge international furor - yet it hardly even talked about water. The quantity of water on the earth can't really be increased or decreased, although we can have an impact on the amount of "usable" water - we can contaminate some water so much that it is no longer usable, and we can clean some sources of water, like seawater, such that they become more usable. However, in many parts of the world, we're hitting ourselves with a "double whammy" - by decreasing the quality, we are effectively decreasing the quantity. And in this brief discussion, we don't even really try to touch on the potentially vast political and social impacts of growing water shortages - and the fact that the poor are often forced to pay the most for their water, while the rich often pay next to nothing.

As some wise person once said - "it is difficult to make predictions, especially about the future." Many observers today still seem to worry about "crying wolf" in terms of the world's water situation. However, it is clear that as the world's population continues to grow, and as we continue to pollute and disrupt the earth's natural water systems, we are headed towards a true global water crisis. Many of the issues mentioned above are inevitably going to boil over in the future - perhaps in the quite near future - and they should be top policy priorities for governments around the world.

(Several of the facts and figures cited above are taken from the "Water Atlas" published by The New Press in 2004.)

The Water Industry: What Is It? How Big Is It? Although we all casually refer to the "water industry," there is of course, strictly speaking, no such thing. What there is instead is a teeming bazaar of many fundamentally quite different businesses that all have something to do with delivery of clean water - but which can't quite be accurately classified under any single heading. As we loosely use it, the "water industry" includes a very broad array of sectors - new technology developers, concrete pipe manufacturers, specialty chemical producers, measurement and monitoring firms, tank manufacturers, treatment equipment manufacturers, manufacturer's representatives who sell all of these things to different end users, engineers and consultants of all stripes, testing laboratories, contract operators of water plants, and many others - companies whose only real similarity is that they are somehow involved in the process of providing clean water.

A diffuse and fragmented industry like the water and wastewater treatment business is very difficult to classify. Obviously, when it is difficult to even define an industry accurately, it is going to be even more difficult - if not impossible - to accurately estimate its size, growth characteristics and other market attributes. Nonetheless, there are some conventional wisdoms and some rough market statistics for the overall water-related business. The size of the domestic U.S. water and wastewater industry is generally estimated at around \$100 billion per year, as summarized from one source in the Table below.

An analysis of these summary figures, and the more detailed data behind them, reveals many interesting insights. First, note that the fees that individuals and businesses pay to utilities for primary water and sewage services comprise almost two-thirds of total annual spending on water in this country. The vast majority of these revenues pass through municipal and public agencies - some 55,000 water utilities and about 16,000 wastewater utilities - not private companies. Notice also that the right-hand column of this table serves to underline the disparity just discussed - projected longer-term growth rates for different sectors of the overall water-related industries range all the way from two to ten percent per year. And certain specific "sub-niche" areas that are not broken out here - such as the membrane filtration or ultraviolet radiation treatment technologies - may be growing at much higher rates, possibly in excess of 15% per year. Finally, the growth rates of individual sectors are themselves experiencing slow but perceptible change. For example, even though water treatment chemicals comprise a very large market, the average growth rate of this sector is widely assumed to be slowly declining. Likewise, it appears likely that the explosive recent growth of the contract operations business will slow somewhat as that sector matures, particularly if public opposition to privatization increases.

**The U.S. Water Industry
(Revenues in Millions)**

Business Segment	2005 Revenue	'06 - '08 Growth
Water Treatment Equipment	\$9,110	6% - 8%
Delivery Equipment	\$11,660	3% - 5%
Chemicals	\$4,020	2% - 3%
Contract Operations	\$2,350	6% - 8%
Consulting/Engineering	\$7,460	5% - 8%
Maintenance Services	\$1,780	4% - 6%
Instruments and Testing	\$1,400	4% - 5%
Wastewater Utilities	\$34,130	4% - 6%
Drinking Water Utilities	\$35,070	3% - 5%
Total U.S. Water Industry	\$106,980	4% - 7%

Adapted from the Environmental Business Journal, 2006

On the other hand, growth *rates* in traditionally less glamorous infrastructure sectors like pipe rehabilitation are likely to increase in the future, as more and more capital is inevitably poured into maintaining and upgrading the nation's infrastructure. A high percentage of future spending will be going into things like steel and concrete pipe, pumps and valves and storage tanks. This may not be the "sexy" side of the busi-

ness, and the companies in this sector are not yet attracting as much attention from the Wall Street analysts - but this is where many of the dollars will be going. A recent study suggested that trenchless pipe renovation will likely grow to \$5 billion annually within the next several years - a growth of 500% from current levels.

In summary, the growth of the overall "business" will probably continue to hover in the neighborhood of 5% to 7% a year - a little in excess of GNP or population growth rates. For strategic planning and analytical purposes, it is more meaningful to talk about the growth and profitability characteristics of individual market sectors.

If market data for the U.S. market is sparse, then information for most of the rest of the world is truly speculative. However, while the U.S. is clearly the world's largest individual market, it is increasingly very clear that opportunities abound for water companies in the rest of the world. Most knowledgeable observers believe that the world market is about three to four times the size of the U.S. market - this seems to be emerging as the conventional wisdom. Several reputable parties have pegged the level of world business at around this level. The English publication *Global Water Intelligence* recently presented a set of assumptions that estimated a global market size of \$420 billion per year.

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Many business consultants and analysts have casually predicted exploding growth for the water industry in the near-term future; however, at least in most sectors of the business, the real situation to date has been more one of lower but very consistent growth. There can be no doubt that fundamental supply and demand considerations, whether expressed in quantitative or qualitative terms, clearly suggest continuing - and probably accelerating - growth into the long-term future. Indeed, it is very difficult to construct any kind

of reasonable future scenario in which this industry will be characterized by anything *other than* very steady and sustained growth, and very attractive long-term business opportunities. However, on the other hand, would-be investors in this business need to understand that very few sectors are growing at the 15% to 20% rates that are often bandied about.

So, how big *is* the water market? The frank truth is that, even when we define individual sectors rather precisely and carefully total up the figures, we don't have a very good idea of just how big this business really is. Certain conventional wisdoms have taken hold within the industry, but it is typically difficult to document these estimates with much in the way of solid market data. In the final analysis, debating this figure is probably not very productive. Under any assumptions, the world water market is huge, and - perhaps most critically - many of the key geographic markets, such as China, are at an earlier and much more rapid stage of growth than is the United States. With a total market that is agreed to be somewhere in the range of hundreds of billions of dollars per year, and given the truly critical underlying needs and factors which are driving this market, individual firms don't really need to worry whether the world market is \$300 billion or \$400 billion a year. For most firms, rough estimates of specific end markets in certain geographical areas are much more meaningful - and more critical for good business planning.

The Water Business - Key Drivers and Trends: Several key factors - economic forces, social demands, and political realities - are driving the overall expansion and evolution of the broader water industry. These drivers, in turn, give rise to various trends and effects which will likely be key attributes of the global water business for years to come. The critical factors have not changed too much over the past few years although their relative significance continues to evolve. As we see them, the fundamental drivers include the following:

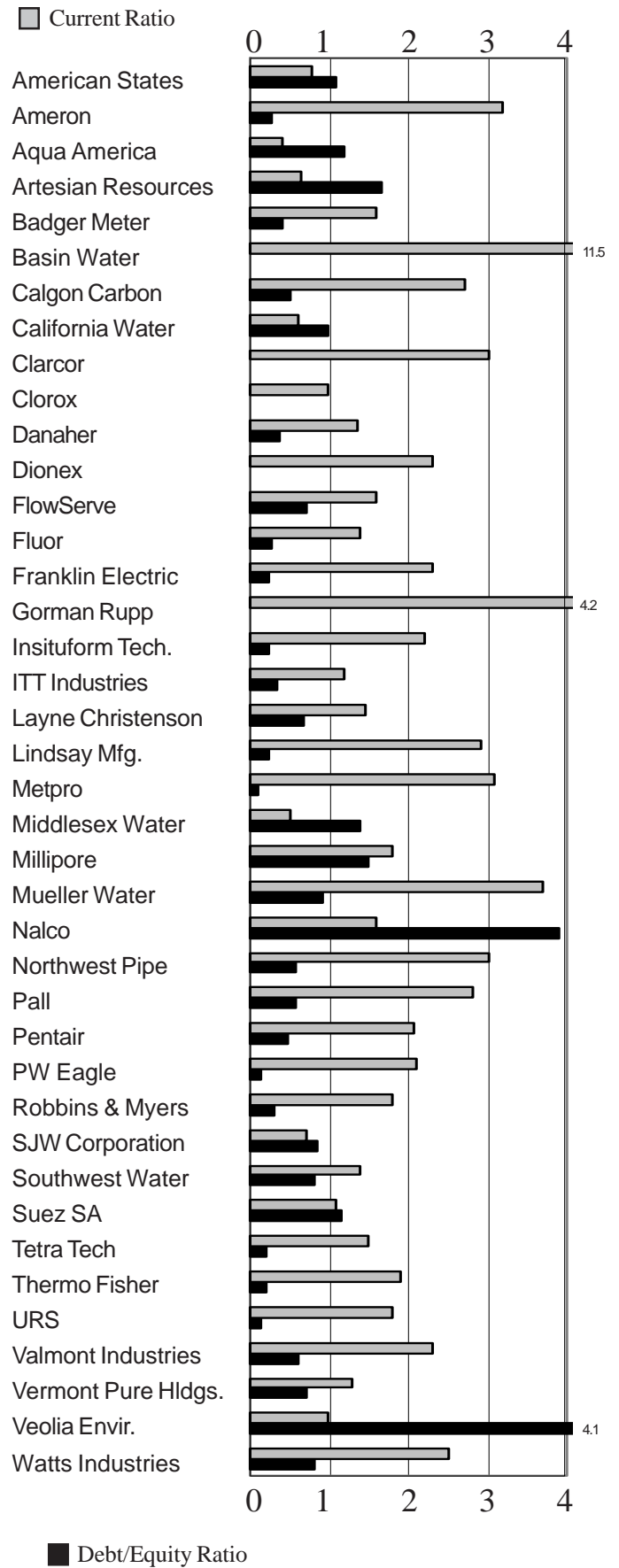
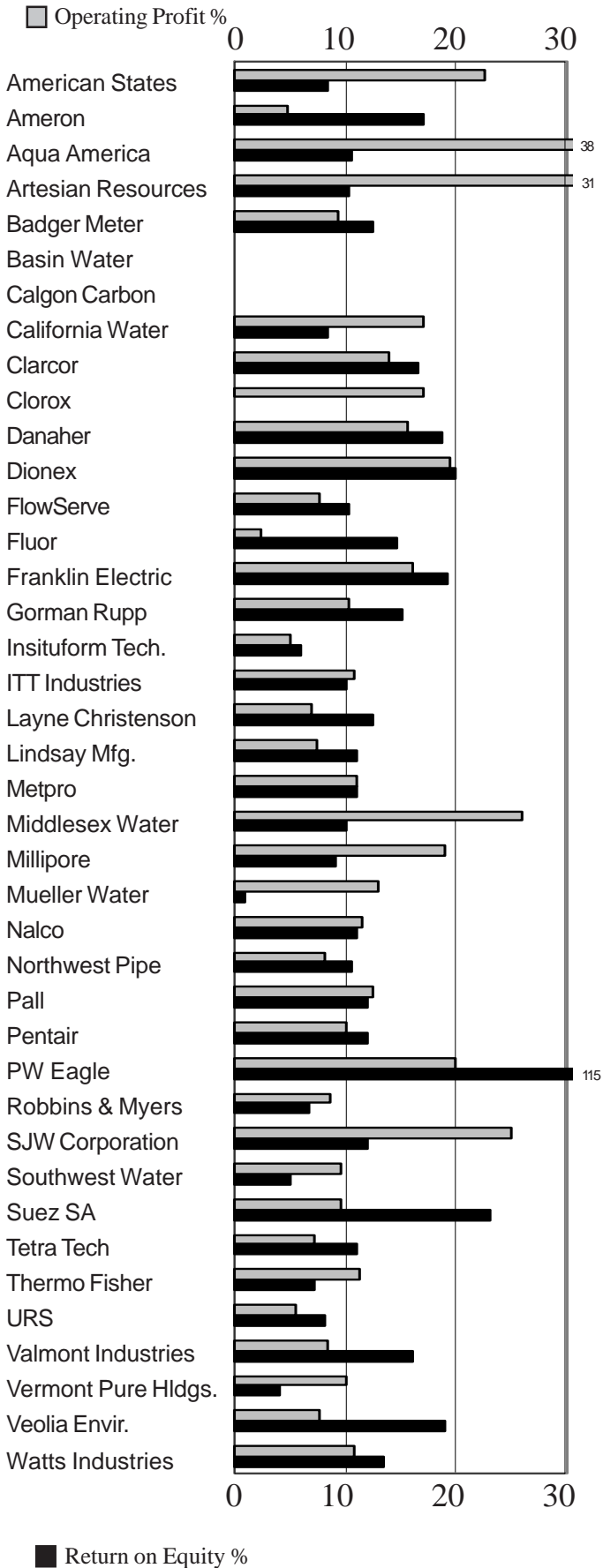
- Water Quality and Scarcity Problems Are Truly Reaching Crisis Proportions, Worldwide: Given all of the discussion above, this is pretty obvious. However, we should start at the beginning - and water quality and scarcity problems are the main concern and driver behind the challenges, all of the regulations, all of the commercial business opportunities and ultimately, the projected growth for the water business over the coming decades.

Clearly, the world has both significant water quantity and water quality problems, but the quantity aspect of this equation - the absolute scarcity of water - is beginning to take on an even greater urgency in many regions. As mentioned above, dozens of reports and studies have pinpointed the fundamental lack of clean water as one of the most serious long-term threats facing mankind. One can scarcely pick up a news magazine or the daily newspaper without seeing an article about water problems. The United Nations Millennium Development Goals identified access to clean drinking water as one of the primary international objectives of this century, asserting that the world should "halve by 2015 the proportion of people without sustainable access to safe drinking water" - a goal that few expect to be achieved. Although it has become commonplace, and even somewhat trite, to de-

(Continued on Page 9)

Profitability & Performance

Balance Sheet Information



Note: Where there is no bar, the number is zero or has a negative value.

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Financial Performance of Water Companies

(Note: The data used to construct the charts and analysis on pages 6 through 8 are from late January, 2007; sources and definition of the various data utilized herein are summarized in the box on page 19.)

The portfolio of publicly traded and water-related companies that is shown in these pages has once again changed somewhat since last year, with the on-going consolidation of the industry. Gone are MPW – a contract services company; Water Pik – which was acquired by a consortium of private equity buyers about a year ago; and Glacier Water – a company which we had followed for several years, but whose gradual decline eventually caused it to be removed from the major stock exchanges. Replacing these firms this year are three new companies. First is Mueller Water Products, a large spin-off in early 2006 from Walter Industries, that was by far the largest water company to come onto the public markets in the last couple of years. The company manufactures and sells various water infrastructure and flow control products for use in water distribution networks, water and wastewater treatment facilities, and gas distribution and piping systems in the United States and Canada. Mueller Water has almost \$2 billion in annual revenues, making it one of the larger companies we follow.

Also included here for the first time is PW Eagle – an Oregon-based manufacturer manufacture and distributor of polyvinyl chloride (PVC) pipe and fittings in the United States. The company's pressure and nonpressure PVC products consist of PVC pipe for applications in the building, municipal water distribution, municipal sewage collection, turf and agriculture irrigation, power distribution, and telecommunications industries. At press time, PW Eagle announced a potential merger with J-M Manufacturing.

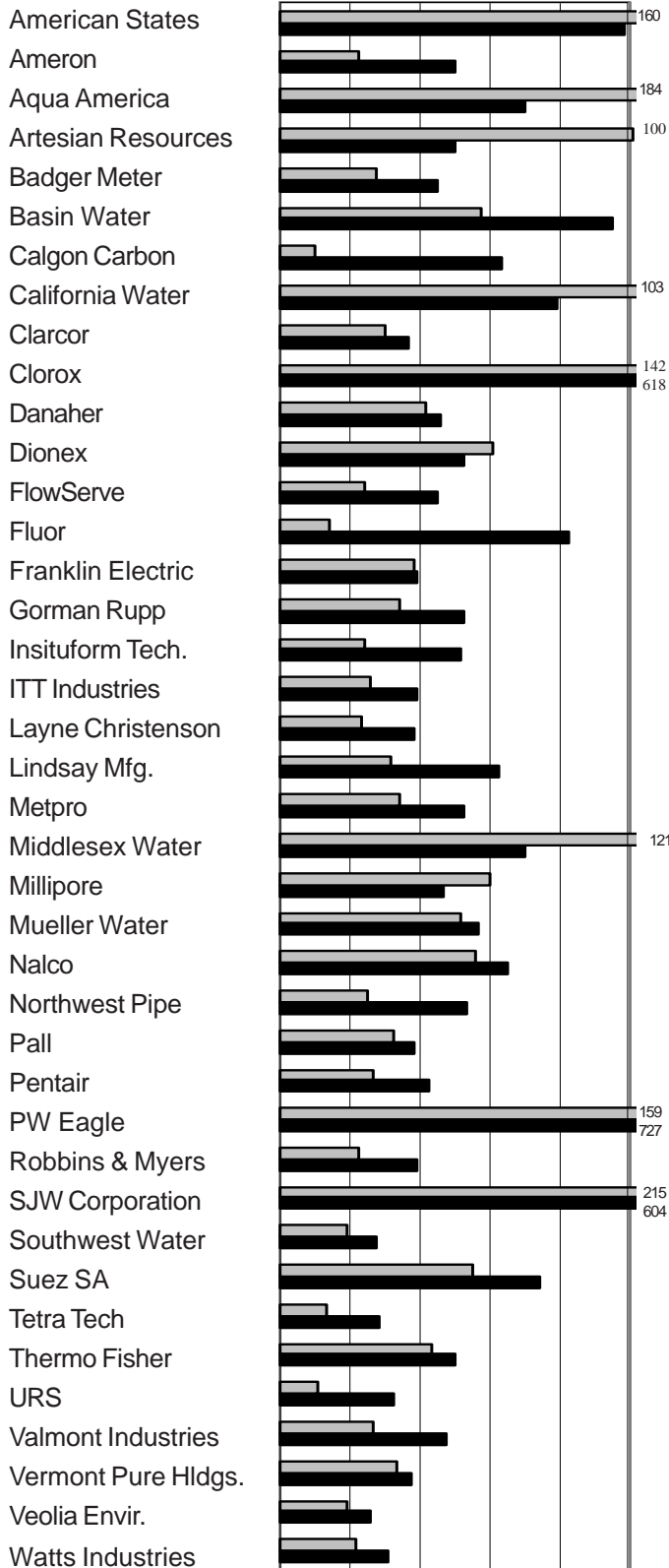
Finally, we also include Basin Water in our portfolio here for the first time. Basin Water was also a new IPO in 2006, though far smaller than the Mueller deal mentioned above. This company is involved with the design, building, and implementation of groundwater treatment systems in the United States. It offers a proprietary ion-exchange well-head treatment system that reduces groundwater contaminant levels. The system is used to treat a range of contaminants, including arsenic, nitrate, and perchlorate. Basin Water currently has about \$20 million in annual revenues.

The right-hand table on page 8 highlights a number of water firms which are trading at or near their 52 week highs – not unexpected, given the strength in the overall market during the latter part of 2006 and so far in 2007. The left-hand table on page 8 is also a reflection of the price of the individual company's stock; many water firms show a P/E ratio of between 15 and 20. This chart serves to underline the point, made elsewhere in this issue, that different sectors of the water "industry" have very different characteristics – including different valuation levels as measured by the public markets. On the year, the publicly traded utilities have generally been up – although not at the generally unsustainable levels that we saw about a year ago now.

Productivity Measures

■ EBITDA /Employee (000's)

0 20 40 60 80 100



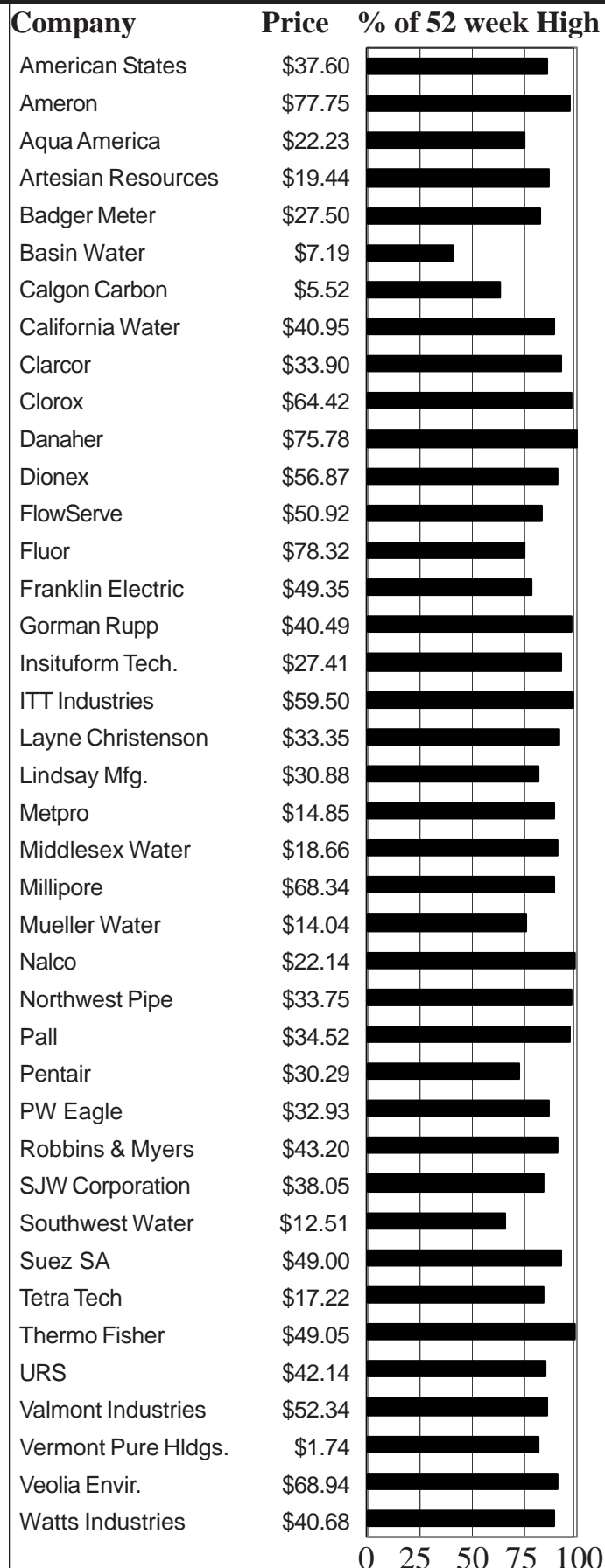
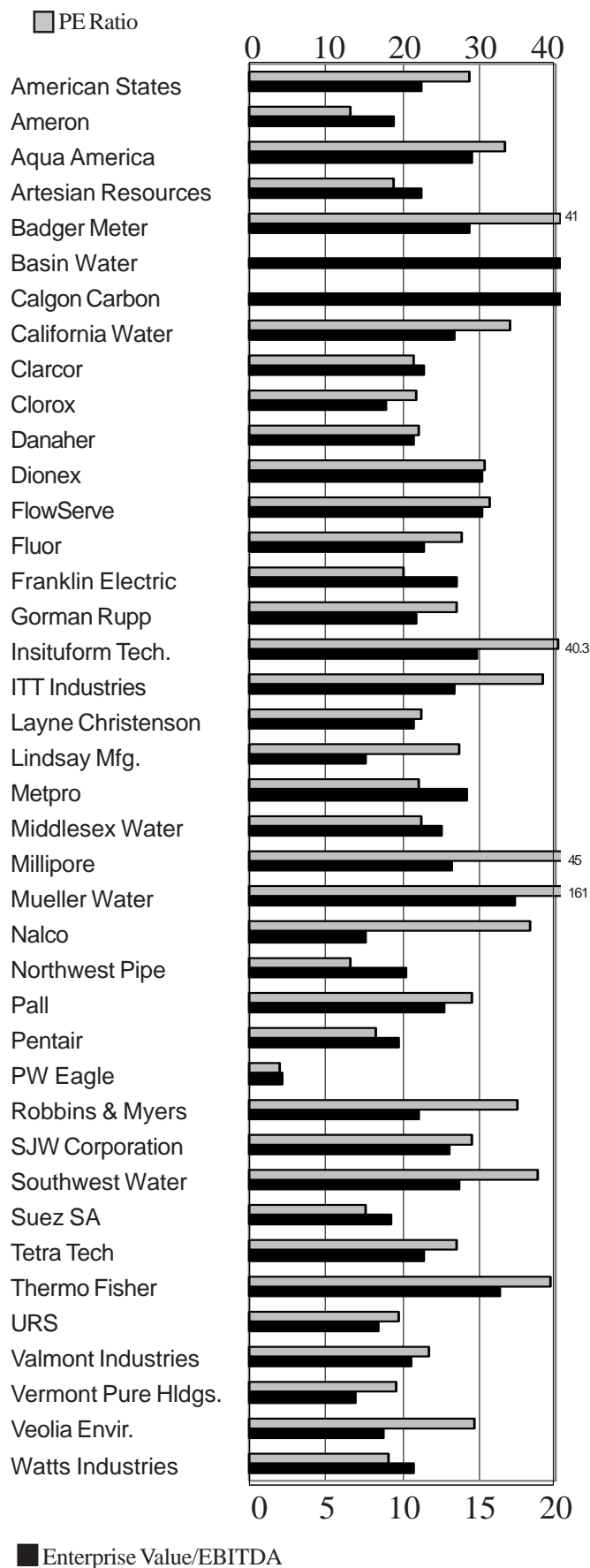
0 100 200 300 400 500

■ Revenues /Employee (000's)

Note: Where there is no bar, the number is zero or has a negative value.

Equity Valuations

Stock Price Performance



Note: Where there is no bar, the number is zero or has a negative value.

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(Continued from Page 5)

scribe water - in terms of economic and political significance - as "the oil of the 21st century," it could well turn out to be true.

• **More Significantly, Public Awareness And Understanding of Water Problems is Increasing:** As these water scarcity and quality problems have become more serious and more apparent, the public has gradually become better informed - and increasingly concerned about the water problems that may be passed on to future generations. Again, one needs only to look at the front pages of the popular media to see how broad and widespread this recognition is becoming. And as the general populace becomes more aware and concerned about water, public demands and perceptions will become more important drivers. A clear, if somewhat misinformed, reflection of this growing concern is the explosive growth of the bottled water industry over the past few years - discussed in more detail below. Although we believe that additional and massive public education programs are still required around the world to inform the public of the real nature of our water quality and quantity problems, general water issues *are* gradually getting more attention.

• **Regulation and Enforcement are Increasing, and New Policies and Approaches are Emerging:** As public awareness and concerns about water grow, they are inexorably translated into greater government review, legislation, regulatory control, and enforcement. As opposed to the arena of broader environmental legislation - where public interest, regulation and enforcement have waxed and waned during the past three decades - when it comes to drinking water, the American public seems insistent upon ever-stronger and broader regulatory protection.

Huge volumes of new regulations have been promulgated by Federal and state agencies over the past couple of decades. Public agencies and private companies struggle to understand and comply with this rapidly expanding and ever more complex regulatory machinery - and it has become a major cost to the public water and wastewater utilities. *The Journal of the AWWA* recently described water regulations as an "immense regulatory maze and administrative superstructure that ... may be at risk of collapsing under its own weight." Regulatory controls are becoming stronger in almost every other region of the globe as well.

Nonetheless, even in the economically most advanced, and most highly regulated countries like the United States, water pollution problems continue to grow and new water contamination issues continue to be uncovered. One recent study - the Environmental Working Group's *National Assessment of Tap Water Quality* - found that "tap water in 42 states is contaminated with more than 140 unregulated chemicals that lack safety standards," and suggested that EPA should be doing a far more thorough job of regulating drinking water - above and beyond the vast regulatory and control infrastructure that we already have in place. The whole new arena of "xenobiotic" contaminants - man-made health, beauty and medical compounds that are now being found in natural waterways - have only recently been detectable at all, and raise many new questions about ultimate impact on human health.

Overlying all of these traditionally regulated areas is growing concern about potentially "introduced" compounds in water distribution systems - terrorist activities, and other security concerns regarding contamination of primary drinking water supplies which have arisen in the last few years. This has raised another key concern in the water utility industry, and an area of new opportunity for monitoring and testing companies. Despite all of the advances in clean water that have been accomplished over the last fifty years, there is still essentially no monitoring of drinking water in the distribution system - monitoring the quality of water once it leaves the treatment plant and runs out into more than a million miles of underground distribution system piping. This is an area that will probably be the subject of considerable new regulation, and a commercial opportunity that will likely boom during the next several years.

• **Huge Economic (and Human) Capital Investments are Required - and Much More Focus is Needed:** In order for municipalities and industry to comply with all these expanding regulations, and in order for the country to maintain and expand the necessary drinking water and wastewater treatment infrastructure, huge capital expenditures will be required into the long-term future. Numerous and extensive studies have predicted how large this collective expenditure must be, and it is certainly in the range of hundreds of billions of dollars over the next two decades. The so-called "spending gap" - the difference between the current amount of U.S. infrastructure spending, and the levels that may be required to really maintain that infrastructure into the longer-term future - continues to increase. Where all the money to address these issues will actually come from is an increasing conundrum.

The impending question of *how* - not if - we should fund these required capital expenditures is likely to turn into a huge and contentious political debate in coming years. For example, the large metropolitan centers that often have the oldest and most run-down infrastructure with the greatest capital needs, are often the very same areas with shrinking center-city populations and a declining tax base. It seems likely that the Federal government will eventually have to step in to the middle of this issue, although it may require major public health crises before that begins to happen. These required billions and billions of investment dollars will represent a huge and unresolved future crisis for the United States - but they also constitute a huge opportunity for firms serving the water and wastewater treatment industry.

Resultant Trends and Developments: These four interlocking industry drivers in turn give rise to various trends and developments in the commercial water business - with respect to supply, demand, market and competitive conditions, and in terms of how we manage and utilize our increasingly precious water resources. These key trends, some of which we have described in detail in past reports, are highlighted below:

• **Out-sourcing or "Privatization" Continues - But Remains Controversial, Particularly in the United States:** "Privatization" has been replaced by "public-private partner-

ship" not only in the lingo, but also in terms of the operating philosophy that must be practiced in order for such ventures to be successful. Regardless of what they are called, the out-sourcing of water and wastewater operations constitutes one of the more controversial aspects of the water industry today.

In many parts of the world, private operation of drinking water assets is taken for granted, and is the operational norm. The French - and more recently the British - are the world's major players in terms of private water management and operation. Privatization and contract water operations are significant and growing in many other parts of the world. *Global Water Intelligence* reports that about 10% percent of the world's population is currently served by private operators - a figure which is expected to grow to 16% by 2015. More than 45% of the population in western Europe is now served by private operators, with rapid growth occurring in the Mediterranean and North African regions.

In the United States, roughly ten percent of the population is provided water by private companies of one sort or another. However, the highly publicized misfortunes of several large privatization projects, combined with an active and growing opposition movement, have begun to force a reassessment of water and wastewater privatization in the U.S. Unfortunately, we tend to get more of the negative news in the popular press. However, there are also a considerable number of success stories, even in South America, where much of the negative publicity about privatization has originated. Nevertheless, privatization of significant drinking water and wastewater utilities, at least large ones, seems to be facing an uphill battle in the United States at the moment - and the U.S. is really quite different in that regard. One European report accuses the United States of maintaining a "bunker mentality" in terms of what seems to be clearly needed increasing levels of privatization in order to maintain drinking water infrastructure.

The arguments *against* privatization of water assets revolve around concerns about the motives of private, for-profit firms, and the sense that access to clean water, as a basic human right, should be equitably allocated and priced. Within such broad confines, there is clearly plenty of room for reasonable people to debate and disagree. Many people simply believe that water resources are a part of our natural heritage which should not be entrusted to private companies to own, manage and disburse. Given the isolationist attitudes that have built since 9/11, the fact that many of the contract operators are foreign-owned companies has led to further concern and suspicion amongst the U.S. public.

On the other hand, the basic economic drivers *supporting* privatization remain strong and growing. Few municipalities enjoy over-flowing coffers, and few public officials who wish to be re-elected want big tax increases on their watch. Most public works managers are between a rock and a hard place - technical requirements, regulatory complexities and overall costs continue to increase, while the general public remains resistant to increasing taxes and users fees. The perception that water is a free good persists, and it may take some severe water shortages or public health disasters before the

public realizes that this just isn't true. As the contract operations firms point out, the best solution to this intensifying dilemma may be to turn to private companies to finance, build and operate their water or wastewater systems. In our opinion, and at the end of the day, this seems likely to happen.

In summary, despite the cries and concerns of labor organizations and various public interest groups, the urgency of infrastructural needs and the political difficulties of increasing taxes make it likely that privatization, under various names, will continue to grow - in this country and around the world. Although the growth rate of out-sourcing of municipal operations has slowed a bit over the last few years, the fundamental drivers behind privatization *and consolidation* - huge capital needs, technological and operational synergies, limited public funds and a widespread aversion to higher taxation - remain strong. At the same time, it is clear that private operators are going to be judged by a very demanding and critical public.

Elsewhere in this report, we discuss the trend towards greater consolidation in the private and industrial side of the commercial water industry. There is growing recognition and discussion of the fact that, in many areas, consolidation on the municipal side of the industry would make economic sense too - with many tiny utilities are struggling individually to keep up in an increasingly complex technological and regulatory environment. However, this is an area fraught with political sensitivities, and little is happening so far.

Finally, it is worth noting that after a decade or more living under the "threat" of privatization, many public agencies and utilities have made substantial progress in terms of undertaking needed productivity improvements and cost reductions - a sort of "de facto" privatization. One way or another, water and wastewater agencies are gradually becoming more competitive and efficient.

• **"Musical Chairs" in the Industry - Ownership Rearrangement and Consolidation Continues:** One major impact of the exploding investment interest in the water industry has been a trend towards consolidation on the vendor side of the business, and an on-going rearrangement of ownership of key industry assets. This has almost resembled a game of "musical chairs" during the last several years. Many major international companies have sought to strategically position themselves to exploit the opportunities offered by this growing business.

First came the widely discussed "foreign invasion" of the U.S. water industry in the 1990s - with British, French and German companies buying up many of the large players in the U.S. business. This phenomenon began to reverse direction in the early part of this decade; these early and largely foreign-based consolidators were replaced by major U.S. industrial corporations, who began to make dramatic moves to acquire assets in the water treatment and purification business in 2001 and 2002. Veolia, Suez, RWE, and the other major European water companies continue to exit all but their out-sourcing businesses in the U.S., while industrial firms such as General Electric, Danaher, ITT, Pentair and 3M are emerging as the new diversified water service and equip-

ment companies. There were fewer "block-buster" deals during 2006 than in previous years - but this is probably more reflective of a dearth of pure-play acquisition opportunities in the United States than it is a lull in strategic interest levels.

The "big deal" of the year came in March, when - not unexpectedly - GE Water announced that it would acquire Zenon Environmental of Canada. Zenon was the major remaining independent membrane manufacturer, and a leader in the rapidly growing hollow-fiber membrane bioreactor (MBR) field. More surprising than the deal itself was the steep price which GE once again paid to get the asset that it coveted - \$650 million for a \$200 million revenue company that had never really generated significant or sustainable earnings. Valuations aside, GE has now built one of the largest water treatment and desalination companies in the world, and is generally the force to be reckoned with on many major projects. Unfortunately, one fall-out of the high prices that GE and other companies have recently paid for water companies is that they have left in their wake an unrealistic set of value expectations for thousands of smaller technology developers, inventors, and tinkerers, who all think their "better mouse-traps" should be worth twelve to fifteen times EBITDA.

Another closely watched deal which closed in 2006 was the sale of residential treatment system manufacturer Kinetico. After a lengthy sale process, the company was ultimately acquired by the U.S. arm of Axel Johnson - one of the largest privately owned companies in Sweden. Axel Johnson had already been a rather silent participant in the U.S. water business - owning the Florida-based treatment equipment company Parkson, Inc. Interestingly, Axel Johnson also recently sold off its wastewater services firm, ADS Environmental.

Although "block-buster" deals were fewer in number this year, smaller deals have continued apace. Pentair made several small acquisitions, including Krystal Klear, a maker of filter housings. Siemens just announced the acquisition of four relatively small water companies, continuing its strategy of adding pieces to fill out and complete its already broadly diversified equipment and service offerings. One new buyer this year was Ashland - the oil refining company based in Columbus - which acquired some Chinese industrial water businesses as well as the \$250 million water treatment chemicals business of German industrial giant Degussa AG. The new parent company of ADS Environmental, the equity capital-backed Nova Analytics, was also an active acquirer during the year, picking up a number of water/wastewater and instrumentation related businesses, including the pipeline division of Severn Trent Services. The Quebec company GL&V continued its purchasing spree - having now conducted nine acquisitions over the past year and a half - most recently buying Enviroquip and process equipment manufacturer Krebs International. (See the special insert page for a more detailed listing of key water transactions over the past several years.)

We tend to focus on activity in the United States, but consolidation activity was perhaps more intense outside of the US this year. Several firms made significant acquisitions to try

to further their strategic footprint in the expanding international water markets. Kelda of Great Britain sold its Connecticut-based Aquarion business to Australia's Macquarie Bank, Limited - another emerging buyer, particularly on the infrastructure side of things. Numerous infrastructure players in the United Kingdom and western Europe have bought and sold very significant assets during the past twelve months, with perhaps the biggest deal currently unfolding between Suez and Gaz de France.

With so many major industry assets changing hands so quickly - or even multiple times - the competitive situation in the water treatment equipment industry is very "fluid." The picture is gradually becoming clearer, but the key question remains - which of these companies will ultimately be the major players in the next generation of this industry? Most observers are betting on the various diversified companies mentioned above - ITT Industries, GE Water, Pentair, Siemens and perhaps several others who have not yet made their first move. But several big questions remain - how can companies like RWE that were such committed buyers a few short years ago turn into such eager sellers? What was wrong with their strategies? Will the new owners of these assets have sounder strategies? And most importantly, what will be the ultimate impact of this large-scale ownership rearrangement on employees, shareholders, and customers?

When we talk of industry consolidation, it is usually within the context of private companies - the "commercial" sector of the business. However, as the efficiencies and economies of scale of larger operations continue to grow, it seems increasingly possible - indeed necessary - that we will begin to see consolidation within the municipal utility sector as well. As observers are increasingly pointing out, it just makes too much sense for it *not* to happen.

Water and wastewater treatment are both very capital intensive businesses, and there is no doubt that scale conveys a distinct operating, technical and financial advantage. Yet, the municipal side of the business continues to be made up primarily of very small local players - almost 85% of all municipal systems are categorized as "small." As the business becomes more and more complex and expensive to run, it seems that this must gradually change. We do see increasing consolidation amongst publicly-traded or private investor-owned utilities - but these companies represent only a small fragment of the overall infrastructure. It is politically and financially far more difficult to try to merge municipally or governmentally-owned systems - even though such mergers may make good economic sense.

And there are other questions in terms of the coalescence of smaller and local utilities into larger and larger "super-regional" utilities? How would a consolidation of the public water utility business affect the delivery of water and provision of sewerage services? Would such super-regional utilities privatize themselves, and or even look at floating public stock? Is it likely that we will see more water and hydro-power based utilities merging, to more effectively utilize their common resource and interest - water? Despite all of the unknowns, it seems likely that we will see more consideration of public utility consolidation in coming years.

• **A Strong Surge of Public and Private Equity Investment Interest in the Industry:** As the widespread recognition of water problems has increased, and as the corporate and strategic consolidation described above has blossomed, hundreds of other strategic and financial buyers have also swarmed into the industry in an attempt to establish a foothold. As is increasingly the case in most other sectors of the economy, the private equity (PE) community is rapidly making its presence and power felt in the water business. For example, it was recently reported that one out of every five workers in the British economy was employed by a private equity-controlled business - and the impact is headed in the same direction in the United States.

Private equity firms raised \$400 billion of new capital in 2006, and conducted deals worth over \$570 billion in just the first three quarters of the year - representing some 25% of all merger and acquisition transactions around the world. The size of private equity deals continues to spiral upwards - several deals in 2006 were in the \$30 billion plus range in terms of purchase price. With this kind of explosive activity, it is little wonder that private equity firms are also carefully combing through the water industry for attractive acquisitions.

Just a few short years ago, the bulk of private capital was chasing after internet and high-tech opportunities, and there seemed to be little interest in water or other environmental businesses. That, however, has distinctly changed. Today there are literally hundreds of PE firms looking to establish a position in the water equipment industry. As other investment opportunities faded, and as the amount of dollars in private equity funds has exploded - there has been a headlong rush into water-related businesses over the past two to three years. The total amount of capital sitting in private equity funds is at an all-time peak, and the availability to "stretch" that capital through additional borrowing has rarely been as attractive as it has been the last year or two. As a result, typical PE managers find themselves today with huge amounts of capital which they have to (relatively quickly) invest somewhere - and the water business is one attractive area in which to explore for good investment opportunities.

Skeptics continue to point out that fundamental opportunities in the water industry really haven't changed that much over the past few years; they suggest that the current interest in the industry is more a result of PE firms desperately looking for new places to put their huge sums of capital to work than it is a true interest in the water sector. However, this argument is rapidly fading, with more and more major investments in the water arena. This is particularly true for the infrastructure sector of the market - water utilities and broader treatment and distribution infrastructure - and particularly in foreign markets, where PE firms have taken huge stakes in several major players. Private ownership of several of the major British water utilities is perhaps the prime example of this trend.

The water industry is increasingly attractive to PE firms for several reasons. First, it is perceived to represent strong and very consistent growth over the long-term future - and certain sectors offer the allure of high profitability at the

same time. The stability and predictability of water utility businesses is the key factor behind the currently high level of interest in infrastructure-related water businesses. The water business offers another characteristic which PE firms typically seek - it is a relatively fragmented industry ripe for consolidation. This offers PE firms the opportunity to consolidate businesses together to build larger, stronger - and more valuable - companies. The only drawback from the PE firm's perspective is the huge premiums being paid for companies in this sector - something which financial buyers often cannot afford to do.

From the seller's perspective, the purported expertise of the PE community is its ability to recognize, acquire and enhance undervalued assets, and to run them in a strictly economic manner - attributes which many "sleepy" water companies could definitely benefit from. In addition, private equity firms can bring more than just money to the challenges facing small and privately-owned water companies - including extensive business operations experience, distribution and marketing contacts, and experience with the financial management and control systems which can help companies become more profitable. The PE investor can also bring a more stable operating environment, in which both the potential conflicts with a larger corporate owner, as well as the pressures of public ownership, are effectively removed. Finally, from the perspective of selling management, careers are much more secure than they might be in a sale to a strategic buyer - in fact, the PE firm will typically only do the deal if it is confident in the capabilities and the commitment of existing management.

Irrespective of the pros and cons of greater PE investment in the industry, various buyers *have* already been involved in several large transactions. Over the past couple of years, notable PE purchases have included Water Pik, Utilities, Inc., Nalco, Culligan Water and - more recently - some of the British water utilities. During this past year, the biggest and most talked about example has been MacQuarie's purchase of Thames Water for approximately \$15 billion, following the break-up of RWE's ill-fated water business. But there have also been many others, a few of which are shown in the Table below.

Major Private Equity Deals in the Water Industry

Seller	Buyer
RWE/Thames Water	MacQuarie
Severn Trent Laboratories	HIG Capital
Anglian Water	Consortium of Investors
Water Pik Technologies	Carlyle Group, Zodiac
Nuon/Utilities, Inc.	AIG Highstar Capital
Suez/Nalco Chemical	Blackstone, Apollo, Goldman Sachs, et. al.
US Filter/Culligan	Clayton, Dubilier & Rice
Bridgepoint/Alcontrol**	Candover Partners
East Surrey Water	Terra Firma Partners
Suez/Northumbrian	Aquavit Partners
RWE/F.B. Leopold	PNC Equity
RWE/Ashbrook Simon Hartley	Blue Sage Capital
US Filter/Waterworks*	Thomas Lee, J.P. Morgan, et.al.

* equity groups later sold business to Home Depot in 2005

** example of one equity group selling to another

A higher level of PE interest is clearly helping to push average valuations higher, and only time will tell just how many of these private equity groups will be able to exit their investments with a reasonable return. However, in at least a couple of circumstances, the PE holder has already exited at a handsome profit - for example, PNC Equity exited its Leopold investment at a price rumored to be twice what it paid, implying a huge return on investment after holding the property for less than two years.

Investment interest in water companies is not just a private equity phenomenon. There is also a greater interest in water investments by the broader public as well. Existing publicly-traded water stocks - though few in number in the United States - continue to be highly sought after by individual investors, as evidenced by continuing high valuations. We are also beginning to see a more active market for initial public offerings of stock in the broader water and related industries. Two significant IPOs occurred early in 2006; Mueller Water Products is a multi-billion revenue company operating in the distribution and infrastructural sector of the market, and Basin Water is a small groundwater treatment and remediation firm (see page 7 for more detail on these two companies). The imminent return of American Water Works to the public market, after its brief ownership by Thames/RWE - likely to occur in 2007 - is being eagerly anticipated by stock analysts and investors. It will once again be the largest publicly-traded water utility in the United States. On the engineering side of the business - and at least partly on the strength of water design and construction markets - there were also several new issues, including Kellogg Brown and Root, SAIC, and ICF Consultants. Further public offerings in the water industry seem likely.

- **Greater Efficiency - More Focus on "Reducing Demand to Increase Supply:"** Smarter, more efficient and more sustainable use of our existing water resources should be considered a new "source" of water - this is perhaps the greatest opportunity we have to extend our overall availability of water. But despite improvement and increasing attention during the last several years, there is still considerable "low-hanging fruit" to be harvested in terms of more efficient conservation, use, and re-use of our water resources.

For example, even today, many water distribution systems incur leakage of as much as 10% to 20% of the treated drinking water. Loss rates in the main distribution systems - referred to as "non-revenue water" - are as high as 25% in many parts of England and France where water mains may be over a hundred years old. This is clearly one of the first areas that should be addressed - it is clearly easier and cheaper, and more environmentally sound, to fix existing water mains than to go about building new dams, reservoirs, or seeking other sources of supply. And this consideration again underlines the expansive growth which the infrastructure sector of the marketplace - pipes, meters, pumps and tanks - is likely to enjoy in the coming years.

From a broader perspective, the last several years of significant droughts across much of the western United States have dramatically illustrated how much water we waste - and how much water we can in fact save, once we are really forced

to confront the issue. Most of us could be far more efficient and miserly in our use of clean water. Greater public awareness of conservation issues and opportunities, and successful local conservation programs have begun to show results in many areas of the country. As discussed later in this report, an interesting but frustrating paradox is beginning to emerge in this regard - as consumers work harder and smarter to use less water, the revenues paid to the municipality or water agency in some regions have fallen sharply, leading to an entirely new and generally unanticipated problem - declining revenue.

Perhaps crying out the loudest for efficiency improvement is the area of agricultural irrigation. Almost 70% of our total water usage as a planet goes to agricultural irrigation, and 40% of our food supply now comes from artificially irrigated lands. As the researcher Sandra Postel says, in her review of irrigation practices *Pillar of Sand*, "irrigation unleashed a profound transformation in human development, and created a new foundation from which civilizations sprung and blossomed." However, irrigation can also be a hugely wasteful process as it is typically practiced. Furthermore, it can lead to salt build-up and infertile soils if not managed properly. Some sources estimate that 30% of irrigated land has already been rendered infertile, or basically useless, because of careless irrigation practices. New and more efficient technologies for the use of water in irrigation, through such practices as drip irrigation - "more crop per drop" - offer great promise. This is not the place for a full discussion of irrigation; however, more efficient water usage, better drainage systems, and increasing use of certain types of wastewater for agricultural irrigation, should all be important policy objectives, and can collectively constitute an important new "source" of freshwater.

In a broader sense, more efficient water usage is perhaps best reflected by the growing interest in water re-use and recycling - a sector that many pundits believe to be one of the most exciting growth opportunities in the entire water business. As the boundary between "water" and "wastewater" continues to fade - as wastewater increasingly comes to be viewed as just another source of primary water - there are strong economic reasons to recycle and re-use wastewater. This arena of possibilities is described in more detail below.

- **Increased Focus on Water Recycling and Re-Use - Technologies and Attitudes:** Water "reuse" - in all of its varied forms - remains one of the most robust sectors of the overall water business. And water "recycling" initiatives, from the individual residence to the large municipality or major industrial installation, are rapidly gathering steam. However, these terms are often used rather vaguely or even interchangeably, and so some definitions and clarifications are in order.

Most wastewaters can easily be recycled and cleaned to levels where they can be re-used for primary drinking water - and this can occur in both a direct and an indirect manner. *Indirect* re-use of treated wastewater for drinking - i.e., after it has been discharged into and withdrawn from a river, or into and out of an underground aquifer, and then put through a primary treatment process - is obviously a widespread prac-

tice everywhere. For example, it is estimated that on some of the major river systems in the United States, water is used and re-used up to 20 times as it travels to the sea - the discharge waters from one wastewater treatment plant essentially comprising the raw water intake at a primary drinking water plant a few miles downstream. In fact, as a result of thirty years of steady progress under the Clean Water Act, the discharged waters from wastewater treatment plants are sometimes cleaner than the supposedly "natural" rivers and streams into which they flow.

What is usually meant by the term "water reuse" however, is a more *direct* type of reuse - without the long-term intervention of nature and the hydrologic cycle - i.e., more immediate treatment and recycling of wastewater for primary use purposes. Although direct re-use of wastewater for drinking or other household uses has been technologically feasible for years, any widespread direct re-use for drinking purposes still seems to be quite a ways in the future. Today, such direct reuse for drinking water purposes is only commercially practiced in a few very arid locations around the world. Putting a "black box" treatment system on the outside of a home to treat sewage and recycle it directly back into the tap - often referred to as "toilet to tap" in the popular media - is clearly "suspicious" or unacceptable to most people. Scare stories in the press tend to reinforce this reticence, even though from a technological perspective, it is fairly straight-forward to recycle wastewater to drinking water standards.

Public resistance to broader direct use of recycled wastewater is, at the base level, simply due to a poor understanding of recycling processes - and ignores the fact that most of the primary drinking water in this country is indeed already recycled, in a broader sense. Wider public acceptance of direct wastewater reuse is a major public education challenge, but eventually more and more direct re-use seems certain to happen - especially in the more arid regions of the world.

There is one very critical statistic to consider when evaluating the potential impact of re-use as a means of extending our water resources - a factor which should eventually make direct reuse much more feasible on a wide scale. Only a tiny percentage of our primary water supply is actually used for drinking. Compared to the roughly 130 gallons of water per capita per day that we currently treat to drinking water standards, most individuals drink less than a gallon a day. Even if we also consider the proportion of our water that we use to cook and clean with - which we might also wish to be treated to high-level drinking water regulatory standards - this is still a small percentage of total water consumption. In other words, the vast majority of the 130 gallons per person per day could be recovered and treated for a variety of other uses *without anyone ever having to drink directly "recycled" wastewater*. Hence, even if only small incremental gains could be made in terms of *non-potable* water re-use, overall water availability concerns could be substantially impacted. (This issue is discussed in more detail below under the consumer section.)

Despite these types of social concerns, more and more cities around the world are beginning to seriously look at recycling wastewaters to reuse for drinking. This is especially true for

cities in arid regions or remote internal areas away from the oceans, where seawater desalination is also a possible supplementary source of drinking water. The inland town of Toowoomba, Australia in Queensland, announced plans this year to evaluate just this kind of direct reuse system to supplement its scarce water resources. Arid but coastal cities, like many of the major metropolitan centers springing up in the Middle Eastern states, are amongst the world leaders in large-scale desalination as a source of drinking water. However, it seems clear that carefully planned and efficient reuse systems are incrementally a far cheaper source of additional water sources than are huge desalination plants, or totally new water sources.

At any rate, one thing is certain - as water prices continue to rise, there will be ever-increasing incentives for more careful recycling and reuse. With greater economic incentives, individuals and households will begin to use and re-use water more carefully, and industrial companies will re-think their approaches and re-tool their manufacturing systems, to utilize less water and to better recycle their wastewater streams.

• ***Incremental but Continuing Technological Advance Will Help Address Some of the Problems:*** Few observers believe that there are any revolutionary technological breakthroughs lurking out there which will transform the treatment and utilization of water. However, incremental technological advances are ubiquitous, and thousands and thousands of technology developers are actively working on developing and commercializing better "mousetraps" across the industry. Perhaps one of the most significant and well-known examples is the improvement in efficiency and unit cost reductions which have been recognized over the past couple of decades in reverse osmosis - one of the primary technologies behind seawater desalination, as well as water treatment and recycling. It is only the rapidly declining cost and improving efficiency of reverse osmosis that has made membrane treatment of raw water and desalination of seawater economically feasible.

Elsewhere across the plethora of different technologies which are applied to the treatment and preservation of drinking water, incremental advances and enhancements to existing technology and continual cost reduction are on-going. A look at the agenda for any technology conference in this industry quickly suggests the breadth of technological approaches which are being applied to water treatment. Beyond the more widely known techniques such as membrane filtration, UV radiation, chlorination, ion exchange, chemical treatment, flocculation and settling, and so on, there is a bewildering array of newer and developing technologies. Briefly, this includes such technologies as electro-coagulation, sonication, cavitation, demineralization, ozonation, electro-deionization, biocidal disinfection, electrodialysis reversal, multi-stage bubble aeration, and various alternative chemical treatments, as well as a new focus on systems which promote and enhance natural water treatment methods, such as natural attenuation and constructed wetlands development.

The proper application of these existing and improving technologies - either separately, or in the right combination with each other - can clearly solve most of the world's water

problems and challenges. The problem in many areas - particularly around the less economically developed parts of the world - is money, not technology. Indeed, many observers of the global water crisis believe that the simpler and "lower tech" approaches - sand filtration and enhanced natural wetland treatment, rather than reverse osmosis and the like - will be easier to implement and cheaper, and may ultimately play more significant roles in helping to solve the vast majority of the world's water shortages. So, despite the lack of any "silver bullets," existing technologies appropriately funded and applied can go a huge way towards solving the world's water problems.

• **Consumers and Residential Users Increasingly Vote With Their Pocketbooks:** As the general public has become more aware and concerned about water, individual consumer preferences and demands are becoming a more important driver in the business. A critical consideration here is the growing concern amongst consumers, particularly the more affluent, that tap water may not be safe to drink. Amazingly, the Metropolitan Water District of Southern California reported several years ago that almost *two-thirds* of their customers no longer thought it advisable to drink the water coming out of their taps. Primarily because utilities have not effectively marketed the true value of their product - although partly because *real* problems do occasionally occur - many consumers now believe they need to either buy bottled water or further treat the tap water coming into their homes. Right or wrong, this is a key driver behind several important sectors of the water business.

This area is becoming an issue of great controversy between the water utility industry - the some 55,000 agencies providing drinking water, most of which are municipally or government-owned and operated - and the residential treatment and POE/POU (point-of-entry/point-of-use) equipment manufacturers and bottled water distributors. The former group suggests that public tap water is truly one of the great economic bargains of all time, while the latter cautions that the only way you can really be sure your water is safe is to treat it again within the confines of your own home or drink it out of a pre-packaged bottle. Although the ultimate outcome of this debate is still in question, the effect has clearly been to strengthen the markets both for bottled water and for POE/POU home treatment products. New markets are also beginning to emerge in areas such as residential water monitoring and testing services.

The explosive growth of the bottled water industry over the past few years is a spectacular example of how customer perceptions - rightly or wrongly - can create and drive new markets. The extent of this phenomenon is staggering - it is now the second-largest beverage category in the United States, and it is estimated that Americans consumed over 7 billion gallons in 2005, an 11% increase over 2004 - or 26 gallons per person - more than \$10 billion worth in total. According to the breathless narrative published each year by the Beverage Marketing Corporation, the reasons are clear - bottled water is "a healthy, safe, ready-to-drink commercial beverage, which is becoming increasingly affordable - a great beverage alternative. Bulk and single-serve packaging options facilitate a variety of uses." Providers continue to mar-

ket bottled water by promoting it as something completely different than tap water - a concept which apparently sells to a large swath of the American public. Statistics abound for this consumer-oriented market - as opposed to the rest of the water industry - and one can easily obtain data for sparkling vs. non-sparkling consumption by age group, bulk retail volumes vs. PET multipacks sales, and so on. In the meantime, the business has quickly been consolidated into the hands of the major international food and beverage companies - Nestle, Coca-Cola, Pepsi and a few others.

Although (a) there is generally scant evidence that bottled water is safer than tap water; (b) the bottled water industry is only lightly regulated today; and (c) the "transportability" of water is easily accomplished by keeping a couple of empty bottles around, the bottled water business seems to be a triumph of marketing - living proof that "perception is reality." The Pacific Institute has calculated that if we took all the money that has been spent around the world on bottled water (\$50 billion over the past decade, and still growing at 10%) we could build all of the treatment systems and infrastructure necessary to deliver good clean drinking water to every person on the entire planet!

A more substantive and serious question which arises out of the whole tap water safety issue, and which is increasingly debated within the industry, has to do with the social efficiency of centralized water treatment versus decentralized or "home" treatment of water. This issue ties back to the fact mentioned above - very little of our centrally treated drinking water is actually used for drinking. If we are only actually drinking 1% of all the water that is treated to our very stringent regulatory standards, does it make any sense from a broader social and political perspective to treat all of our water to these exacting standards? Would it make more sense to treat water to lower standards at and considerably less expensive central plants, and gradually develop an infrastructure where individuals treated this water for their own drinking purposes at the point of use? In other words, would it make sense to save a lot of money in the construction of such sophisticated central facilities, and have each home and business treat that very small amount of water that they drink or bathe in via POE/POU types of devices at the point where it is actually consumed? This would obviously require a massive re-thinking and re-building of the entire water infrastructure system in the country, and hence is not likely to happen any time soon. However, over time, we may indeed see more and more consumers taking matters into their own hands, and treating or re-treating water to their own specifications at the point of use. Some utilities have already experimented with providing POE treatment devices to their users. This issue will probably represent a major social and economic debate in the future.

• **New Paradoxes and New Questions Continue to Emerge and Confuse the Situation:** Particularly within the U.S., the water business seems increasingly confused by a series of emerging ironies or paradoxes. For example, although the pressing need for vast water infrastructure expenditures is becoming progressively clear, it is less and less obvious where the funding for these investments will come from - local agencies and municipalities continue to suffer from tighter fiscal

constraints, and the Federal government, at least at this point in time, shows no inclination of wanting to get involved. Projections about the limitless future of the water business are beginning to be tempered by the reality of national fiscal constraints - there are huge needs, but how will we ever fund the solutions? As we have indicated above, it may only be a series of public health calamities resulting from the weakened water infrastructure that will eventually force a Federal attention to this problem.

As we mentioned at the outset, from an investment perspective, the water industry has never been hotter - investment interest in all facets of the water industry has been booming. Investors of all stripes have been rushing to investigate the water industry - corporate and strategic investors like the General Electrics and Siemens' of the world, hundreds of private equity groups like CD&R and the Carlyle Group, and literally millions of private individual investors. The stock prices of water companies have been driven to high levels, M&A transactions are occurring at very high valuations, new companies are rushing to the public markets, and various types of new water-specific investment vehicles are coming out. But it often seems that there is a stampede of investor interest chasing after relatively few real and attractive investment vehicles - investors lament the paucity of pure-play water stocks in the United States, and are increasingly turning to foreign stock markets to invest in attractive water companies. Nonetheless, as global water concerns are better understood and as commercial opportunities are better defined, there is a huge reservoir of investment funds seeking to find a home in the water industry.

However, at the same time as this frenzy of investment interest has intensified, we hear incessantly about the drastic need for new investment, the capital expenditures that will be required to maintain and expand the drinking water and wastewater infrastructure - both here and around the world. Every month seems to bring forth a new study of future water needs, and the hundreds and hundreds of billions of dollars that will be required to continue to provide clean water. The most recent EPA estimate of capital requirements, for just the drinking water side of just the U.S. infrastructure system, is estimated at some \$277 billion over the next two decades. The controversial "spending gap" - the difference between what experts estimate that we *should* be spending and what we *are* spending to correct these problems - continues to increase, and seems to portend potential disaster somewhere in the future. Similar estimates of investment needs, with even larger magnitudes, apply for most of the rest of the world as well. The infrastructure is crumbling in many parts of the economically developed world, and doesn't even exist at all in many parts of the less developed world. In short, the needs in this industry are truly vast - and the situation cries out for new dollars to be invested.

This situation represents another major paradox and dilemma for the water industry - on the one hand, we seem to have lots of dollars looking to be invested, and on the other hand, huge infrastructure and capacity needs that are crying out for new dollars. On one side, hungry investors complaining about the lack of good investment opportunities, and on the other, the public clamoring for the rebuilding and expansion

of a dilapidated water system. Given the urgency of the world's water problems, this is a situation which cries out for new and revolutionary approaches - for more creative financial mechanisms which will allow private investors to put their money to work for the public good, and concurrently be able to earn a competitive rate of return on those monies in the process. And if this is not going to occur on a widespread scale through out-sourcing or public-private partnerships, then we either need to find alternative means in the short-term, or we will be forced to yield to limited and less attractive options over the long-term. There is a huge interest in water investment, and we clearly have huge needs - we must figure out better ways to connect this supply of "water dollars" with the obvious demand for water dollars.

In another somewhat counter-intuitive trend - water conservation measures continue to improve in many arid parts of the country, but the resulting lower water usage has translated into lower revenues to the municipality, and hence fewer funds to invest in badly needed infrastructure. By "doing the right thing" and conserving water, consumers are putting a greater, rather than a lesser, financial burden on the water authority. In short, responsible customers must be told to both use fewer gallons *and* pay more for the gallons they *do* use - not a very palatable outcome to either the water supplier or the customer.

The theme of this report is "more questions than answers" - and we have certainly already posed many difficult and challenging questions. However, perhaps one of the biggest unanswered - perhaps unanswerable - questions is how global warming will affect the world water situation. At first glance, most people worry about the simpler and more straightforward potential impacts of global warming - rising sea levels, and what the impact might be on low-lying areas. But the eventual impacts of global warming, though still poorly understood, will be far more complex.

Yes, rising sea levels could present a huge challenge to the world, and to drinking water and wastewater treatment systems along the coastal cities where much of the world's population lives (see *TEBS*, Spring 2005). Low-lying deltaic countries, such as Bangladesh, could lose significant percentages of their land area with only minimal increases in sea level. Although melting glaciers in the Himalayas - which form the headwaters of the major rivers supplying two of the most populous nations on earth, India and China - might give the illusion of bountiful water for a few years, once they are gone, water shortages in those areas could be permanent and extreme. The potential of global warming to shift the *predictability, timing, and extent* of natural rainfall patterns around the world could truly wreak havoc in terms of water availability, agricultural productivity, and food supplies. This impact could, as they say, "change everything." Scientists are only just beginning to understand the potential long-term effects of global warming, and economists and planners have hardly started to think about the potential economic and social effects.

The Future - How The Experts See It: In the previous pages, we have touched upon many of the key trends and likely future directions in the broader water industry. How-

ever, to get a broader and more diverse perspective, this year we asked a number of leaders and experts in the water business to briefly share their outlook with us, and to describe what they see as critical future trends. Some of their comments are paraphrased below:

There is obviously a broad consensus that the urgency of the world water crisis is growing, and that it can no longer be overlooked. The dire statistics cited throughout this report - regarding the severity of water problems and related public health problems in many parts of the world - have not improved. Despite an obvious desire by all to see these problems begin to be corrected, and to achieve more specific international directives like the United Nations' Millennium Development Goals, most people agree that things aren't improving very fast. Jeff Garwood, who heads up General Electric's water business, summarizes the situation concisely - "the well is drying up."

The future of water is a future of confusion, conflict and rapid change, says Peter Gleick, President of the Pacific Institute (www.pacinst.com) a California think tank that deals with world water issues. But its not all doom and gloom, he hastens to point out; the future will also see a flowering of new ideas, tools and solutions - new and innovative technologies, more aggressive policies, and new financing and regulatory approaches to solving water problems.

Ben Grumbles, Assistant Administrator of Water for the U.S. Environmental Protection Agency - the primary protector of the nation's water resources - is only too familiar with the problems, and our vast infrastructural needs. Grumbles travels the country advocating four specific approaches for beginning to address our water problems: (1) better management - working with partners to develop more productive and sustainable utility practices and attributes; (2) full-cost pricing - insuring that customer rates reflect the full value of services provided; (3) improved water efficiency - using water more wisely and efficiently; and (4) beginning to take more of a watershed approach in water resource decisions. Only by simultaneously moving forward on all of these fronts, does Grumbles see us beginning to make real progress in this country. (See "EPA's Approach to Sustainable Water Resource Management" *TEBS*, Winter, 2006.)

Expanding regulatory control on the water industry, and greater regulatory complexity, seems assured going into the future - here and in most other countries. This will be a result not only of greater awareness and concerns on the part of the public, but also as Jack Hoffbuhr, Executive Director of the American Water Works Association points out, better understanding of public health issues and a more sophisticated ability to analyze contaminants in water at extremely low levels of concentration. As our level of scientific understanding improves, so will our ability to measure and manage environmental issues and challenges.

Although we are likely to see greater government involvement and regulation in the water market, most of the experts also seem to agree that we can expect greater private participation in the marketplace in one form or another, and more use of market-based mechanisms to help efficiently allocate

increasing scarce water resources. As might be expected, industry leaders have differing opinions on the future role of the private investors in the water business. For example, there are broad concerns about the role of private equity investors in the utility side of the industry - whether profit-driven short-term investors are appropriate owners of businesses which naturally have very long-term investment cycles.

Hoffbuhr, whose trade association represents the drinking water utilities of the country, emphasizes the inevitability of the huge investment requirements that are so often cited, and reminds us that such huge financial needs are not just unique to this country. The problems may be more heavily studied or better understood here, but other countries have needs just as great or greater. Nick Debenedictis, CEO of the major publicly-traded utility Aqua America, points out that water is the only utility business that has not been deregulated, and that it is by far the most capital intensive. More capital must be invested in this business than any other type of utility in order to generate one dollar of revenue. Debenedictis cites figures which indicate that an investment of \$3.45 is necessary to sustain one dollar of on-going revenue in the water business, whereas the comparable figure in the telephone and gas or electric utilities is only \$1.00 to \$1.50. Many issues and challenges in this industry boil down to the fact that the water business is unique in terms of its large investment needs and long-term time horizons.

Many of these experts mention the role that technology can play in solving the world's water problems. Christopher Gasson, Editor of *Global Water Intelligence*, sees low pressure membranes as the next "big thing" in water treatment technology, pointing out that whereas today only about ten percent of new water plants employ membranes, ten years hence this figure is likely to be closer to 70%. Greater membrane usage, he asserts, will be the best and most cost effective means of treating the ever-lower quality source waters that we will necessarily have to turn to in the future. Grumbles of the EPA also expects to see considerable technological advances - in such areas as water monitoring, desalination, and the integration of water efficiency and energy efficiency (which Grumbles calls "connecting the drops and the watts.")

Interestingly though, its not just the "high-tech" end of the business that is likely to see rapid expansion. Hoffbuhr emphasizes that simpler technologies - such as one filtration process recently announced that is powered by a bicycle - will be better positioned to treat water in less developed countries at the village level. Gleick agrees, noting that smaller-scale, flexible systems for both water supply and wastewater treatment and reuse will expand much faster than most of us expect today.

Techniques for water conservation and improved efficiency will also expand rapidly as water prices rise. There is a vast untapped potential here, says the Pacific Institute's Gleick. For example, GE's Garwood expects to see rapid advances in the area of what he calls "efficiency monitoring" - at the intersection of modern information technology and environmental needs. This will include a range of advanced real-time systems to much more accurately monitor and measure

how effectively we are using our increasingly limited water and energy resources.

Siemens Water Chief Executive Roger Radke also emphasizes the conservation and efficiency opportunity, pointing out that the "green" practices which have started to take hold in the building industry will be rapidly adopted by the water industry as well. This is particularly true, he points out, of energy efficiency improvements, which were brought into focus this past year with sharply increasing energy prices. He also sees smaller physical foot-prints in water plants, "smart" automation and control systems which will help operators reduce chemical and electricity usage, and other sustainability-oriented advances. Radke cites one of Siemens' projects in reuse, or more efficient use - a system to harvest and treat rainwater for use in flushing toilets in a new university engineering building. "That's a glimpse of the future," says Radke.

Bill Bertera, Executive Director of the Water Environment Federation - the trade group representing the wastewater treatment side of the business - emphasizes the significance which global warming is likely to have on the water business as we know it today. He believes that better understanding of the intimate relationship between global warming and the hydrologic cycle will present many new and challenging demands on the public water and wastewater sector and private sector water users alike. GE's Garwood mentions the possible impact of increasing floods and droughts on the world insurance industry, and the eventual dislocations that abrupt and unexpected ecosystems changes could cause in the whole international food supply and trade system.

Gleick concurs, adding that as climate change effects get worse, it will have unexpected and unanticipated impacts on water availability, water quality, and water-related business risks. As people and nations gradually realize the critical significance of water to civilization and life itself, he says, "water and its management will increasingly play an important part in trade and diplomatic discussions, as both the public and private sectors seek holistic solutions to issues of economic development, the elimination of poverty, and the promotion of peace and security." Bertera sees huge opportunities and challenges here for both the public and private sectors over coming decades.

Another trend high-lighted by Gasson, which hasn't really been addressed anywhere in this report, is the on-going shift in project management and delivery methods - in particular, the shift in many municipal water and wastewater projects to "design-build" approaches. As treatment technology and regulations become more complex and sophisticated, this also helps to drive the shift to a design-build approach - where the design and construction of facilities is managed by a single party or group. This is not really a new approach, but it *is* relatively new to many vendors and customers in the water business, and it is changing the way business is done, particularly here in the United States.

Many of these industry leaders talk hopefully, and in general terms, of the need and opportunity for new philosophical approaches to water management, new regulatory policies, new financing and incentive mechanisms to help us better husband our ever scarcer water resources. Although details are still sketchy in many regards, it seems likely that we will see far more reliance on market-based mechanisms for more efficient water resource management in the future - such things as watershed basin-wide pollution trading rights, tradable water withdrawal rights, and so on. The EPA's Grumbles believes that innovative Federal approaches and incentives can help the market function more efficiently in this area, and he expects more private sector participation in developing, financing, and managing water infrastructure and services. "If the true value of clean water to our society and our economy is apparent and clearly articulated, the market will help find answers and provide tools for the challenges ahead," Grumbles says.

Both Garwood and Radke mention one other critical challenge. They point out that most of the world's future population growth is likely to occur in the emerging "mega-cities," the vast slums surrounding cities like Mexico City, Lagos, and Sao Paolo. By 2015, Garwood says, there will be 26 such metropolises with populations of over ten million. How we will possibly be able to provide clean water infrastructure in those sprawling areas represents a huge challenge, and underlines the vast opportunity for new water treatment and reuse technologies.

Despite all these worries, concerns and future challenges, however, Debenedictis points out that we should all remem-

Water: Good News and Bad News

Good News	Bad News
There is a lot of fresh water in the world	Its not always where man needs it
Water is free from nature	Infrastructure needed to deliver water is expensive
In many areas, water is readily accessible at a low cost	People assume it will always be available, and take it for granted
Nature is constantly recycling and purifying water in rivers and lakes	Man is polluting water faster than nature can recycle it
There is a huge amount of water underground	Man is using this water faster than nature can replace it
Five billion people have reasonable access to fresh water	Over one billion do not
3.8 billion people have at least basic sanitation	2.4 billion do not
Millions are working their way out of poverty	Affluent people use more water
The pace of industrialization is increasing	Industry will require more fresh water
Industry is becoming more efficient in its water use	Many industries are still using water unsustainably/inefficiently
Awareness of water issues is increasing	Translating awareness into action can be slow

Source: "Facts and Trends" World Business Council on Sustainable Development

ber what this industry is in fact achieving in United States today - providing good quality, clean water, delivered directly to the home, at a tiny fraction of the cost of bottled water or other alternatives. And WEF's Bertera says that all of these future challenges in the water and wastewater treatment industries will offer growth and profit incentives "only hinted at in today's thinking." "Prices will rise, conflicts will intensify, but new successes will materialize as well," says Gleick. In summary, the challenges facing this industry world-wide may be great, but so are the opportunities.

Conclusions: The one clear and inescapable conclusion of all of this discussion is *the inevitability of continuously rising water prices* over the longer-term future - indeed, the *urgent need* for rapidly rising water prices in many parts of the globe. Water resources are poorly managed in many parts of the world, and water remains truly - and in some cases absurdly - cheap (see "Water is Cheap, Ridiculously Cheap" *TEBS*, Winter 2006). An authoritative Special Report a few years ago from the Economist, concisely concluded that water is "ill-governed and colossally under-priced" around the world. Discouragingly, it also reported that the United States is the most wasteful nation on earth in terms of water usage.

The true *cost* of delivering clean water - as well as the aver-

age *price* of water - continues to creep slowly upwards in most localities, but prices are not rising at the kind of rates that will be necessary if we are going to upgrade and maintain our infrastructure on a truly sustainable basis. It seems clear that we still don't recognize the true value of water - and few of us currently have to pay anywhere near what it is really worth to us. Any review and analysis of the water situation, particularly in the United States, must come to the same conclusion - we simply have to start paying more for water, both to encourage more efficient patterns of use, and to finance a sustainable treatment and distribution infrastructure. Water prices, in many parts of the world, simply need to rise quite substantially before most of us will begin to make consumption choices based upon relatively small price variations.

In its recent review of water pricing around the world, *Global Water Intelligence* asserted that "there is no correlation between....water scarcity and water price." The report also observed that there is no other product whose price to the consumer is so totally unrelated to its cost - an observation that seems to often go unnoticed or ignored in most economic and political debates. Indeed, to paraphrase Benjamin Franklin's observations of over 200 years ago - it seems likely that we will only recognize the true value of water once our "well runs dry."

HOW TO READ THE ENVIRONMENTAL BENCHMARKER AND STRATEGIST

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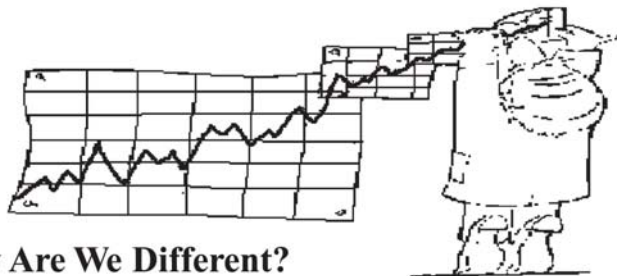
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- number of shares includes all shares outstanding, less the shares held in treasury
- price to earnings ratio is calculated using earnings *before* extraordinary items and accounting changes over the past four quarters
- EBITDA equals earnings before interest, taxes, depreciation and amortization
- net earnings used to calculate return on equity is calculated as income after taxes plus minority interest and equity in affiliates plus preferred dividends and U.S. GAAP adjustments.
- return on equity is calculated as net earnings available to common shareholders divided by average common equity over the most recent five quarters
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As prices continue to increase, decisions about water usage must inevitably begin to take on greater significance in the overall economy. And as prices rise, many of the trends discussed above will only intensify - greater reliance on reuse and recovery, more emphasis on conservation, a continuing trend towards more private-public partnerships, more rapid advancement in technology, and probably, an on-going consolidation in the industry. This is already starting to happen - water prices are rising faster than inflation, but in many areas prices need to increase at a much greater rate.

The outlook for the future doesn't have to be entirely gloomy - as the Table on the bottom of page 18 shows, there is both good news and bad news, as far as the worldwide water industry is concerned.

Over time, water will come to be viewed more and more as a true economic commodity - one that can be bought, sold, moved around like other commodities - and yes, hoarded. Government subsidies, and major Federally-funded dams, water distribution and irrigation programs over the past hundred years have seriously distorted the workings of a free market in the United States, but market forces seem likely to increasingly exert themselves as clean water becomes more scarce. Increasingly, it will make sense to evaluate, understand and manage water resource on a watershed basis - independent of political boundaries that may interfere.

However, at the same time, and from the global perspective, the "commoditization" of water will have to be aggressively balanced by equity and fairness concerns - everyone needs water to live, and there will always be some who can't afford to pay for it. Finding the right balance to this dilemma - *water as an economic commodity versus water as a human right* - will be one of the great social, economic and political challenges of this century. And as mentioned above, we must develop new and more creative financial mechanisms which will allow hungry private investors to put their money to work for the public good - better ways to connect growing investment interest with the huge capital requirements which are staring us in the face.

Yes, water frequently falls from the sky. Yes, three-quarters of our planet is covered with water. And yes, fresh water is abundant in many parts of the globe. But it's not always clean, it's not always where we need it, and it costs the world hundreds of billions of dollars a year to collect, clean, and distribute. The world's population has increased four-fold over the last hundred years, but we still have the same amount of water. And, unlike any other commodity, there is truly no substitute for water.

In closing, we need to remember that the amount of freshwater on this earth is pretty much fixed - and the bottom-line is that we need to become much smarter and much more efficient in our treatment and usage of this increasingly scarce resource. The facts are simple - water is an essential prerequisite of life, to sustain and improve our standard of living and our modern industrial economy - and *we are not going to find a substitute for water*. As the global water crisis intensifies, we face numerous and daunting political and economic challenges, but there will also be almost limitless opportunities for creative, innovative and well-managed firms to help provide solutions.

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