



SPECIAL REPORT

# WATER

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Water is one of those things easily taken for granted in the developed world. However, as Standard & Poor's Ratings Services discusses in this week's special report, that isn't likely to be the case forever.

Deputy Chief Economist Beth Ann Bovino opens the report by asking if water is the new oil. She says, no, not yet, but notes that it's easy to envision a time in the not-too-distant future when it will be as avidly sought after, as important to economic development, and as intertwined with international and domestic policy as oil is today. She quotes the 2030 Water Resources Group, a consortium of largely private companies formed in 2008 to contribute new insights to the issue of water scarcity. The Group notes that the existing sustainable global water supply currently stands at 4,200 billion cubic meters, while withdrawals are already at 4,500 billion cubic meters. That deficit will only grow as usage keeps rising—to a projected 6,900 billion cubic meters by 2030. But steps to reduce consumption or demand through better water conservation, recycling, desalination of seawater, and technological innovations in industries that use great amounts of water could narrow, or perhaps even eliminate, this gap.

Of course, all of these measures will require money—and a lot of it—and it isn't clear where it will come from. But whatever or whomever the source, the credit quality of the borrowers will still no doubt be a factor.



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## 12 **Special Report** **Every Drop Counts: Is Water The Most Valuable Liquid Asset?**

By Beth Ann Bovino, New York

Is water the new oil? It isn't yet. But it's easy to envision a time in the not-too-distant future when water will be as avidly sought after, as important to economic development, and as intertwined with international and domestic policy as oil is today. To be sure, some regions around the world have long thirsted for enough water. But now this need has spread far beyond the traditional dry or impoverished areas of the world.

## Features

### 16 **Is The U.S. Water Sector Approaching A Tipping Point?**

By Aneesh Prabhu, CFA, FRM, New York

For centuries, man has known that water is key not only to life but also to economic development. As populations and economic output have grown, so has the demand for water. In the past century, worldwide demand for water tripled, and currently it is doubling roughly every 20 years. And as higher standards of living have led to greater per capita water use, demand in many parts of the world has begun to outstrip available supplies.

### 25 **From Public To Private And Sometimes Back Again: The Shifting Dynamics Of Water Utility Ownership**

By Aneesh Prabhu, CFA, FRM, New York

The history of ownership of water systems in the industrial world has been dynamic. Public interest—and ownership—has been a constant even as it has swung from passive involvement to active ownership. Three principal reasons are based on the central tenet that water is unique: public health, increasing cost of delivery, and the monopolistic nature of water management. Governments have been wary about ceding responsibility for such an essential commodity.



### 30 **U.S. Power Sector: Heavy Demand, Limited Supplies, And More Regulation Could Swamp Their Credit Quality**

By Aneesh Prabhu, CFA, FRM, New York

Little attention has been given to the large amounts of water that power plants use to generate electricity. Of the total amount of water on the planet, only 3% is fresh water. Of that, only about 1% is in free-flowing rivers, streams, and lakes. The huge amounts of water required for power generation are beginning to jeopardize utilities' ability to meet demand for electricity. Proposed regulations also may require facilities to minimize harmful effects on the environment.



### 35 **Worth Its Salt? Desalination In The U.S. Offers Benefits, But At A Price**

By Robert Hannay, San Francisco

In some communities in the U.S., population growth has led to water demand outpacing supply. In others, vulnerability to droughts has led to scarce supply in dry years. And environmental concerns and increasing regulation have resulted in reduced water availability in some parts of the country. Local factors determine how utilities can deal with supply issues. But for areas located near the coast, utilities are turning to another option: desalination.

**40 From Droughts To Conservation, Water Can Have Big Effects On U.S. Municipal Utility Credit Quality**

By Theodore Chapman, Dallas

National attention has been focused on U.S. municipal infrastructure quality and capital needs. Many policymakers view infrastructure investment as a potential economic stimulus tool.

While some are trying to figure out what they need to fix and how much it will cost, the general consensus is that needs are large and federal funding is scarce.



**46 U.S. Municipal Water And Sewer Utilities: Funding Long-Term Needs Remains Their Biggest Risk**

By Theodore Chapman, Dallas

Debt issuance declined for the U.S. water, sewer, and drainage utility sector last year. Still, the sector needs infrastructure investment due to aging systems; regulatory issues; and migrating populations to the South and West, stressing existing water supplies in those regions. Utilities will have a tough year addressing these issues.

**52 U.S. Flood Insurance: While The Government Is Treading Water, Private Insurers Are Just Getting Their Feet Wet**

By Blake Mock, New York

Whose earnings and balance sheet are most at risk when catastrophic flood losses hit the U.S.? U.S. floods have limited impact on earnings, capital, or, ultimately, credit ratings on private insurance companies. In the U.S. such coverage is nationalized through the National Flood Insurance Program. The future of the program is uncertain, however, and the proposed amendments may encourage private participation.

**Credit FAQ**

**57 How Water Shortages In Eastern England Could Increase Costs For U.K.-Based Utilities**

By Michael Wilkins, London

The east of England is experiencing a drought, with reservoir levels 20% lower than normal. The region is likely to face severe water shortages due to significant changes in rainfall patterns on account of climate change and an increasing population. This could lead to water shortages, increased energy prices, and flood risk. It could also lead to operating and financial challenges for utilities and energy-intensive businesses operating in the region.

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Media, Entertainment, and Cable Industry Breakfast Briefing	March 7	New York
Global Impacts and Outlooks— Exploring Cross-Asset and Cross-Market Perspectives	March 21	New York

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Principles of Quantitative Equity Investing	March 29-30	New York



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## Greece Ratings Lowered To 'SD' (Selective Default) Following Distressed Debt Restructuring

Standard & Poor's Ratings Services lowered its 'CC' long-term and 'C' short-term sovereign credit ratings on the Hellenic Republic (Greece) to 'SD' (selective default).

Our recovery rating of '4' on Greece's foreign-currency issue ratings is unchanged. Our country transfer and convertibility (T&C) assessment for Greece, as for all other eurozone members, remains 'AAA'.

The downgrade to 'SD' follows the Greek government's retroactive insertion of collective action clauses (CACs) in the documentation of certain series of its sovereign debt on Feb. 23, 2012. The effect of a CAC is to bind all bondholders of a particular series to amended bond payment terms in the event that a predefined quorum of creditors has agreed to do so. In our opinion, this action materially changes the original terms of the affected debt and constitutes the launch of what we view as a distressed debt restructuring. Under our criteria, either condition is grounds for us to lower our sovereign credit rating on Greece to 'SD' and our ratings on the affected debt issues to 'D'.

As we have previously stated, we may view an issuer's unilateral change of the original terms and conditions of an obligation as a de facto restructuring and thus a default by

Standard & Poor's published definition (see *"Retroactive Application Of Collective Action Clauses Would Constitute A Selective Default By Greece,"* published Feb. 10, 2012, and *"Rating Implications Of Exchange Offers And Similar Restructurings, Update-,"* published May 12, 2009). Under our criteria, the definition of restructuring includes exchange offers featuring the issuance of new debt with less-favorable terms than those of the original issue without what we view to be adequate offsetting compensation. Such less-favorable terms could include a reduced principal amount, extended maturities, a lower coupon, a different payment currency, different legal characteristics that affect debt service, or effective subordination.

We do not generally view CACs (to the extent that they are included in an original issuance) as changing a government's incentive to pay its obligations in full and on time. However, we believe that the retroactive insertion of CACs will diminish bondholders' bargaining power in an upcoming debt exchange. Greece launched such an exchange offer on Feb. 24, 2012.

If the exchange is consummated (which we understand is scheduled to occur on or about March 12, 2012), we will likely



consider the selective default to be cured and raise the sovereign credit rating on Greece to the 'CCC' category, reflecting our forward-looking assessment of Greece's creditworthiness. In this context, any potential upgrade to the 'CCC' category rating would, among other things, reflect our view of Greece's uncertain economic growth prospects and still large government debt, even after the debt restructuring is concluded.

If a sufficient number of bondholders do not accept the exchange offer, we believe that Greece would face an imminent outright payment default. This is because of its lack of access to market funding and the likely unavailability of additional official financing. The revised financial assistance program provided by most of the eurozone governments and the stand-by credit arrangement with the International Monetary Fund are predicated on a successful exchange offer.

Our T&C assessment for Greece, as for all other eurozone members, is 'AAA'. A T&C assessment reflects our view of the likelihood of a sovereign

restricting nonsovereign access to foreign exchange needed to satisfy the nonsovereign's debt-service obligations. Our T&C assessment for Greece expresses our view of the low likelihood of the European Central Bank restricting nonsovereign access to foreign currency needed for debt servicing.

If Greece were to withdraw from eurozone membership (which is not our base-case assumption) and introduce a new local currency, we would reevaluate our T&C assessment on Greece to reflect our view of the likelihood of the Greek sovereign and its central bank restricting nonsovereign access to foreign exchange needed for debt service. Contrary to the current case, in this scenario, the euro would be a foreign currency, and the Bank of Greece would no longer be part of the European System of Central Banks. As a result, under our criteria, the T&C assessment can be at most three notches above the foreign-currency sovereign credit rating.

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## S&P Assesses Emerging European Sovereign Sensitivity To Eurozone Shocks

Standard & Poor's has constructed the Emerging Europe Sensitivity Index (EESI), a new index that measures the relative vulnerability of emerging European countries to disruptions in capital inflows. The report titled, "*S&P's Sensitivity Index Measures Emerging Europe's Vulnerability To Eurozone Shocks*," published Feb. 28, 2012, on RatingsDirect on the Global Credit Portal, explains how the index was constructed, assesses 19 non-eurozone sovereigns, and assigns scores to each of the surveyed countries.

While the EESI does not directly affect our sovereign credit ratings, it does measure relative sovereign vulnerabilities to external shocks that could—via foreign exchange and GDP effects—materially increase

public debt levels and imply downward ratings pressure. Current EESI scores suggest that progress has been made at least in reining in previously high current account deficits; however, there are notable exceptions such as Turkey and Ukraine. The risk is that, despite the rebalancing achieved so far, the renewed deleveraging of the eurozone financial sector could trigger destabilizing capital outflows from many emerging European economies, with negative knock-on effects on growth and public finance.

We assess Turkey as being the most vulnerable to sudden financial account outflows and external refinancing risks. Its EESI score is the highest of all, at 2.94. (The higher the score, the greater relative vulnerability of an emerging non-eurozone economy to shocks in the euro-

zone.) The most obvious side effect of Turkey's credit boom has been the rapid widening of its current account deficit to a multi-year high of 10% of GDP in 2011 (a deterioration also instigated by higher oil prices).

Hungary has the second highest score (2.09), meaning that, of the surveyed countries, it is the second-most vulnerable to potential eurozone shocks. It owes its vulnerability to its external debt stock, rather than its external flow position; Hungary actually ran a small basic balance surplus in 2011.

At the other end of the scale, Russia (-0.07), Kazakhstan (-0.45), and Azerbaijan (-2.19) are the least sensitive to eurozone deleveraging as measured by the EESI. Although they rely heavily on commodity prices, their track record of operating repeated annual current

account surpluses, amid high foreign exchange reserves and relatively low foreign currency lending, supports their low-vulnerability EESI scores.

Since the onset of the financial crisis in 2009, many of the surveyed countries have made good progress in rebalancing and deleveraging. The economies of Albania, Ukraine, Serbia, Romania, Macedonia, Lithuania, Latvia, and Hungary are more open (as measured by exports to GDP) than ever before. But any protracted weakening in eurozone demand for their exports, or waning eurozone parent bank support, could weaken confidence in emerging Europe, just as it appears to have adjusted to a less credit-driven growth model.

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## European Central Bank's Liquidity Injections Give Eurozone Banks Time To Adjust Their Business Models

The 2011 earnings statements published by European banks over recent weeks have been overshadowed by the European Central Bank's (ECB's) unprecedented funding operations in December 2011 and February 2012, according to a report, "*ECB's Funding 'Bazooka' Gives Eurozone Banks Time To Reshape Their Business Models And Balance Sheets*," published Feb. 29, 2012.

We believe that the ECB's intervention has materially reduced the risk of a liquidity-driven bank failure, and averted the possibility of a severe credit crunch and

additional recessionary pressure across the Economic and Monetary Union (EMU or the eurozone). We also think that the ECB's actions have helped warm up public funding markets from the deep freeze of late 2011, although investor demand remains selective.

Nevertheless, we consider that the ECB's actions do not address the underlying structural issues in the banking sector. Such issues in our view include capital shortfalls at various banks, the questionable viability of some business models in the medium term, and continued



uncertainty over the appropriate carrying values of assets such as certain sovereign exposures. Significantly, by substantially reducing debt refinancing risk as an immediate concern, the ECB's

intervention has allowed banks more time to adapt their balance sheets and strategies to the new market and regulatory context. To this end, we expect another challenging year as banks



## European Financial Stability Facility Outlook Revised To Negative Due To A Lack Of Credit Enhancements

Standard & Poor's revised its outlook on the European Financial Stability Facility (EFSF) to negative from developing. At the same time, we affirmed our 'AA+' long-term and 'A-1+' short-term issuer credit ratings on the EFSF.

Following the lowering of the ratings on France and Austria on Jan. 13, 2012, the rated long-term debt instruments already issued by the EFSF are no longer exclusively supported by guarantees from the EFSF guarantor members rated 'AAA' by Standard & Poor's or 'AAA' rated liquid securities. Instead, the EFSF's instruments are now covered by guarantees from guarantor members or securi-

ties rated 'AAA' or 'AA+'. Therefore, on Jan. 16, 2012, we lowered the long-term issuer credit rating on the EFSF, and the issue ratings on its long-term debt securities, to 'AA+' from 'AAA'.

At that time, we considered that credit enhancements—in addition to the existing 165% over-guarantee provided by each non-borrowing EFSF member state—that would offset our view of the now-reduced creditworthiness of the EFSF's guarantors and securities backing the EFSF's issues could be forthcoming. However, we no longer expect EFSF member states to provide additional credit enhancements to ensure that its rated long-term debt

instruments will be exclusively supported by guarantees from the EFSF guarantor members rated 'AAA' by Standard & Poor's or 'AAA' rated liquid securities.

The negative outlook on the long-term rating on the EFSF mirrors the negative outlooks of France and Austria. Absent additional credit enhancements, we could lower the ratings on the EFSF if we lowered the long-term sovereign credit ratings on any of the EFSF's 'AAA' or 'AA+' rated members (Germany, France, The Netherlands, Austria, Finland, or Luxembourg) to below 'AA+'.

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continue to deleverage, sell or close noncore businesses, recognize problem assets, and accumulate capital through various means. The trying economic and market conditions form a difficult backdrop for this transition.

We find it increasingly difficult to generalize about the positioning of the European banking sector in view of the significant divergence we see between countries and individual institutions. These disparities are mirrored in a wider dispersion of banks' ratings and their stand-alone credit profiles, and also in the extent of reliance on ECB funding facilities. Reflecting our view of the continuing pressures on the sector, our

medium-term credit outlook varies from stable to negative; we currently have negative outlooks or negative Credit-Watch placements on 27 of the 50 largest European banks that we rate, and stable outlooks on the other 23. We expect significant sectoral restructuring in the peripheral eurozone countries, but note generally greater stability in parts of northern Europe such as the Nordic region.

There have been a number of rating actions on the top 50 European banks over the past three months, prompted by two events. First, in November and December 2011, we implemented our revised bank rating criteria, which resulted in an affirma-

tion or one-notch downgrade of the long-term ratings on most Western European issuers, although there were also a small number of upgrades. The criteria changes reflected a recalibration of our analytical framework rather than a fundamental change in our view of the sector. Second, in January and February 2012, we took rating actions on various banks in light of rating changes on most eurozone sovereigns and changes in the Banking Industry Country Risk Assessment scores for Italy, Portugal, and Spain.

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## Canadian Municipalities' Credit Quality Proves Resilient In Economic Downturn

The global recession did not leave Canadian municipalities entirely unscathed. Like much of the rest of the world, these local governments were still dealing with the aftermath in 2011. And many challenges remain, with the European debt crisis and sluggish U.S. recovery affecting governments worldwide.

But despite the problems that another economic slowdown presents, Standard & Poor's has taken predominantly positive rating actions on Canadian municipalities in the past two years. "A combination of stimulus funding from higher levels of governments and strong liquidity reserves has left issuers in a good position, both in dealing with their own finances and getting through their infrastructure backlogs," said credit analyst Adam Gillespie in the report, titled, "*Canadian Municipalities' Credit Profiles Prove Resilient Through Tough Economic Conditions*," published Feb. 29, 2012.

Local governments could face increasing stress on their credit metrics, with stimulus programs coming to an end and infrastructure needs still present. Funding from higher levels of government could be squeezed as they address their own deficit problems. But overall, we expect Canadian municipal credit quality to continue its high investment-grade ways for the foreseeable future.

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## Ratings On United Mexican States Affirmed On Cautious Fiscal And Monetary Policy

Standard & Poor's affirmed its 'BBB/A-3' foreign currency and 'A-/A-2' local currency sovereign credit ratings on the United Mexican States. The outlook remains stable, and the transfer and convertibility assessment is unchanged at 'A'.

"The ratings on Mexico reflect the government's track record of cautious fiscal and monetary policy that has contributed to low government deficits and inflation, bolstered economic resiliency, and contained external debt levels," said credit analyst Lisa Schineller. "The ratings also reflect Mexico's limited fiscal flexibility and modest medium-term growth prospects," she added. About 35% of total budgetary revenues come from the oil sector, rendering the government vulnerable to volatile oil prices and a potential decline in oil production over the medium term, while the non-oil tax base remains low.

The Mexican economy grew 3.9% in 2011, with domestic demand gaining further traction while net exports moderated. We expect growth to decelerate in 2012 to 3%—in line with the deceleration that occurred at the end of 2011 and amid global economic uncertainty. We then expect growth to average 3.3% in the following several years, a rate that is subdued compared with that of most other emerging economies.

The local currency rating on Mexico is two notches higher than the foreign currency rating. We based the notching on several factors, incorpo-

rating our assessment of Mexico's fiscal and monetary policy flexibility and supportive institutional framework. This includes the country's independent monetary policy and track record of stable inflation and a floating exchange rate regime. In addition, Mexico has an active local currency fixed income and money market, which accounts for about 40% of GDP.

The 'A' transfer and convertibility assessment, three notches higher than the 'BBB' long-term foreign currency sovereign credit rating, reflects Standard & Poor's opinion that the likelihood of the sovereign restricting access to foreign exchange that Mexico-based nonsovereign issuers need for debt service is significantly

lower than the likelihood of the sovereign defaulting on its foreign-currency obligations. Mexico's open foreign exchange regime and outward-oriented economic policies suggest a lower likelihood of resorting to such restrictions in a downside scenario than for more interventionist sovereigns. Current account receipts account for 34% of GDP.

"The stable outlook reflects our expectation of policy continuity through another presidential and Congressional election cycle, with elections scheduled for July 2012," Ms. Schineller added. "We expect that the level of drug-related violence will remain high over the next several years, but not have a material impact on economic policy, but weigh on more robust growth prospects," she explained.

We could raise the ratings

amid signs of stronger medium-term public finances and growth prospects. This could occur, for example, if the next administration puts in place policies that strengthen the general government (central and local) non-oil revenue base or encourage more domestic investment. Conversely, we could lower the ratings if Mexico's medium-term investment and growth prospects were to deteriorate further compared with its peers'. This would likely hurt the profile of Mexico's government debt and fiscal balances and could weaken public support for the current fiscal and monetary policy framework.

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## Interdependence Between Insurers And Banks Could Weaken Under Basel III And Solvency II

In Standard & Poor's view, the Basel Committee on Banking Supervision's new global standards for banks' liquidity and capital adequacy (Basel III) and the EU's Solvency II directive could interact with unintended consequences (*see "Basel III And Solvency II Could Have Unintended Cross-Sectoral Consequences," published Feb. 28, 2012*). By tightening the regulatory requirements in the aftermath of the financial crisis, global policymakers may inadvertently damage the cross-sectoral links between

insurers and banks. The world's insurance and banking sectors are interdependent: insurers need to invest the premiums they receive from policyholders safely, while banks need to finance their operations.

Through Basel III, regulators are prompting banks to strengthen capital, obtain more long-term financing, and replace existing hybrid capital structures with hybrid instruments that are much more like equity. At the same time, through Solvency II, regulators may be introducing incentives for insurers in

Europe to reduce their exposure to banks. So far, insurers have shown little appetite for the enhanced equity features of banks' newer hybrid instruments. If this pattern holds when Solvency II takes full effect, the cost of bank capital may rise, dampening bank credit quality and global economic well being.

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## U.S. Military Entities 'AA-/A-1+' Rating Affirmed, Off CreditWatch Negative

Standard & Poor's affirmed its 'AA-/A-1+' corporate credit rating on Dallas-based Army & Air Force Exchange Service (AAFES). The outlook on the long-term rating is stable.

We also affirmed our 'AA-/A-1+' corporate credit rating on Virginia Beach, Va.-based Navy Exchange Service Command (NEXCOM) and Quantico, Va.-based Marine Corps Community Services (MCCS). The outlook on the long-term rating is negative.

We removed our ratings on these government-based entities from CreditWatch, where we had placed them with negative implications on Dec. 2, 2011.

"The ratings on AAFES, NEXCOM, and MCCS reflect our opinion that there is a very high likelihood that the U.S. government would provide timely and sufficient extraordinary support to the entities in the event of financial distress," said credit analyst Helena Song. The ratings also reflect our expectation that stable operating performance and solid credit metrics will continue to support the stand-alone credit risk profile for the three entities.

The 'AA-' rating on AAFES is based on the company's stand-alone credit profile of 'a', plus a two-notch uplift reflecting the very high likelihood of extraordinary support from the U.S. government in the event of financial distress, whereas the 'AA-' rating on NEXCOM and MCCS is based on the companies' stand-

alone credit profile of 'a-', plus a three-notch uplift. In accordance with our criteria for government-related entities, our view of a very high likelihood of extraordinary government support is based on our assessment of the entities as follows:

- Each company's very important role as a provider of service to military personnel around the world. A default of each entity would have a major to manageable impact on the government.
- The very strong link between AAFES, NEXCOM, and MCCS—which are all U.S. Department of Defense entities—and the U.S. government.
- Although there have been no historical needs for extraordinary support, we believe the government will provide sufficient and timely credit support to these entities based on its policies.

In our opinion, these government-related entities are an integral part of the U.S. military structure. They provide retail services at competitively low prices to military personnel and their families through a network of stores on military bases. AAFES and NEXCOM also support morale, welfare and recreational programs, designed to enhance the lives of service members and their families. As such, at least 50% of AAFES' earnings and about 70% of NEXCOM's earnings are distributed in the form of a dividend to support these programs. The funds



that are not distributed are reinvested in their earnings.

The 'a' stand-alone credit profile on AAFES reflects our view of its "strong" business risk profile and "modest" financial risk profile under our criteria, whereas the 'a-' stand-alone credit profile on NEXCOM and MCCS reflects our view of their "satisfactory" business risk profile and "modest" financial risk profile. The entities' unique and captive customer base and their ability to offer low prices have supported their stable operating performance.

Although AAFES uses external funding mainly to support growth in the deferred payment program offered to customers, its credit metrics remain solid.

NEXCOM and MCCS both have maintained a very conservative financial policy, which is evident in their solid credit metrics.

We expect that stable operating performance and solid credit metrics will continue to support the stand-alone credit risk profile for all three entities.

Although our ratings outlook on the U.S. government is negative, our outlook on AAFES is stable. Based on our government-related entity criteria, a future downgrade of the U.S. to 'AA' would not result in another downgrade of AAFES. We also expect that stable operating performance and solid credit metrics will continue to support the 'a' stand-alone credit risk profile on AAFES.

On the other hand, the ratings outlook on NEXCOM and MCCS is negative. Based on our criteria, a downgrade of the U.S. would result in a downgrade of these entities. For example, we would lower our corporate credit rating on NEXCOM and MCCS to 'A+' if we lowered our long-term rating on the U.S. to 'AA' or 'AA-'. Our 'a-' stand-alone credit profile should remain unchanged.

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## Clearer View Of Thai Flood Losses Underscores Negative Outlook For Thai Insurers

The devastating floods in Thailand late last year could mean much larger losses for Asia insurers than early indicators suggested.

Standard & Poor's estimates the current gross losses for insurers at about US\$16 billion to US\$18 billion. In a report, titled *"Thai Floods Dampen Asian Insurers' Earnings And Capitalization,"* published Feb. 29, 2012, Standard & Poor's also suggests that the higher-than-estimated losses could lead to negative rating actions on insurers in the region.

Insurers and reinsurers'

earnings announcements over the past few months have given a better picture of the possible extent of the losses. On-the-ground assessments by loss adjustment teams have led some insurers to raise their net loss estimates, in some cases by up to three times the initial estimate.

"Our outlook for the insurance industry in Thailand remains negative, reflecting our expectation of significantly lower earnings and possibly weaker capitalization among affected insurers," said credit analyst Connie Wong. "Some

companies may have sufficient reinsurance protection for ultimate losses or external sources for capital. However, overall we expect the Thai insurance sector to report bottom-line losses," she added.

Insurance losses have been so high in the Thai insurance industry that it has changed Standard & Poor's opinion on those markets being catastrophe-remote. "We expect the terms and conditions on catastrophe reinsurance to continue to tighten and catastrophe reinsurance capacity to remain tight, with reinsurance pricing

on catastrophe perils increasing significantly. However, we expect the underlying pricing for the non-catastrophe business to remain competitive and offset the overall upward pricing trend, especially in the Thai market," said Ms. Wong.

Standard & Poor's estimates accumulated gross losses for the big three Japanese insurance groups—Tokio Marine Group; MS&AD Insurance Group; and NKSJ Group—at ¥920 billion (US\$11.9 billion) with net losses of ¥447 billion (US\$5.8 billion). We believe that flood losses constitute more than two-thirds of the absolute loss because key losses have been from industrial parks, which have significant Japanese investment. Consequently, Japanese insurers have been hard hit despite their strong financial profiles.

Small regional reinsurers and local insurers would suffer the most if ultimate net losses are larger relative to capitalization. Losses of both local insurers and regional reinsurers could escalate sharply once their reinsurance protection is exhausted. While regional insurers and reinsurers will bear most of the Thai flood-related losses, global reinsurers will inevitably pick up some of these losses through their exposure to regional players. Nevertheless, global reinsurers' strong capitalization and reinsurance or retrocessional coverage should enable them to absorb these losses.

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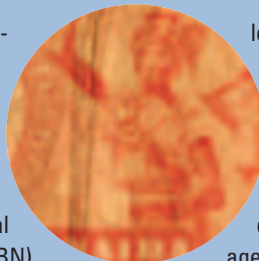
## Nigeria Has Made Good Progress In Overhauling Its Banking System

After more than two years of central bank support, Nigeria's commercial banks are again engaging with the domestic economy, Standard & Poor's said in a report examining the progress of an overhaul of the country's banking system. Nigeria now has fewer, but larger, banks, with better corporate governance and regulatory oversight. However, in our view the sector needs a longer regulatory track record before we stop considering corporate governance and regulatory oversight to be among its key risks.

In the report titled *"Strong Regulatory Action Proves Its Worth For The Nigerian Banking System,"* published Feb. 29, 2012, we note that in 2009, eight of the country's 24 banks had to be rescued after weak risk management and corporate governance

lapses caused nonperforming loans to rise to more than a third of total loans across the banking system. The Central Bank of Nigeria (CBN) responded strongly, removing executive teams from failed banks, fully guaranteeing the interbank market, and setting up the Asset Management Company of Nigeria to purchase a large proportion of nonperforming loans from Nigerian banks. It also set up sizable intervention funds to support credits to the real economy. Finally, it is facilitating a series of mergers between failed banks and their stronger competitors.

As a result of the CBN's efforts, the industry and its regulation have improved significantly. Fewer, larger institutions have emerged fol-



lowing a succession of mergers triggered by the sharp rise in nonperforming loans. In our opinion, risk management—particularly in higher-risk lending such as foreign currency loans and retail—and access to low-cost funding will be the key differentiators affecting banks' performance.

In our view, long-term success for Nigerian banks will chiefly depend on them enhancing their risk management, improving their governance, diversifying their loan portfolios, and securing their funding profiles.

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# Every Drop Counts

## Is Water The Most Valuable Liquid Asset?

### Overview

- Demand for water is quickly outstripping supply in many parts of the world, and the imbalance will only grow as industrialization and population growth continue to expand.
- Some estimates place the share of the world's freshwater supply devoted to growing food at about 70%, with industry and human consumption accounting for the rest. Demand in all three categories is growing.
- Questions about the institutional framework for allocating water, whether public, private, or some combination of the two, will likely become more pressing if the cost of providing clean water becomes harder to bear.

Is water the new oil? It isn't yet. But it's easy to envision a time in the not-too-distant future when water will be as avidly sought after, as important to economic development, and as intertwined with international and domestic policy as oil is today. To be sure, some regions around the world, from the deserts of the southwest U.S. to the arid provinces of northwest China, have long thirsted for enough water. But now this need has spread far beyond the traditional dry or impoverished areas of the world. Even as industrialization and population growth explode in the developing world, more people in the U.S. are now living in dry areas once considered only marginally habitable. And to fund the significant water utility and infrastructure projects needed to meet growth, borrowers across the globe will increasingly turn to the capital markets.

At the same time, efforts to boost the global water supply are likely to be influenced by concerns about environmental degradation, cyclical droughts, long-term climate change, and, paradoxically, even flooding. The critical question of what the institutional framework for allocating this increasingly scarce resource will look like—whether public, private, or some combination of the two—will inevitably come to the fore as nations, and regions within nations, compete to provide water.

The United Nations projects that under moderate fertility estimates global population will grow 33% between 2010 and 2050, and even more if birthrates don't fall as much as it expects. But even now, the imbalance between global water supply and demand is growing. According to the 2030 Water Resources Group, the existing sustainable global water supply currently stands at 4,200 billion cubic meters, while withdrawals are already at 4,500 billion cubic meters. That deficit will only grow as usage keeps rising—to a projected 6,900 billion cubic meters by 2030. But steps to reduce consumption or demand through better water conservation, recycling, desalination of seawater, and technological innovations in industries that use great amounts of water could narrow, or perhaps even eliminate, this gap.

These measures will cost money, however, and it isn't clear where the funding will come from. Already, the cost of water is rising: In the year ended July 2011, the price for water rose an average 6.8% around the world, according to Global Water Intelligence, and about 8.1% in the U.S. Standard & Poor's Rating Services expects that as with oil, the world could eventually face volatile prices, uncertain supplies, and increasing social unrest related to water, as well as the prospect of stunted economic growth as its water shortages deepen.

### Where Does The Water Go?

Water is interwoven with the global economy to a degree that might at first be hard to imagine. The greatest use of water by far is agriculture: Some estimates place the share of the world's freshwater supply devoted to growing food at about 70%,

with industry and domestic use accounting for the rest. But the share of water devoted to agriculture could rise with a change in the mix of agricultural production. The developing world's growing middle class, for instance, has begun to move toward a more Western diet, with its emphasis on meat. Conservationists and the cattle industry differ on how much water is necessary for beef production, for example. But some midpoint estimates conclude that it takes about 2,000 gallons of water to make one pound of beef—as opposed to 500 gallons for a pound of chicken or 100 gallons for a pound of potatoes. When total current and future irrigation needs are considered—especially for such water-intensive staples like rice or cotton—it's clear that water supplies are likely to be strained.

The growing world population will also require more electricity, and power production consumes the lion's share of water for nonagricultural industry. That includes not only hydroelectric power, but water for cooling and other uses at power plants. As recently as 2005, the U.S. Geological Survey estimated that production of electricity (excluding hydroelectric power) uses about 201,000 million gallons of water each day, accounting for 49% of total water use in the U.S. Moreover, power plants draw about 70% of this water from freshwater sources—and they sometimes return it to the environment either polluted or too hot (or both), which causes environmental damage and further diminishes supply.

The saying that “oil and water don't mix” can be more than just a metaphor. Take the example of shale oil. Although it is not yet a major source of oil, shale-oil production is growing: A 2006 report from the U.S. Dept. of Energy Office of Petroleum Reserves estimated that producing one barrel of shale oil in the American west requires from one to three barrels of water, depending on the process used. (One barrel is the equivalent of 42 gallons.) Therefore, a field producing 1 million barrels daily would require at least 42 million gallons of water each day. In addition, the U.S. government believes population growth around new shale oil fields would further boost water needs.

Assuming that this growth eventually totals another 177,000 people across a given 1,000-barrel-a-day region, the government estimates the need for another 24 million gallons of water per day. Thus, producing 1,000,000 barrels a day translates into a total need for at least 86 million more gallons of water each day, and as much as 150 million gallons. And these numbers go up as production increases. There is no assurance that the industry will always have the water it needs, especially in regions where supplies are already subject to the competing needs of agriculture, industry, human consumption, and periodic drought.

A similar trend holds for the newer technology of hydraulic fracturing, or hydrofracking, of shale formations for natural gas. Hydrofracking is already a booming business in some states and will likely grow, considering natural gas's reputation as one of the more environmentally friendly fuels for power production. But a single well can use anywhere from 3 million to 9 million gallons of water, according to scientists at the New York State Water Resources Institute. A well requiring 4.5 million gallons of water, for instance, would use the same amount of water as all of New York City draws in seven minutes, according to one energy company estimate. But industry observers expect the number of hydrofracking operations to keep growing. Moreover, because fracking involves chemicals as well as water, environmentalists have raised vigorous concerns about the potential of these operations to contaminate groundwater.

While power production accounts for the lion's share of water consumption in industry, other sectors are also vulnerable to water shortages. Semiconductor makers, mining companies, beverage companies, and chemical manufacturers all have a vested interest in securing enough water. When production facilities are in areas where water availability is at risk, these companies can face lost production, higher costs, and lower profits.

### Who Will Control The Water Supply?

In the U.S., the largely public ownership of water has often offered an implicit



assurance that it will be readily available, relatively cheap, and usually safe. But in some cases the cost of providing clean water may become more than public authorities are willing or able to bear. Rather than raise taxes or float debt, the government (in the U.S., often a municipality or county) can sell its waterworks to investors, use the proceeds to cover other budget shortfalls, and let the private sector raise funds for capital improvements. The flip side is that as with the privatization of other public infrastructure, the cost of service tends to rise. Advocates of privatized systems say the cost increases are due, in part, to public authorities' past underinvestment.

While the U.S. water utilities remain largely investor-owned, England has taken a different road, privatizing all its water utilities in 1989 under Prime Minister Margaret Thatcher, who believed that they would operate more efficiently under private ownership. These privately owned waterworks, however, are still subject to regulatory oversight. And some nations, such as France, operate most of their waterworks through a system of public-private partnerships where, for example, the private sector takes on the costs of maintenance and distribution under contract from the state.

How to best allocate water is a philosophical question with no clear answer. Practically speaking, any system can deliver the goods. The mandates for safety and delivery will be similar. And in both industrialized and developing nations, investor-owned, public, and public-private systems have all been tried with varying degrees of success. But since water is a necessity, one can argue that the government should subsidize its price sufficiently to ensure that everyone gets what they need, rather than let the free market set the price. Theoretically, pricing water according to market forces will allow for greater investment in water utilities, more efficient operations, and a bias toward conservation when water is scarce. But such a system can also render some people or industrial users

unable to pay, while public ownership may result in lower water prices.

### Too Much Water, Or Too Little?

While the need for water is only growing, the impact of drought, flooding, or long-term climate change on availability complicates the ways in which the world will learn to address this demand. Some scientists are already blaming global warming for the years-long drop in the Colorado River, one of the largest water sources in the western U.S. Droughts have taken their toll in Texas and parts of the southeast U.S. as well in recent years. Similarly, scientists worry that a drought in eastern England that has spanned many years might be partly attributable to climate change. This drought could hurt the region's economy without additional supply or significant conservation measures, and operating costs for local power and water companies could increase enough to affect their credit ratings.

Too much water can be a problem as well. Eastern England faces the double whammy of both drought and flood risk. While flooding from rivers is expected to be limited, rising sea levels are a risk, as much of the area is below sea level and on a flood plain, and Norfolk and Suffolk have some of the fastest eroding coastlines in Europe.

Many parts of the U.S. are also in flood areas, where the problem is too much rather than too little water. Yet residential and business construction has gone forward in these areas, in part, because since 1968 the U.S. government has taken the lead in providing flood insurance through the National Flood Insurance Program. By contrast, private insurers offer virtually no flood insurance, citing the difficulty in modeling for flood losses. They offer only limited coverage on some high-value properties. That raises questions about what the economic impact of higher rates among private insurers would be if they offered flood insurance more widely. The NFIP is set to expire on May 31, 2012, although efforts in Congress to extend it are underway.

Would less flood insurance or sharply higher rates deter further development in flood-prone areas of the country? Might the political pressures on the government to cut spending encourage policymakers to reduce or even eliminate its involvement in flood insurance? If, as some scientists believe, changing weather patterns are increasing the risk of U.S. coastal flooding, the only sure thing is that however the issue plays out, it is likely to result in significant financial losses for someone. The only question is for whom.

The U.S. is at a point where conservation measures are beginning to level out water use. And new sources of water can also help ease shortages. Several areas in the U.S. have begun planning to desalinate water, either from the sea or from brackish water (saline, non-ocean sources). Operations to render salt water drinkable have been more commonplace in parts of the world where freshwater was always in shorter supply, such as the Middle East, but are rarer in the world's temperate zones. The drawbacks are still cost and operational complexity. And while those are definite credit risks, the successful operation of a desalination plant can also enhance a water utility's credit quality because it can assure its customers of adequate supply.

If nothing else, meeting the world's growing need for water will be expensive. The funding necessary to build the infrastructure to meet that need, from dams and desalination plants, to local pipelines, will be enormous—and governments, private investors, and individuals alike will bear the cost. Some may balk. But water is life itself. And for life, somehow, we suspect we will all find a way to pay. **CW**

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# Is The U.S. Water Sector Approaching A Tipping Point?

**F**or centuries, man has known that water is key not only to life but also to economic development. As populations and economic output have grown, so has the demand for water. In the past century, worldwide demand for water tripled, and currently it is doubling roughly every 20 years. And as higher standards of living have lead to greater per capita water use, demand in many parts of the world has begun to outstrip available supplies.

Based on its current projections of population and economic growth, The 2030 Water Resources Group projects that by 2030, water use will be 40% greater than the current sustainable supply (see table 1), and that a third of the world's population—mostly in developing countries—will face a deficit larger than 50%. Such a projected supply gap would be alarming under any conditions, but it is even more so considering that the water utility sector has historically been afflicted with insufficient planning, underinvestment, and inefficient markets.

Water availability is almost always a local or regional issue, and supplies vary widely based on surface distribution, climatic conditions, and chemical quality. The physical scarcity of water in some areas and the inequitable distribution of it in others could push the growing water scarcity into a full-blown global crisis within the next decade. Although these factors are relevant globally, they pose the greatest risks in sub-Saharan Africa, several cities in India, the great plains of China, the Middle East, southeastern Australia, and the western and southwestern U.S., where water is already scarce.

Table 1 **Aggregate Water Demand/Supply Imbalance\***

Bil. cubic meters				
	Current withdrawals	Existing sustainable supply	2030 projected use	Deficit (%)
Global	4,500	4,200	6,900	(39.10)

\*Assumes no efficiency gains.  
Source: The 2030 Water Resources Group.

Table 2 **Average Water Tariffs In Select Countries, 2011**

	Combined tariff price* (\$/1,000 gal.)	Change (%)	Domestic use (gal./person/day)
Denmark	33.43	0.10	30
Australia	21.88	11.50	160
Germany	20.29	1.80	40
France	17.26	(0.60)	61
United Kingdom	16.18	3.90	37
Czech Republic	13.74	5.70	56
Canada	11.89	7.50	205
Poland	11.81	17.80	39
United States	10.27	8.10	163
Japan	9.69	0.20	98
Portugal	8.59	0.60	81
Turkey	8.10	10.50	63
Italy	6.85	11.60	127
Russia	3.76	21.90	97
South Korea	2.88	0.20	146
Mexico	2.61	2.80	53
China	1.74	5.70	25
India	0.57	1.80	37

\*Average price among cities. Combined tariff includes water and wastewater tariffs.  
Source: Global Water Intelligence.



## Overuse Of Groundwater Is Causing A Supply/Demand Imbalance

Of the total amount of water on the planet, only 3% is fresh water. Of this, 70% is frozen in glaciers or under the permafrost, 29% is in underground aquifers (groundwater), and only about 1% is in free-flowing rivers, streams, and lakes (*surface water; see note 1*).

These crucial groundwater reserves are increasingly being drawn in nonsustainable ways. In many places around the world, withdrawal rates from groundwater aquifers are exceeding replenishment rates, resulting in land sinkage. Agriculture has been a key cause of this overuse because a significant proportion of the water drawn for agricultural purposes is lost to evaporation and runoff.

Agricultural yields in both rain-fed and irrigated areas grew about 1% annually between 1990 and 2004 (*see note 2*). Industrial output using water improved by a similar rate. If agriculture and industry sustain this rate through 2030, the increase in supply through efficiency improvements would offset only 20% of the expected increase in demand. Similarly, a business-as-usual supply build-out, assuming constraints in infrastructure rather than in the raw resource, would offset an additional 20% of the gap. What's more, closing the supply and demand imbalance using nontraditional supply measures—such as desalination, rainwater harvesting, gravity transfers, and national river-linking projects—is unlikely to work because such measures face a steep marginal cost curve (the production cost of the highest-cost producer required to serve demand).

### Urbanization and climate change put water supplies at risk

The recent trend of large population movements into arid and semi-arid regions around the world has put additional strain on existing water supplies. By 2030, urbanization is expected to result in 60% of the world's population living in cities (*see note 3*). Replacing vegetation and open land with impervious surfaces such as roads, housing, etc. constrains a river's natural runoff, essentially damming up the

river within the city. Thus, urbanization compounds water scarcity by putting stress on water supplies, leading to floods in some areas and droughts in others.

There is also a tremendous focus on how future climate change will affect the planet. In 2011, some of the worst floods in history hit Thailand, Australia, and Cambodia, causing widespread destruction and economic disruption. For instance, Thailand's GDP was slashed as much as 1.5% after its flood. In addition, severe droughts have affected regions in Australia, China, the Middle East, East Africa, and the southern U.S. The 2007 drought in southeastern Australia's Murray-Darling basin knocked 1% off that country's economic growth that year (*see note 4*).

Chart 1 **Total 20-Year Needs Of U.S. Public Water Systems, By Project Type**

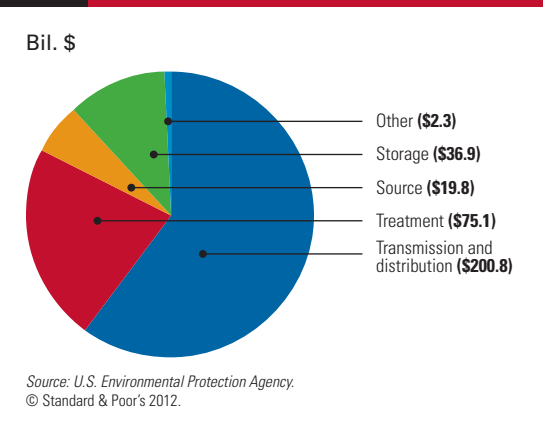
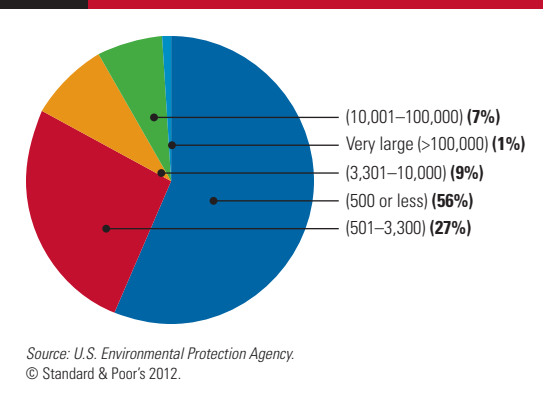


Chart 2 **Water System Size Category By Population Served**



Why governments give lower priority to water-related issues than to climate change issues is unclear, especially considering that most scientists believe the majority of water-related risks are relatively near-term compared with the damage expected from global warming. Climate change will, however, likely exacerbate the problem of local water availability in many countries because of expected rises in sea level that would lead to significant changes in the timing and magnitude of water runoff.

#### Investment in infrastructure is crucial

Access to water in many parts of the world is limited based on natural constraints and infrastructure capacity. Without an equitable approach to closing the supply and demand imbalance, The 2030 Water Resources Group estimates that a supply-only solution would require an additional \$200 bil-

lion investment annually in upstream water resource spending above current spending levels. This is about five times the current annual global expenditure on supply infrastructure.

In the U.S., for instance, infrastructure is failing at an increasing rate each year. The Environmental Protection Agency (EPA) estimates that the public water system will need about \$335 billion in investments over the next 20 years—more than double the estimate from as recently as 2002 (*see chart 1*). And industry experts estimate that at the current rate of investment, it would take about 900 years to replace the U.S. water infrastructure.

#### Water Is Still Undervalued As An Economic Resource

Water is a finite resource, and it has no substitute. Its sustainability depends on it being valued properly to pay for infrastructure upgrades and to stimulate

Table 3 Combined Water Tariffs In Select U.S. Cities

	Combined tariff* (\$/1,000 gal.)	Year-over-year change (%)
Atlanta, Ga.	23.42	12.4
Seattle, Wash.	21.35	N/A
Portland, Ore.	20.45	7.0
San Francisco, Calif.	17.27	6.8
Columbus, Ohio	14.54	6.8
Boston, Mass.	12.56	2.8
New York City, N.Y.	10.98	7.5
Detroit, Mich.	10.62	9.7
Philadelphia, Pa.	10.61	6.2
Washington, D.C.	10.54	16.0
Nashville, Tenn.	10.50	5.3
Minneapolis, Minn.	10.21	4.3
Los Angeles, Calif.	9.38	9.0
Cleveland, Ohio	9.23	24.0
Indianapolis, Ind.	9.08	14.8
Louisville, Ky.	8.50	4.7
Dallas, Texas	7.73	2.8
San Antonio, Texas	6.47	(1.9)
Memphis, Tenn.	4.20	41.6
Chicago, Ill.	3.73	0.0
<b>Average of 20 cities</b>	<b>11.57</b>	
*Combined tariff includes water and wastewater tariffs. N/A—Not available. Source: American Water Intelligence.		

## Types Of Water Scarcity

### Physical Water Scarcity

Arid regions are most often associated with physical water scarcity. Yet, water can be scarce even though it seems to be abundant because resources are overcommitted from overdevelopment of hydraulic infrastructure, most often for irrigation. In such cases, there simply is not enough water to meet both human and environmental demands. Symptoms of physical water scarcity are declining groundwater and water



allocations that favor some groups over others (*see also sidebar 2*).

### Economic Water Scarcity

Economic scarcity results from a lack of investment in water infrastructure that prevents people from getting enough water for agriculture or drinking. Even where infrastructure exists, water may be distributed inequitably. Much of sub-Saharan Africa, for instance, faces economic scarcity.

exploration for new supplies. In an efficient market, a supply and demand imbalance and constraints on a valuable resource should normally draw new investments and spur regulatory policies that augment supply. Yet, no new investments are being made, and the supply and demand gap is widening. Why?

In many parts of the world, including the U.S., water allocation is handled by governments rather than by free markets. Local government policies have often kept water prices below the cost of service, resulting in a financing gap that is usually made up by intra-governmental cash transfers or taking on new debt (or reducing future spending for operation and maintenance). And when a commodity's true price is not reflected in the rates consumers pay, the commodity is often overused. We have identified two main reasons why water has not been viewed as an economic resource in the U.S.: asset ownership and a fragmented industry.

#### Asset ownership affects the cost of credit

In the U.K., privatization starting in 1989 has resulted in 10 large investor-owned water utilities, representing more than 85% of the country's total systems. But in the U.S., only 16% of the water systems are investor-owned. The vast majority are local municipality- or government-owned systems, which have hitherto relied on municipal tax-exempt debt to finance their capital needs. By taking advantage of the credit support from a city or state government, these

systems have been able to access debt cheaply, and the cheaper sources of capital have tended to crowd out more expensive private capital. Now, because of economic conditions, state and local government budgets are constrained and their credit strength is under pressure just when the water sector needs capital to fund growing maintenance and expansion programs.

In addition, the water industry generally is the most capital-intensive of the various utility sectors; the capital-investment-to-revenue ratio is about 3.5x (*partly because rates are kept artificially low; see note 5*). This means that a water utility must invest \$3.50 for every dollar it expects to generate, almost twice that of electric utilities, the next-highest capital-intensive industry. It is not unusual for a water utility to spend three times its annual depreciation on capital expenditures. As a result, most water systems need continual access to external funding sources.

#### Fragmentation has led to inefficiency

The fragmented nature of the U.S. water industry underscores the large capital needs. According to the EPA, the U.S. has 52,873 community water systems supplying most people's drinking water. Of these systems, 4,217, or 8%, serve more than 246 million, or 82%, of the total population (*see chart 2*). Small systems are less able to raise the capital to meet regulatory requirements. It is no coincidence that most regulatory violations occur in systems that serve fewer than

20,000 customers. Although competition tends to encourage consolidation, water assets in the U.S. are relatively difficult to buy or sell because most water systems are so small that it is uneconomical to purchase them without significant regulatory support. Only if a single company captured the entire market and exploited all the potential for lower unit costs through increases in scale could production be organized as cheaply as possible.

#### Prices Have Started Reflecting Scarcity

In the U.S., the largest locations facing water stress are, predictably, the country's most arid areas: the Colorado River region, California, and the Great Basin in Nevada. These regions have experienced drought conditions resulting from cyclical weather patterns, but the real concern is that in many places, water woes are now structural. For instance, according to the Texas Water Development Board (*TWDB; see note 6*) Texas needs about 18 million acre-feet of water per year. However, as aquifers become depleted, the existing water supply is expected to decline to about 15.3 million acre-feet from an already inadequate 17 million acre-feet.

In areas where demand has begun to outpace supply (*see chart 3*), market mechanisms are being structured so water can be allocated where it is needed the most. For instance, organized markets for tradable water entitlements or rights have emerged (*see sidebar 2*) in Phoenix and in the Murray-Darling Basin in Australia. Prices for wholesale water (also called "raw"

water) are increasing as water is reallocated from irrigation to municipal consumption.

The cost of supplying water services varies with local labor rates, the rate of infrastructure maintenance and replacement, and water scarcity, among other factors. Data from the Bureau of Labor Statistics shows that the cost of water and wastewater treatment services has risen faster than the consumer price index (CPI; see chart 4). Although labor costs generally rise with GDP, infrastructure-related spending varies by system age and size, regulatory service

mandates, and the ebb and flow of financing. Water scarcity can force a utility to spend more on expensive marginal sources of drinking water (such as desalination and wastewater reuse) or reduce the volume available to customers, which means utilities must raise the price per unit of water sold so total revenues will cover fixed costs.

**Tariffs On Delivered Water Are Also Rising**

Prices for delivered water vary widely around the world (see table 2).

Chart 3 U.S. Regions Experiencing Water Stress

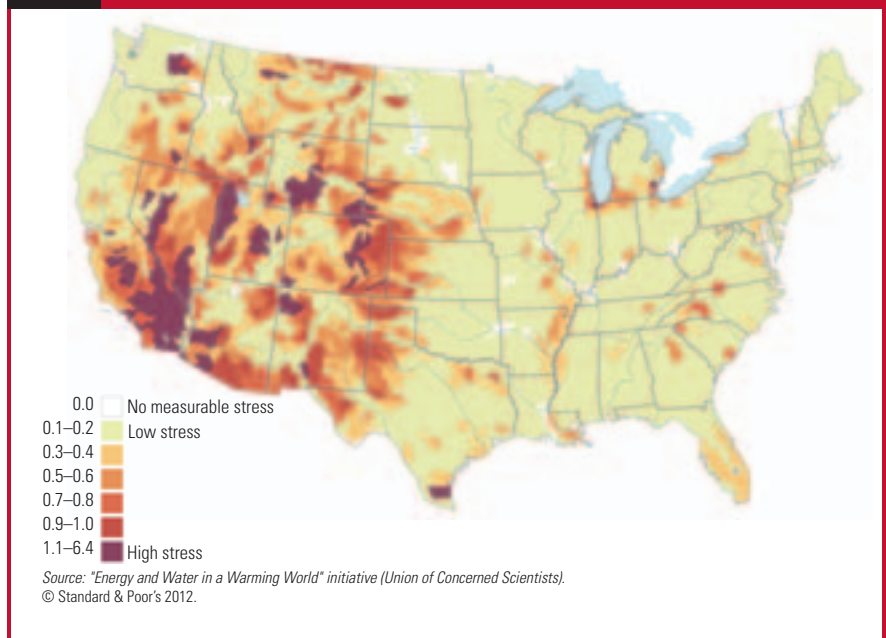
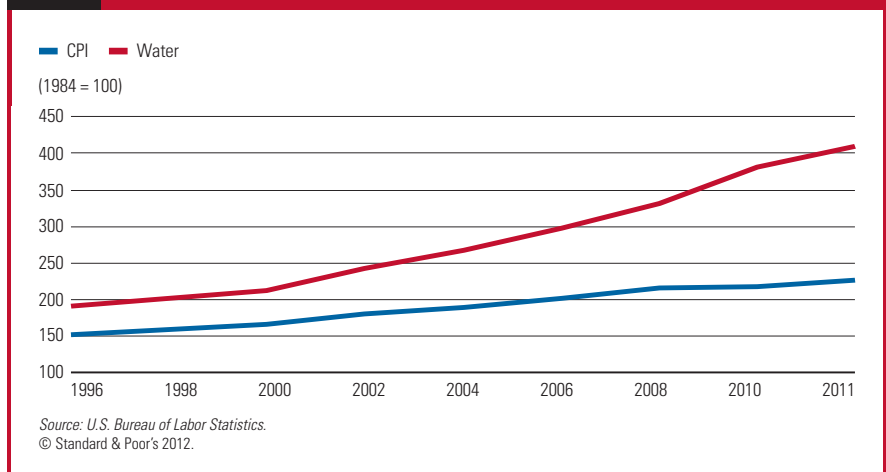


Chart 4 Average U.S. Water And Sewage Cost Increase Compared With CPI





According to Global Water Intelligence, water tariffs globally rose an average of 6.8% (at constant exchange rates) for the 12 months ended July 2011. Over the corresponding period, average combined tariffs in the U.S. rose about 8.1% even as the CPI rose 3.6%.

Although average U.S. tariffs are up, the increase is primarily the result of a few cities pursuing large rate hikes, typically to fund major capital programs (see table 3). Most capital expenditures, in fact, are undertaken to enable compliance with federal mandates, such as for water and wastewater disinfection, water storage, and

sewer overflows. Cities have had to raise water prices because other financing options have disappeared since the economic slowdown.

Even though water prices in the U.S. have risen faster than elsewhere in the world, U.S. tariffs are still about half of those in northern Europe, for example. Still, because American consumers use nearly twice the water per capita as northern Europeans, the actual household water bills in the two regions are not much different. However, the result is that operating surpluses that go toward paying for capital projects are typically smaller in

the U.S. than those in Europe. It is inevitable that all U.S. water and sewer utilities will eventually have to increase their operating surpluses to European levels because the historical reliance on municipal, city, or state funding has simply dried up.

### Credit Implications For The Sector

From a credit perspective, the U.S. investor-owned water utility industry is one of the most stable and highly rated sectors among U.S. industrials. Yet, we expect to see plenty of ripples in the overall water sector as it grapples with its considerable challenges.

## What Are Water Rights?

Water rights and water allocation arrangements reflect differing traditions and conditions. Where water is concerned, when demand exceeds supply, the challenge for governments is to allocate it fairly.

Water rights and water allocation programs in the U.S. have largely been under the states' purview. Broadly, there are three types of water rights, and groundwater allocation policies may often incorporate some combination of these options.

### Riparian Rights

Riparian rights are the basic rules used to allocate water in the eastern U.S. (broadly defined as the region east of Kansas City). Under this doctrine, the right to use water from a stream or lake belongs to whoever owns the land on the bank. Every riparian owner is entitled to use water as the stream flows through the landowner's property. These policies evolved in an area where water is generally plentiful and government involvement is minimal.

Two rules generally govern how much water a riparian owner may use. The older rule holds that a landowner must leave the natural flow of the river unchanged, without altering the rate of flow, the quantity, or the quality of water, so that downstream riparian owners have the water in its natural condition. The new rule of reasonable use states that each riparian owner may use the water, regardless of the natural flow, as long as their use does not cause unreasonable harm to any downstream riparian user.

### Regulated Riparian

Increasing population and development in the eastern U.S. have magnified the problems of water distribution. In response, most states have overlaid the traditional riparian system with new administrative schemes, such as permit systems, for regulating water use. These schemes have been dubbed "regulated riparian." The most important feature of these statutes is that

direct users of water must have a permit from a state administrative agency to use water. However, the concept of reasonable use may be applied differently from the common law riparian doctrine.

### Appropriation System

The arid climate of the western U.S. is less conducive to the riparian system. It was obvious that most of the land in the West required irrigation for settlements. Limiting the use of streams only to those on adjoining land would have drastically curtailed the settlement and development of the new lands, rendering non-riparian lands practically useless. As a result, early western settlers developed an appropriation system, which was later codified by court decisions, constitutional provisions, and state statutes.

In contrast to a riparian right, an appropriation right is independent of land ownership. Users may buy a certain quantity of water for a beneficial use. The major concept here is "beneficial use," which is a fundamental aspect of western U.S. water law. The appropriator can use only the amount of water it currently needs, allowing excess water to remain in the stream. Once the water has served its beneficial use, any excess or runoff must be returned to the stream. Unlike riparian rights, which remain in effect whether the landowner uses the water or not, appropriation rights are held only as long as the user continues proper beneficial use. These rights can be traded and are subject to forfeiture for non-use. The Northern Colorado Water Conservancy District and the middle Rio Grande market in New Mexico are two of the most actively traded water rights in the U.S.

Appropriation rights are never equitable because first-in-time appropriators are guaranteed an ascertainable amount of water and have priority over later appropriators during water shortages.

*Source: American Water Works Assn. (Manual of Water Supply Practices).*

In sharp contrast to the U.S. electric and gas utility sectors, which are largely investor-owned, about 85% of the water sector and almost the entire wastewater segment is municipally owned. Water departments have been cash cows for municipalities and cities, and financing to fund capital spending programs was readily available. Now, these issuers are witnessing a sea change. Repair and maintenance expenditures are increasing as water systems age and become less compliant with

nisms. Standard & Poor's views such recovery mechanisms, under which companies recover capital investments outside of traditional rate cases, as particularly beneficial to credit quality because of the scale of the cash flows affected by these investments. Such mechanisms currently exist in California, Connecticut, Delaware, Illinois, Indiana, Missouri, New Hampshire, New York, Ohio, and Pennsylvania, and were recently introduced in New Jersey. The regulatory compact has thus far worked well.

## We consider the state regulatory environment to be the most significant credit variable for investor-owned water utilities.

EPA regulations, and many municipalities have not initiated financing for the upkeep of their facilities because of deteriorating balance sheets and burgeoning deficits. Given the current low level of interest rates, we think deferring such spending is a lost opportunity. We believe the American Recovery and Reinvestment Act, which provided stimulus money to a number of water and wastewater systems, has only delayed the inevitable. To generate public-budget revenues or to reduce public outlays, taxes, and borrowing requirements, we expect to see private enterprises increasingly buying midsize (10,000 to 20,000 customers) municipal systems. Midsize water systems account for about 10% to 15% of the U.S. water sector.

As with electric and gas utilities, we consider the state regulatory environment to be the most significant credit variable for investor-owned water utilities. Some characteristics that we consider critical to our evaluation of a water utility's regulatory risk are the timeliness of rate orders, the use of forward-looking financial measures, and the application of various cost and investment tracking mecha-

The viability of the regulatory compact is becoming increasingly critical in enabling water utilities to access the public debt markets because all water entities have large capital spending requirements and need a continual source of financing. However, achieving a viable compact may be easier said than done. Water still remains the most affordable utility; a typical bill represents only about 0.5% to 1.0% of U.S. disposable household income. As a result, cost increases thus far have not faced significant regulatory or political resistance. In the case of public companies, we often do not know what the cost of delivered water is because the cost is buried under subsidies and sunk costs of municipal and regional water departments. Yet, evidence is mounting that water stress is increasing, and water prices in the U.S. will inevitably have to rise. Over time, as stress turns into scarcity and regulators face requests for significant rate increases, economic decisions will have to be depoliticized.

Still, we believe that as prices rise, so will incentives for technological innovations, ways to reduce demand,

and opportunities to recycle and reuse this commodity. Innovations will also occur in the financial markets and in the structure adopted by sponsoring entities. For example, the introduction of public/private partnerships such as leases and concession contracts can introduce competition and provide greater flexibility for private-sector providers to meet the needs of municipally owned water utilities. **CW**

### Notes

- (1) Source: "The Water Problem," Global Policy Forum (Oct. 8, 2007).
- (2) Source: The 2030 Water Resources Group.
- (3) Source: "World Urbanization Prospects," Department of Economic and Social Affairs, population division, United Nations (July 30, 2007).
- (4) Like their counterparts elsewhere in the world, Australian engineers pockmarked the Murray-Darling basin with dams, weirs, and locks. By the 1990s, the drawbacks were evident: States were allowing irrigators to use too much water. By 1994, humans were consuming 77% of the river's average annual flow. The mouth of the river began to silt, and the city of Adelaide, which draws 40% of its municipal supplies from the river and up to 90% when other reserves dry up, started experiencing water scarcity.
- (5) Source: "A Fresh Look At U.S. Water And Wastewater Infrastructure: The Commercial And Environmentally Sustainable Path Forward," David Haarmeyer (Journal Of Applied Corporate Finance, Summer 2011).
- (6) Source: "Water for Texas 2012 State Water Plan," Texas Water Development Board.

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# From Public To Private And Sometimes Back Again

## The Shifting Dynamics Of Water Utility Ownership

The subtitle for *“The Hobbit”*—the famous fantasy novel by JRR Tolkien, and a prequel to *“The Lord Of The Rings”*—is “Or, There And Back Again.” The plot follows the quest of a “hobbit” named *“Bilbo Baggins”* to win a share of the treasure guarded by the dragon, *“Smaug.”* Similarly, as water becomes an increasingly scarce resource, the industry’s structure too has had its version of “there and back again” in its quest for unlocking the value of this “precious” commodity.

### Overview

- Water utilities around the world provide one of mankind’s basic needs.
- Public ownership versus private ownership of water utilities has been debated since the rise of the industrial world.
- Ultimately, it seems public ownership will retain its dominance in the U.S.



The history of ownership of water systems in the industrial world has been dynamic. Public interest—and ownership—has been a constant even as it has swung from passive involvement to active ownership. We believe that there are three principal reasons for this, all based on the central tenet that water is unique: public health, increasing cost of delivery, and the monopolistic nature of water management (*see note 1*). Governments have been wary about ceding responsibility for such an essential commodity, arguing that anything vested with so critical a public interest is best retained under the auspices of city authorities, free from concern for profit motive. But there has been no consistency in practice of maintaining ownership at all times and in all places.

Because consumers wanted access to water without having to pay for it—and expected their governments to comply with that expectation—by the end of the 19th century the policy pendulum on water in the industrial world had shifted squarely in favor of government ownership and away from the numerous private owners until that time. By 1915, the U.K. had nearly 800 public waterworks, serving an estimated two-thirds of the population. Similarly, by the outbreak of World War I, France was supplying two-thirds of its major cities through municipal *régies* (*see note 2*). By the 1920s, the U.S. had 9,850 public systems serving most people's water needs. The low proportion of investor-owned water utilities contrasted sharply with the nearly all-private pattern in the electric and gas utility sectors.

transferred the provision of operational services to the private sector (*see note 3*). In between those two extremes are many models of public-private partnerships (PPP). For example, a city might transfer the operations of water networks for certain periods of time through contractual arrangements, as is practiced in France. The transfer is temporary because of the vital importance of the water system, which the city does want to eventually control.

#### France

The first franchise contract for water distribution in France was in 1782, when authorities granted the Perrier brothers exclusive distribution rights in Paris for 15 years. Since 1950, many municipalities, including Paris, turned to private companies to manage their systems. Today, private companies supply about 72% of drinking water in France, usually under a franchise, lease, or management agreement through a PPP. Yet, even in France, the debate on public versus private ownership continues. In a symbolic move, water supply management in Paris—which industry observers view as the birthplace of water privatization—returned to public hands in 2010 when the then ongoing contracts with major players Veolia Environnement S.A. (BBB+/Stable/A-2) and Suez Environnement (a unit of GDF Suez S.A.; A/Stable/A-1) expired. The municipalization was part of Mayor Bertrand Delanoë's electoral promise in 2008 triggered by rising water prices.

The franchises and the privatization of water supply have generally taken one of three forms in France. The first is a franchise agreement called a concession (essentially, full-service contracting). In this system, a private company contracts with the government to have the exclusive right to operate, maintain, and invest in the waterworks for a given number of years. Such a system is especially advantageous when the municipality lacks funds for major capital spending. The concessionaire advances capital for construction and operation, assumes full responsibility

## The history of ownership of water systems in the industrial world has been dynamic.

Indeed, the ownership of water utilities, both in the U.S. and Europe, has cycled back and forth between public and private. At certain times, political demands of public health have prompted municipal authorities to claim control over water supplies and then to find some means—such as taxes or fees—of paying for their maintenance and growth. At other times, authorities have concluded that the cost of clean and accessible water was simply too high to bear alone and too risky as an investment. In these cases, the authorities turned portions of their public service over to private firms, leaving them to bear the costs of capital investment. But neither approach solved the underlying issue: whether public or private, suppliers were left struggling with how to pay for an increasingly expensive commodity that consumers seemed unwilling to treat as an economic resource but regarded instead as a community need.

In contrast, we find that waterworks in present-day U.K. are entirely private. In France, many municipalities have transferred water services to private companies; the waterworks are essentially privatized through delegation of operations. In the U.S., water supply remains largely government-owned, with investor-owned utilities supplying only about 15%. However, because of the impact of the recession and its aftermath on state and local government budgets, the U.S. could see some move toward private operations, in our opinion.

#### European Countries Try Different Models

At one end of the spectrum, a municipality can entirely own and operate a water system. At the other end, a private entity both owns the infrastructure and operates the supply network. In the EU, the U.K. is the only country where public authorities have completely



and risk for management and maintenance of facilities, and collects payment directly from users. The duration of the agreement is generally long term—20 to 30 years—to enable amortization of the original capital outlay. A user pays a set monthly fixed charge for access to a supply pipe along with a variable charge based on the number of cubic meters of water consumed.

The second is a lease agreement, which the French call *affermage*. In this form of privatization, the private operator does not bear the costs for new investment. The local government bears expenses for installing major civil works, and the private firm subsequently manages the completed facilities and provides working capital. Such systems are popular when municipalities provide financing at preferential interest rates. The contract period is typically shorter than a concession, usually lasting 10 to 15 years. The contract also details specifications for maintaining or upgrading facilities. Usually, ongoing day-to-day expenses such as electromechanical, hydraulic, and metering equipment is the operator's responsibility, while capital outlays such as civil works, water collection, and facility expansion are the responsibility of the municipality. As in the concession system, a formula fixes the price of water.

Other forms of contracts between public and private entities, namely management contracts, are closely related but differ in the rights of the operator. These forms transfer only partial performances to the private side and generally involve relatively limited responsibilities for the private firm (*see note 4*). Under a management contract, the operator collects the revenue only on behalf of the government and in turn receives a fee. The duration of the agreement is also shorter, about six to 10 years.

The main players in France are publicly listed Veolia, Suez Environnement, and Saur S.A.S. (unrated). Veolia and Suez also dominate international markets, serving an estimated 110 million water customers and 85 million

wastewater customers. They bid for concessions from municipalities around the world. The concessions are usually long term, but these companies face a risk when they renew concessions because the city can renegotiate prices or award the contract to another player. In addition, we have seen lately a tendency for some large cities to start operating their networks themselves. The level of competition seems to have been increasing in the past few years, with a pressure on costs.

#### England and Wales

In 1989, under Prime Minister Margaret Thatcher, the British government privatized the nation's waterworks and created 10 multipurpose investor-owned water companies. The waterworks privatization was the largest stock offering in history at that time. In addition, there were also about 30 companies that avoided earlier nationalization and joined the newly formed investor-owned utilities in the deregulated market. The Office of Water Services regulates the 10 water and sewerage companies and 11 water-only companies that exist today in England and Wales under a single regulatory framework. The price-cap regulation sets price limits over a five-year price-control cycle and enables utilities to profit from increasing efficiency. Regulators compare utility performance across a range of benchmarks and reward or penalize companies accordingly.

The larger private companies that we rate in the U.K. are United Utilities PLC (BBB-/Stable/A-3) and Severn Trent PLC (BBB-/Stable/A-3), the second- and third-largest of the 10 water and sewerage companies, respectively, in England and Wales by regulated asset value. We also rate the class A bonds issued by Thames Water Utilities Cayman Finance Ltd., which reflect the underlying credit quality of Thames Water Utilities Ltd., the largest water and wastewater company in the U.K. covering Greater London and the Thames Valley, and the structural features of its corporate securitization.

In the past 10 years, remarkable changes have occurred in these companies' ownership structures. Institutional investors hold a growing pool of public and private capital that is looking for exactly the kind of stable and predictable returns that water infrastructure investments offer. So, conglomerates or financial firms own most of the larger players. For instance, in 2006, Kemble Water Ltd. (unrated), a consortium Australia-based Macquarie Infrastructure Fund led, purchased the U.K.'s biggest water company, RWE Thames Water PLC (unrated), from the German RWE AG group for £8 billion. Hastings Funds Management Ltd., an Australian infrastructure investment fund, bought South East Water Ltd., the U.K.'s second-largest water-only utility. Similarly, Malaysia-based infrastructure conglomerate YTL Corporation Berhad (unrated) owns Wessex Water Services Ltd. (BBB+/Stable/—).

#### The rest of Europe

Other EU countries largely follow the public model, with municipal companies controlling water supply. We rate a few that perform water and sewerage services, as well as other related services such as heating. Still, private ownership has developed to some degree in Germany (Stadwerken) and finds support in Spain, Italy, and Denmark. The German privatization model prefers that a supervisory body regulates the private entity. The companies normally raise rates in accordance with municipal law, and local governments must approve the increases. Gelsenwasser AG (A-/Stable/—) is the largest independent drinking water service provider in Germany's Ruhr region and has long-term service contracts with about 40 municipalities.

#### Beyond The Politics Of Privatization...

Because water delivery is a key public service, privatization is extremely controversial. Our discussions with state regulators in the U.S. have indicated that despite their small size relative to electric and gas utilities, water utilities

draw the most active customer participation. Basically, people just don't like paying for water.

The arguments for and against privatization are clear-cut. Detractors claim that:

- Private companies aren't necessarily interested in protecting watersheds and natural ecosystems;
- Past privatization projects have led to massive employee layoffs to cut costs;
- Rates have increased despite lack of infrastructure investment;
- Private companies generally make decisions without the public's input; and
- Companies have compromised service and water quality in the drive for profits.

## With costs of maintaining waterworks increasing, municipal owners have three choices...

However, there is also an inherent conflict when the government sets standards for water service and takes responsibility for following those standards. If no one presses water utilities on regulatory standards, they may not press the government for extra investments. Privatization advocates claim that rates have been kept low because of a chronic underinvestment in the system or through subsidies. While it is true that rates tend to rise after the signing of a concession agreement, the argument goes, it is often because the new operator finally addresses the underinvestment (*see note 5*).

There is no clear-cut superior performer between the two. Some of the better service providers in the world, like the Public Utilities Board of Singapore and Phnom Penh Water Supply Authority, are publicly owned and operated. Similarly, many, like Manila Water, are privately owned and operated.

The franchise concept, too, has had mixed performances. In Manila, the two concessionaires—consortiums of United

Utilities/Bechtel/Ayala Corp. and Benpres Holding/Suez Environnement (formerly Lyonnaise des Eaux) have provided water supply and wastewater services for 25 years. However, in 2003, the city of Atlanta terminated its 1999 20-year joint-venture operations and maintenance contract with United Water Resources and its parent Suez Environnement because of alleged quality violations, even as rates rose significantly.

### ...Economic Conditions Lead To Privatization

By the turn of the 19th century, changes in finance had enabled a robust and stable municipal bond market to emerge

in the developed world. That drew a willing pool of investors, and cities rushed in to borrow funds to build infrastructure, including waterworks. In the U.S., municipal debt continues to be tax-exempt, while privately issued debt remains taxable (*see note 6*). Therefore, public utilities enjoy lower capital costs than privately owned utilities. By taking advantage of this tax advantage as well as the credit support from a city or state government, municipality-owned water systems have been able to issue debt relatively cheaply. This source of capital has tended to crowd out more expensive private capital. The result is that today municipalities own as much as 85% of the U.S. water system.

Now, these municipal issuers are going through a sea change. The recession and its aftermath have constrained state and local government budgets, which is weighing on credit strength. Also, historically, waterworks used to be cash cows because most of the system was already built and the cost of adding new customers was minimal.

Now, the water sector is entering a phase requiring capital to replace aging pipes, to meet growing maintenance expenses related to evolving U.S. Environmental Protection Agency (EPA) rules, and to meet expansion programs. Yet, because of deteriorating balance sheets and burgeoning deficits, many municipalities have not even initiated financing for maintaining facilities.

With costs of maintaining waterworks increasing, municipal owners have three choices: raise water rates to meet operations and debt service requirements, cut operating expenses to offset higher debt service costs, or privatize the utility. While privatization may have several objectives, the one most likely to dominate a municipality's decision to privatize its waterworks is the political resistance to raising rates that support the required investments needed by the waterworks (depoliticization of economic decisions), in our opinion. To produce public-budget revenues or to reduce public outlays, we expect to see increasing divestitures of midsize (10,000 to 20,000 customers) municipality-owned systems to private enterprises. These represent about 10% to 15% of the U.S. water sector.

That's where we think PPPs could increasingly step in, as they have in Europe. For instance, pension funds have invested in water indirectly through infrastructure funds, such as those that Macquarie manages in the U.K. Public sector pension funds need low-risk, high-yield investments to meet growing liabilities, and water investments meet this requirement. Selling water assets to pension fund investors also helps restore municipal balance sheets, while at the same time meeting pensioners' needs. Some early forays include the March 2010 purchase of Southwest Water Co. (unrated) by JPMorgan Asset Management and Water Asset Management LLC. Southwest Water has utility and contract operations in California and other Western states. Similarly, in December 2010, the Carlyle Group announced its purchase of Park Water, a family-owned, California-based water utility.

## A Question Of Efficiency And Equity

We can essentially separate privatization of water systems into questions of efficiency (i.e., the lowest-cost method of achieving an outcome) and questions of equity (i.e., the fairest way to achieve the outcome). Efficiency demands that the price of water reflect the cost of gathering, purifying, and distributing safe drinking water to consumers. A price increase is justified on such grounds because higher water bills will invariably reduce demand, allowing water systems to defer or downsize costly additions to supply-side capacity. Based solely on the issue of efficiency, privatization seems a rational decision.

Equity, however, is an altogether different matter. According to EPA guidelines, water is such an essential commodity that no family should have to allocate more than 2% of its household income to it. The resistance to what is likely to be higher unsubsidized water bills has caused local reformers and politicians throughout history to resist privatizing municipal water works. The result has been, and remains, a market in which political demand largely dictates price. We often do not even know what the cost of delivered water is because the cost is buried under subsidies and sunk costs of municipal and regional water departments (*see note 7*). The price of water bears little relation to either the available supply of water or the cost of delivering it to a customer's tap. Thus, seen through the prism of equity, water perhaps ought to remain under the purview of municipal systems, and reflect what the government, rather than the market, can bear.

How pressing the need for municipal revenue becomes will likely go a long way toward determining whether issues of efficiency or equity predominate—and how far U.S. water systems go down the path of privatization. Europe, like Tolkien's hobbit, has been there and back again with no conclusive answers. But no matter what municipalities decide, one thing is certain: As populations grow and demand climbs, which direction to take in managing this essential global resource is likely to become an increasingly critical question. **CW**

## Notes

- (1) "To the Tap: Public versus Private Water Provision at the Turn of the Twentieth Century," Debora Spar and Krzysztof Bebenek (Business History Review 83, Winter 2009).
- (2) The high fixed-cost component in the supply of water makes the laying of parallel networks by a competing bidder unprofitable, and a monopoly naturally results.
- (3) More specifically England and Wales; in Scotland and Northern Ireland publicly owned companies provide water services.
- (4) One form of management contract in France is "Regie interessee." In this form, the private firm shares the revenues or profits with the municipality.
- (5) The financial players who acquired water utilities in Europe didn't help alter the image of unconscionable profits by leveraging the holding company and distributing the proceeds as dividends.
- (6) The U.S. Treasury Dept. issued new tax regulations in 1997 enabling long-term private contracting for water operations and management. Under previous rules, if a publicly owned water facility was under contract operation for more than five years, it was deemed to be for private use and ineligible for tax-exempt capital financing. With longer-term contracting now practicable, it's possible to incorporate long-term capital investments into operating and maintenance agreements and amortize them over a period that makes such agreements more cost-competitive.
- (7) Economically, an income transfer program, such as the Low-Income Home Energy Assistance Program, could help low income water customers cover the costs of higher rates without distorting the market for water.

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## U.S. Power Sector

# Heavy Demand, Limited Supplies, And More Regulation Could Swamp Their Credit Quality

### Overview

- The huge water requirements for electric power generation are beginning to jeopardize some utilities' ability to meet demand.
- A plant's choice of cooling system can make a big difference in how efficiently it operates and the amount of water it uses, and thus the plant's effect on the environment.
- The Environmental Protection Agency issued proposed standards that would cover roughly 1,260 existing facilities that each withdraw at least 2 million gallons of water per day for cooling.
- The incremental effect of capital spending on an industry already reeling from significant environmental-related spending can be substantial.

**T**he threat of global climate change has focused considerable attention on the types of fuel used for power generation, but little notice has been given to the large amounts of water that power plants use to generate electricity, despite the more immediate nature of dwindling water supplies. Thermoelectric power plants accounted for approximately 45% of the total water withdrawn from U.S. surface water sources in 2009 (*see note 1*). Every day in 2008, water-cooled power plants in the U.S. withdrew, on average, 60 billion to 170 billion gallons of water from lakes, rivers, and streams and consumed 2.8 billion to 5.9 billion gallons of that water (*see note 2*). Of the total amount of water on the planet, only 3% is fresh water. Of that, only about 1% is in free-flowing rivers, streams, and lakes (surface water); 70% is frozen in glaciers or under the permafrost, and 29% is in underground aquifers (*groundwater; see note 3 and the related article, "Is The U.S. Water Sector Approaching A Tipping Point?" published Feb. 27, 2012, on p. 16*).

The huge amounts of water required for power generation are beginning to jeopardize utilities' ability to meet demand for electricity. For example, the Electric Reliability Council of Texas noted in an October report that approximately 9,000 megawatts (MW) of generation in Texas is dependent on water rights from sources that are at historically low levels. In 2011, Texas suffered one of the driest summers since the state began keeping records in 1895. The hot weather was extreme, sustained, and widespread.

Dallas's daily highs exceeded 100°F every day in August but two and reached 110°F on Aug. 2 and 3, 2011. Peak power demand reached a record 68,294 MW on Aug. 3, exceeding the previous record by 2,518 MW, or 3.8%. Temperatures throughout the state that month broke records. As the demand for power rose, so too did the demand for water by power plants.

Water is used extensively in the electric power sector, primarily for cooling to condense steam as part of the process

that drives the steam engine. This steam-cooling step accounts for virtually all the water used in most power plants, given that the steam itself circulates in a closed system. The amount of water a power plant needs depends on which of three basic cooling technologies it uses (*see sidebar*). As a result, the cooling technology a power plant adopts, and the plant's choice of fuel mix, can ease or exacerbate the stress on the water supply.

### The U.S. Power Fleet's Water Profile

Power plants use water in two ways: withdrawal and consumption. Withdrawal is the water a power plant takes in from the source. After use, most of the water is returned back to the source. Consumption is the water lost to evaporation.

Although the consequences of water loss from consumption are apparent, withdrawal is no less important because a power plant's intake structure can trap fish and other aquatic life. Moreover, the water returned to the source is at a higher temperature and may harm aquatic life again.

In addition, a power plant's water requirements can vary greatly depending on the fuel type and the cooling technology it uses. For instance, a nuclear power plant with a once-through cooling system withdraws 25,000 to 60,000 gallons of water per megawatt-hour (MWh) of electricity produced but consumes 100 to 400 gallons per MWh (*see note 4*). On the other hand, a nuclear plant using closed-loop technology withdraws only 800 to 2,600 gallons per MWh but consumes 580 to 845 gallons per MWh (*see chart 1*).

Overall, 53% of the electricity generating capacity in the U.S. comes from closed-cycle cooling systems. Once-through cooling was the conventional technology until the early 1970s but is now uncommon for new power plants because of section 316(a) of the Clean Water Act, which regulates water intake structures and thermal pollution discharges. As a result, the average age of a closed-cycle cooling system is 29 years, compared with 50 years for once-through systems.

Chart 1 Power Plant Water Use By Fuel Type And Cooling Technology

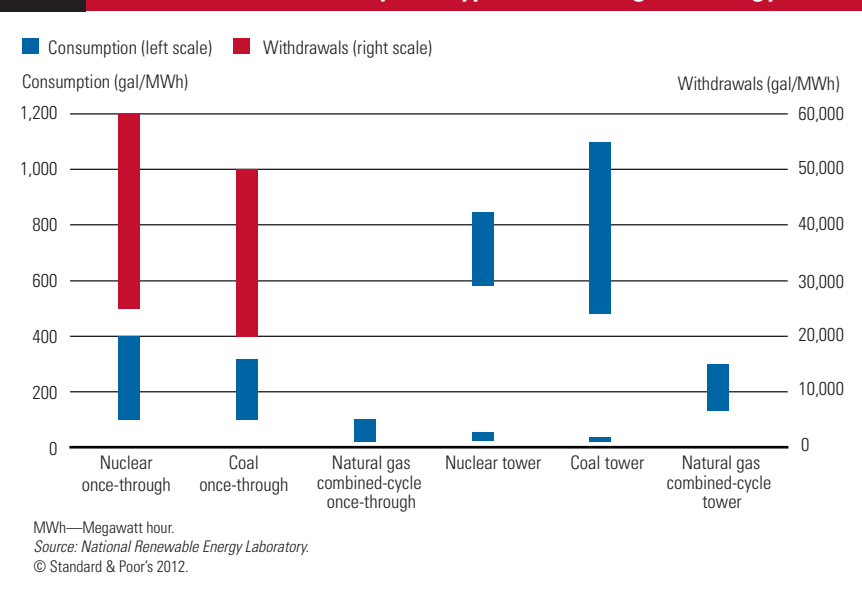
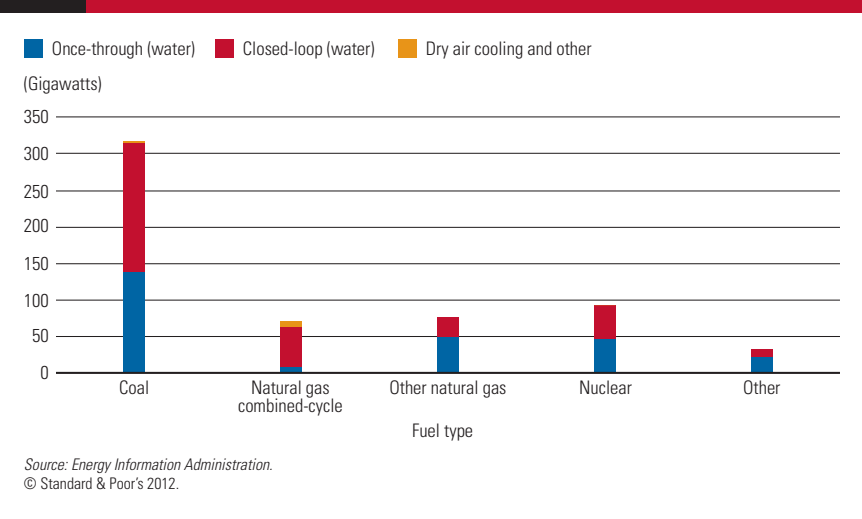


Chart 2 U.S. Power Generating Capacity By Cooling Technology And Fuel Type



Once-through systems are more prevalent in the eastern U.S. (broadly defined as the region east of Kansas City), and closed-cycle systems are more common in the West. As a result, plants in the East generally withdraw more water per MWh generated than those in the West.

### Fuel Mix Also Determines Water Needs

U.S. power plants have widely ranging water-use and carbon emissions profiles. For instance, because nuclear units are the most water-intensive, a generation company with a large fleet of nuclear plants that uses fresh water for once-through cooling will have high water requirements but a small carbon footprint. Utilities with high water

requirements put more stress on local water resources, while utilities with high carbon footprints will eventually contribute to long-term water scarcity (see charts 3 and 4).

### Water Intake Regulations Are Coming

On March 28, 2011, the Environmental Protection Agency (EPA) issued its proposed standards for comment. The rule, Section 316(b) of the Clean Water Act, requires that facilities with cooling-water intake structures ensure that their location, design, construction, and capacity reflect the best technology available to minimize harmful effects on the environment, specifically damage to aquatic life. The rule covers roughly 1,260 existing facilities that each with-

draw at least 2 million gallons of water per day for cooling. The EPA estimates that approximately 670 of these facilities are power plants. Moreover, new units that add electrical generation capacity at an existing facility would be required to incorporate technology that is equivalent to closed-loop cooling.

Although the MW that may require conversion to closed-loop cooling is uncertain, the Electric Power Research Institute estimates the capital cost of closed-loop/cooling pond technology to be about \$30 per kilowatt (see note 5). The proposed rule delegates implementation to state environmental regulators and allows them to consider both the costs and benefits of cooling system design in their application of its requirements at each facility.

## Cooling Technologies In Thermoelectric Power Plants

### Once-Through Cooling

As the name suggests, a once-through cooling system uses water as a coolant once—running it through the system to condense steam from the turbine—before discharging it back into the water supply.

The advantages of this technology are twofold: the relatively low capital and operating costs, and low net water consumption. The disadvantages are disruptions to local aquatic wildlife, once during water intake and again during the discharge downstream, when the water released could be about 20°F higher. Notably, although net water consumption is low, the high volumes required for the plant to operate could be a constraint during a drought. For instance, a coal-fired power plant with a once-through cooling system will consume 10x more water than coal (by weight) and many times more than a plant with a closed-loop system. This also makes pumping water to the plant very expensive.

### Closed-Loop Cooling

Also known as “recirculating cooling,” “cooling towers,” or “wet cooling,” closed-loop cooling has become the technology of choice for most power stations built since the early 1970s. Cooling water exits the condenser, goes through a

cooling tower, and is then returned to the condenser. These systems take in a fraction of the water that once-through cooling systems do. However, a closed-loop system can consume more than twice as much water as a once-through system because much of the recirculated water evaporates to

condense the steam. Closed-loop cooling systems are the most effective at reducing the number of aquatic animals sucked into cooling systems.

### Dry Cooling

These systems are similar to closed-loop systems, except that towers cooled only by air are used instead of an evaporative cooling tower. The system blows dry air across steam-carrying pipes to cool them, essentially eliminating water loss through evaporation. A significant downside of dry cooling is that ambient temperatures and humidity determine the effectiveness of dry cooling. The net result is that plants using

wet cooling are more efficient than dry cooling plants, especially in a hot, arid climate. The average loss of output by dry cooling plants is approximately 2% annually. But at the peak of summer, when demand is at its highest, a wet-cooling plant can be as much as 25% more efficient than a dry one.

For this reason, some power plants rely on a hybrid cooling system, in which the plant operates in dry-cooling mode much of the time but switches to wet cooling during hot weather.



Inundated (no pun intended) by the potential effects of the Cross-State Air Pollution Rule (Casper) and the Mercury And Air Toxins Standards (MATS) on its operating fleet, the U.S. power industry has thus far put off facing water intake rulemaking effects into future years. But the incremental effect of capital spending on an industry already reeling from signif-

icant environmental-related spending can be substantial. For instance, New Jersey regulators wanted Exelon Corp. to build expensive new cooling towers at the Oyster Creek nuclear station. But Exelon said the towers' cost—estimated at more than \$800 million—would be more than the 45-year-old plant was worth. Consequently, Exelon announced in

December that it will shutter Oyster Creek in 2019, 10 years before its license expires, in a deal with the state that will allow the reactor to operate until then without requiring cooling towers to be built. The closure of the 620 MW base-load unit could affect both capacity and the energy markets in New Jersey, and require the New Jersey Board of Public Utilities to explore alternative generation proposals.

We expect other utilities to make similar decisions once the rules are more certain. Although we expect the effect on reserve margins to be minimal, the combined effect of Casper, MATS, and 316(b) water intake rules could not only impinge on the credit profiles of power companies, it could also alter the dispatch profiles of the Mid-Atlantic and southeastern markets.

Still, the industry thinks it unlikely that the EPA's proposed rule will mandate the use of closed-cycle cooling at all plants, but will apply only to power plants in coastal or estuarine areas instead (see note 6). We expect the EPA to issue a final rule later this year. **CW**

**Notes**

- (1) Source: U.S. Geological Survey 2009.
- (2) Source: "Freshwater Use By U.S. Power Plants—Energy and Water in a Warming World" (EW3, November 2011).
- (3) Source: "The Water Problem," Global Policy Forum (Oct. 8, 2007).
- (4) Source: National Renewable Energy Laboratory, March 2011.
- (5) Source: "Water Consumption of Energy Resource Extraction, Processing, and Conversion" (Harvard Kennedy School Belfer Center, October 2010).
- (6) New Jersey wanted Exelon to install a closed-loop cooling system that uses much less water from the Barnegat Bay. Barnegat Bay is a brackish estuary that empties into the Atlantic Ocean.

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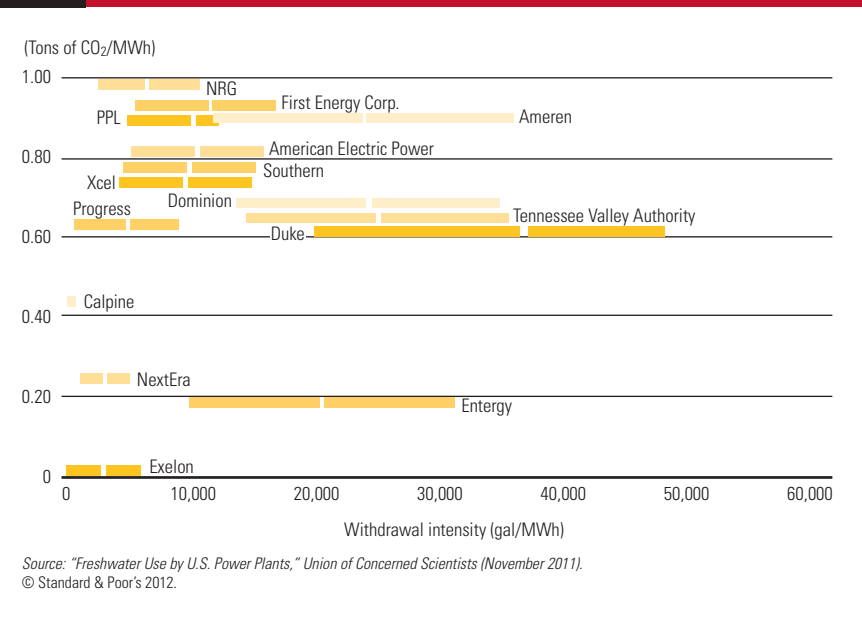


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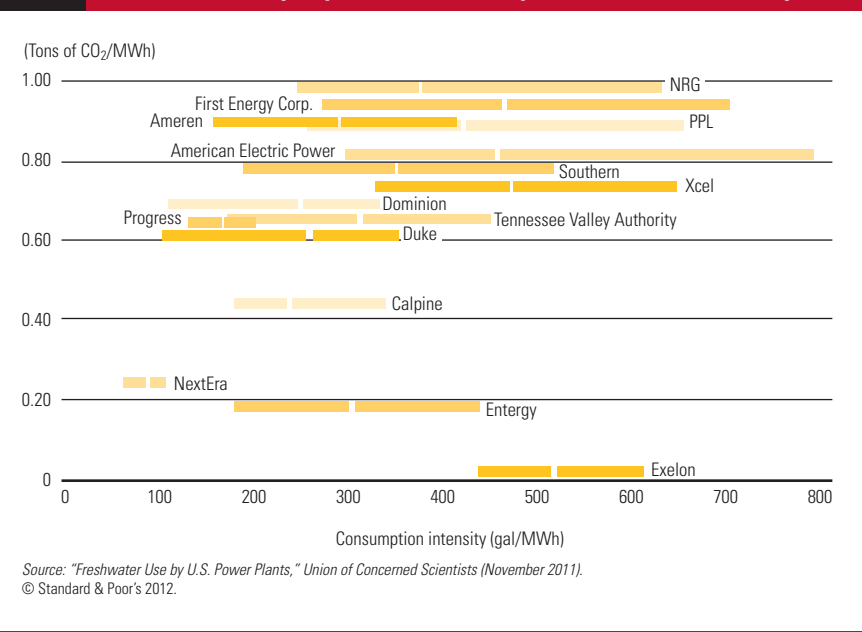
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**Chart 3 U.S. Power Company Carbon Intensity Versus Water Withdrawal**



Source: "Freshwater Use by U.S. Power Plants," Union of Concerned Scientists (November 2011). © Standard & Poor's 2012.

**Chart 4 U.S. Power Company Carbon Intensity Versus Water Consumption**



Source: "Freshwater Use by U.S. Power Plants," Union of Concerned Scientists (November 2011). © Standard & Poor's 2012.





# Worth Its Salt?

## Desalination In The U.S. Offers Benefits, But At A Price

**W**ater, just like any other natural resource, doesn't come in an infinite supply. That means keeping up with demand can be difficult for some public water utilities in the U.S. In some communities, population growth has led to water demand outpacing supply. In others, vulnerability to droughts has led to scarce supply in dry years and a surplus in wet ones. And environmental concerns and increasing regulation have resulted in reduced water availability in some parts of the country.

### Overview

- As water utilities in the U.S. grapple with rising populations, demand, and water supply needs, they are expressing more interest in desalination.
- U.S. utilities have had varying success in developing and running desalination plants.
- The use of desalination plants can improve credit quality through enhanced supplies and reliability but can also hurt utility credit quality through high capital costs, construction risk, and higher operating costs.

Utilities can deal with supply issues in several ways depending on local factors, including conservation, participation in regional surface water projects, water purchases and exchanges, use of recycled water for irrigation, acquisition of new water rights, and development of additional wells. But for communities located near the coast or by other untapped saltwater sources, some utilities are turning to another option: desalination.

The logic is simple. A community with water supply needs that is reasonably close to the ocean can “de-salt” the water and add it to its supply. Desalination can also work for inland communities near sources of brackish water (water with salt content not suitable for drinking but below that of seawater). While advances in technology and energy recovery have lowered the cost of desalination, startup and operating expenses can still be high. Desalination plants also face regulatory

hurdles and often environmental opposition. And the financial risks of developing a facility can be significant.

Both the benefits and the drawbacks of a desalination project can affect a utility’s credit quality. Successful projects can bring diversification to water supply portfolios, make the supply more reliable, and provide emergency supplies during droughts. This can help stabilize operations and, potentially, credit quality. Conversely, the costs and risks of desalination can also increase a utility’s financial risk profile. Desalination projects can require substantial new debt or a drawdown in capital reserves and expose a utility to potential cost overruns. The cost to operate the plant, or purchase water if the plant is privately owned, can lead to higher overall operating costs, even after the savings from reduced reliance on other sources are taken into account.

We expect interest in desalination to continue over the next decade. While desalination will likely represent only a limited portion of water supplies in the U.S. for the foreseeable future, it can be an important element of a utility’s water portfolio.

### The Alchemy Of Making Saltwater Drinkable

Desalination technology is not new, but advancements in recent years have reduced energy use and costs, making it a more viable option. Internationally, most desalination plants use either thermal or membrane technology to remove salt. Thermal desalination plants use heat to distill water. These are common in areas with abundant fossil fuels, such as the Middle East, which is home to some of the largest thermal desalination plants. Membrane-based plants use semipermeable membranes to remove salts from a saltwater feed supply. Large membrane-based seawater desalination plants have recently been built in Israel and Australia to provide drought-proof supplies. In the U.S., most municipal desalination plants—either currently in operation or planned—use membranes through a process called reverse osmosis that separates saltwater into product water and concentrate (or brine). Most of the current desalting capacity in the U.S. treats brackish water rather than seawater, although interest from utilities in seawater applications is on the rise.

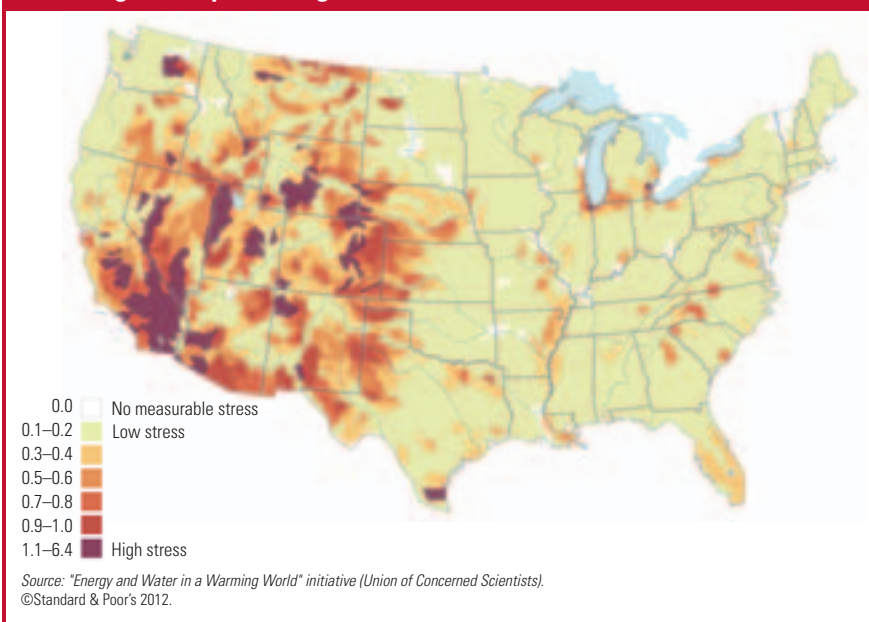
The main elements of a reverse-osmosis desalination plant are:

- The intake system,
- The pretreatment system,
- The reverse-osmosis process (using membranes),
- The post-treatment system, and
- The concentrate disposal system.

For brackish water desalination, the intake system is similar to that of a typical water treatment plant that uses groundwater or surface water. For seawater desalination, the intake system is usually either a screened open-ocean intake or a sub-seafloor intake (such as beach wells). Water is pretreated to remove particles and organic matter and protect the membranes. The quality of the intake water

Desalination technology is not new, but advancements in recent years have reduced energy use and costs, making it a more viable option.

U.S. Regions Experiencing Water Stress



dictates the level and type of pretreatment. The reverse-osmosis process uses pressure to pass the pretreated water through the semipermeable membranes, which produces product water and leaves behind concentrate (brine). Product water is delivered to the post-treatment system, where it is treated as needed to make it suitable for the utility's potable distribution system. The concentrate is conveyed to the disposal system, which uses a dedicated discharge pipeline, a shared discharge pipeline (such as with a wastewater treatment plant or power plant), deep-well injections, or other methods.

Much of the cost of operating a reverse-osmosis desalination plant is associated with its high energy use. The water intake system, the reverse-osmosis process, other required treatments, and conveyance to the water distribution system all require energy. The reverse-osmosis process in particular requires high pressure to force water through the semipermeable membranes. Although recent advancements in membranes and energy recovery mechanisms have lowered energy requirements, operating costs can still be high. And energy use increases as salt concentration rises, which means brackish water desalination plants typically have lower energy requirements than seawater desalination plants do.

### Why Use Desalinated Water?

For water utilities in coastal areas facing supply shortages or water reliability issues, seawater desalination offers a drought-proof, reliable, virtually limitless water supply. For communities with access to a brackish water source, desalination offers a new, untapped supply.

Often, utilities consider desalination to diversify and expand their water supply portfolios. For utilities that depend on imported water, desalination can offset wholesale water purchases and reduce their exposure to increasing wholesale costs or wholesale reliability issues. For example, many Southern California water utilities rely on imported water from the Colorado River and San Joaquin/Sacramento Delta to cover demand. The availability of these sources is affected by variable

hydrologic conditions and increased environmental regulation. And wholesale water rates have been on the rise.

The Metropolitan Water District of Southern California (MWD; 'AAA/Stable' revenue bond rating), a major wholesale water provider, currently charges \$794 per acre-foot for Tier 1 full-service treated water, up from the \$478 per acre-foot it charged only five years ago. The San Diego County Water Authority ('AA+/Stable' revenue bond rating), MWD's largest customer, is involved in several potential seawater desalination projects to diversify its water supply and reduce its reliance on MWD. Several MWD customers already operate brackish water desalination projects, which help reduce their imported water use, with others in the planning stages. Although many Southern California utilities are pursuing supply diversification to reduce their reliance on imported MWD water, we believe MWD's wholesale supply will remain extremely important to utilities in the region.

Rather than offsetting imported water use, some utilities are planning desalination plants to reduce their over-reliance on certain local supplies. Desalination can be an attractive choice for utilities experiencing falling groundwater levels or seawater intrusion in local aquifers. Tampa Bay Water, Fla. ('AA+/Stable' revenue bond rating) built its large, 25 million gallon per day (mgd) seawater desalination plant to reduce pumping in its well fields. Soquel Creek Water District ('AA/Stable' revenue bond rating) in Santa Cruz County, Calif., is jointly studying a potential 2.5 mgd seawater desalination plant with the City of Santa Cruz ('AA/Stable' water revenue bond rating) to offset pumping from its overdrafted groundwater basins.

Some utilities pursue desalination projects to prepare for supply emergencies, namely droughts. Santa Barbara, Calif., commissioned a desalination plant in 1991 to serve as a temporary emergency supply source after experiencing severe drought conditions; however, sufficient rainfall since 1991 left the facility mostly idle. The plant has been decommissioned, although the

basic infrastructure remains in case of future droughts. Santa Cruz, Calif., is participating jointly in the study of the desalination plant with the Soquel Creek Water District in preparation for drought years that could affect its surface water supply. The Florida Keys Aqueduct Authority ('A+/Stable' water revenue bond rating) has two seawater desalination plants with a combined capacity of 3 mgd for an emergency supply, if needed.

Utilities have also developed brackish water desalination plants to unlock unused local supplies. These projects have the added benefit of helping restore groundwater basins and protecting freshwater supplies. El Paso, Texas, ('AA/Stable' water and sewer revenue bond rating) owns a 27.5 mgd desalination plant, which allows the city to use the brackish groundwater in its arid service area and increase its overall supply. Some other utilities operating brackish water desalination plants include:

- Eastern Municipal Water District, Calif. ('AA/Stable' revenue bond rating);
- Chino Basin Desalter Authority, Calif. ('AA-/Stable' revenue bond rating);
- San Juan Capistrano, Calif. ('A/Stable' water system certificates of participation rating); and
- Alameda County Water District, Calif. ('AAA/Stable' water system revenue bond rating).

With existing and planned desalination projects, the need for and suitability of each project depend on specific characteristics of the utility. Seawater desalination is most viable for coastal communities (although long-distance distribution pipelines have been proposed). Brackish water desalination requires a local water source and a means of disposing the brine. Both offer project participants an expanded water supply portfolio.

### The Limits Of Desalination

With all the benefits a desalination plant has to offer, one might wonder why the coasts are not dotted with facilities or why more inland utilities are not recovering brackish groundwater.



The answer lies with the many challenges of successfully developing and operating a desalination plant:

- The planning and environmental permitting process can be long and complex;
- The projects can be expensive and entail construction risk;
- The cost of operating the plants can be high;
- Some plants have experienced operational issues, limiting capacity for periods of time; and
- Projects can face local opposition on environmental or other grounds.

## Desalination plants often entail large capital costs and the risk of cost overruns for the project sponsors.

Desalination projects face a myriad of environmental hurdles that can affect the project's costs, timing, and feasibility. Seawater desalination facilities, in particular, are often located in sensitive areas, and feed water intakes and brine discharge can affect marine habitats. Local opposition on environmental grounds can stymie the political will to follow through on a project. Projects must also seek approval from a number of regulatory bodies. Some of the agencies involved in the permitting process for desalination plants in California, according to the California Department of Water Resources Desalination Planning Handbook, include: the National Marine Fisheries Service, U.S. Fish & Wildlife Service, California Coastal Commission, State Department of Public Health, State Department of Water Resources, State Water Resources Control Board, California Public Utilities Commission, and various local agencies.

In addition, desalination plants often entail large capital costs and the risk of cost overruns for the project sponsors. The operating costs of a desalination plant can also be high and can be a

deterrent to pursuing a project. Much of the operating cost is associated with the high energy requirements of a reverse osmosis plant, with typically higher costs for higher salinity seawater compared with brackish water. Tampa Bay Water's seawater desalination plant suffered from contractor bankruptcies, delays, operational issues, and cost overruns before final completion. San Juan Capistrano's brackish groundwater desalination facility has suffered from a number of operational issues (partly due to the discovery of methyl tertiary butyl ether in the groundwater),

lowering its output and leading to continued reliance on imported water. (Methyl tertiary butyl ether, or MTBE, is a gasoline additive.)

The costs of building, operating, and maintaining a desalination facility must also be weighed against the cost of imported water (if available), of developing alternative sources, or of pursuing conservation within a service area. And all-in costs must be considered, including debt service, required maintenance, and future renewal and replacement work. Often, other alternatives may be more attractive than desalination. Although the Nipomo Community Services District ('A/Stable' revenue bond rating) commissioned studies of a potential desalination project to reduce its reliance on an overdrafted groundwater basin, the district is instead pursuing an intertie pipeline with another utility at this time to diversify its supply. The Marin Municipal Water District ('AA+/Stable' revenue bond rating) had been planning a desalination plant in the San Francisco Bay, operated a small pilot plant in 2005 and 2006, and finalized

an environmental impact report in late 2008. But as of April 2010, the district's board said it put the project on hold due to a drop in demand in recent years.

### A Sampling Of Completed And Planned Desalination Projects

#### El Paso, Texas

The need to reduce pumping from fresh groundwater sources and the abundance of brackish groundwater prompted the City of El Paso, jointly with nearby Fort Bliss, to construct a brackish water desalination plant. Completed in 2007 at a cost of about \$87 million, the Kay Bailey Hutchison Desalination Plant uses reverse osmosis to treat brackish groundwater from the Hueco Bolson aquifer. The plant can provide up to 27.5 mgd of treated water to the El Paso water system and helps prevent salt intrusion of the freshwater supplies at the Hueco Bolson aquifer. Disposal of the concentrate is achieved through deep-well injection. Desalinated water is now a key supply source in this arid region. Standard & Poor's maintained a 'AA' rating on the city's water and sewer revenue bonds throughout the development and completion of the plant.

#### San Diego County Water Authority, Calif.

San Diego County Water Authority (SDCWA) is a wholesale water provider to member agencies in western San Diego County. SDCWA relies heavily on imported water from MWD and—as part of its supply diversification strategy—is exploring a number of desalination projects. The efforts include participation in the Carlsbad Desalination Project and potential projects at Camp Pendleton (50 mgd to 150 mgd) and Rosarito Beach in Mexico (initially 25 mgd). The Carlsbad project is a fully permitted 50 mgd desalination plant and conveyance pipeline that Poseidon Resources Corp. is developing privately. The project site is adjacent to the Encino Power Station in Carlsbad, Calif., which allows the plant to use the power plant's cooling water for its



seawater intake and to share use of the discharge channel. SDCWA is currently negotiating a water purchase agreement with Poseidon and anticipates bringing a draft agreement to its board in the summer of 2012. A preliminary term sheet agreed upon in July 2010 commits Poseidon to provide water at \$1,661 per acre-foot (in 2010 dollars), although these terms are not final. This compares with MWD's treated wholesale water costs of \$794 per acre-foot for Tier 1 water and \$920 per acre-foot for Tier 2 water. Under its urban water management plan, the authority projects 6% of its water supply will come from seawater desalination by 2035. Standard & Poor's maintains a 'AA+' rating on the authority's water bond debt outstanding.

#### [San Juan Capistrano, Calif.](#)

San Juan Capistrano has historically relied heavily on imported water from MWD to meet its demand. In an effort to reduce its imported water purchases, the city entered into a contract with a private developer in 2002 to design, build, and operate a 5.14 mgd reverse-osmosis brackish water desalination plant, known as the Groundwater Recovery Plant. The plant was completed in 2005 and was expected to provide 4,800 acre-feet of water per year. However, operational issues and the discovery of MTBE contamination at the wells led to the plant performing below capacity. In addition, disputes between the city and contractor led to both mutually terminating the long-term operating agreement in 2008. The city now runs the plant with in-house staff. The plant's reduced operating capacity resulted in the city's continued reliance on expensive imported water. It also reduced the city's grant revenue from MWD, which was based on the volume of groundwater recovered, to below expectations. On June 29, 2011, Standard & Poor's lowered its rating on the city's water system certificates of participation to 'A' from 'AA' based on the system's weak financial performance, which largely stemmed from the ongoing operational issues with

the Groundwater Recovery Plant. At that time, the city was working to remedy the plant's issues and bring it up to full capacity.

#### [Santa Cruz, Calif. and Soquel Creek Water District, Calif.](#)

Santa Cruz and the neighboring Soquel Creek Water District are collaborating on the planning and design of a 2.5 mgd seawater desalination plant. The supply issues confronting each utility differ, but both see benefits in the joint project. Santa Cruz relies heavily on surface water supplies, which are susceptible to periodic droughts. The Soquel Creek Water District relies exclusively on groundwater from two aquifers that have a history of overdraft conditions, raising the risk of seawater intrusion and decreasing yields. Under the current conceptual operating agreement, Santa Cruz would have priority use of the output in drought periods, when surface water supplies are less reliable. Soquel would have priority use during nondrought periods to reduce reliance on its aquifers. The project is in its evaluation phase, with an estimated cost of \$113 million. If approved, both utilities will be exposed to the high capital costs and potentially high operating costs of the plant. However, we believe the desalination plant could serve as a model of regional collaboration, bringing benefits to both partners with unique needs.

#### [Tampa Bay Water, Fla.](#)

To reduce groundwater pumping and to diversify the Tampa Bay region's water supply, Tampa Bay Water constructed a 25 mgd seawater desalination plant, the largest in the U.S. Originally planned for completion in 2002, the project suffered delays, contractor bankruptcies, operational issues, and cost increases. In 1999, Tampa Bay Water selected a private consortium to design, build, own, and operate the plant. Tampa Bay Water originally intended for the consortium to finance the project with a conduit bond issuance. However, by 2002 one of the consortium partners filed for bankruptcy and Tampa Bay

Water decided to purchase the project and finance its completion with its own revenue bonds. In 2003, a contractor bankruptcy and operational issues resulted in Tampa Bay Water terminating its construction contract and hiring a new contractor to perform substantial remedial work. Finally, in January 2008, the plant was deemed contractually complete. During this period, the project's cost increased from an estimated \$110 million to a final cost of \$158 million. The utility received substantial financial assistance from the Southwest Florida Water Management District. Standard & Poor's raised its long-term rating to 'AA+' from 'AA-' on Tampa Bay Water's bonds in 2008. The raised rating was partly due to the completion of the project. Today, desalination is an important element of Tampa Bay Water's supply portfolio. Although since completion, the plant has experienced periods of below-capacity operations due to maintenance needs.

### **The Risks And Benefits To Credit Quality**

In general, many public water utilities have maintained strong credit quality and ratings while implementing substantial capital plans. Typically monopolistic service positions, customer price inelasticity, and rate autonomy are factors that have supported strong ratings, in our view. We also believe that utilities can undertake desalination projects without experiencing deterioration in their credit quality as part of a well-managed capital plan. Desalination can be an important element of a utility's water supply strategy. But the risks that come with pursuing desalination projects are real, and the experience in the U.S. is still limited. **CW**

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# From Droughts To Conservation

## Water Can Have Big Effects On U.S. Municipal Utility Credit Quality

### Overview

- Intense competition for potable water means that while water in most of the U.S. is not yet priced like a commodity, it could be, and sooner than many might think.
- Although conservation efforts affect utility financial risk profiles, they can be beneficial.
- Making the most of increasingly scarce federal funds for infrastructure renewal and prudent risk management, including raising rates as needed, will be vital for utilities to maintain credit quality.

**N**ational attention has been focused upon U.S. municipal infrastructure quality and capital needs. Many policymakers also view infrastructure investment as a potential economic stimulus tool. U.S. weather patterns that ultimately affected utilities or their demand in 2011 only served to focus attention on these needs. While some are trying to figure out exactly what they need to fix and how much it will cost, the general consensus is that needs are large and federal funding is scarce.

For U.S. waterworks and sanitary sewer utilities, most of which are municipally owned and operate independently of each other, the main capital investment needs relate to rehabilitation, regulation, and growth. These are also the categories of projects that are most likely to be eligible for alternate funding sources, such as Drinking Water State Revolving Fund (DWSRF) or Clean Water State Revolving Fund (CWSRF) loans or possible limited grant money. Typically, federal and state sources such as CWSRF loans have a below-market cost of borrowing and are sometimes subordinate in repayment lien to the utility's debt, although in some cases they require some level of local matching.

## While water in most of the U.S. is not yet priced like a commodity, it likely could be within our lifetime.

Not eligible for CWSRF funding are certain projects to enhance raw water supply, although for some utilities this can be a considerable component of their capital improvement programs. While the Environmental Protection Agency (EPA) has begun incorporating climate change into its long-term needs assessment, this area remains at management's opinion as to whether the utility's supply is adequate to meet demand, or whether certain projects are "climate ready."

Water utilities are no stranger to doing more with less. Of all the potable water in the U.S., only a fraction of end-use consumption is actually for municipal needs. Competition with power plants, farmers, and industry, as well as allocation between and among other municipalities, means that while water in most of the U.S. is not yet priced like a commodity, it likely could be within our lifetime. Between the effects of

supply and demand and the need to fund the infrastructure likely falling on local ratepayers, affordable prices will be a hot topic for policy and decision makers.

Standard & Poor's Ratings Services notes that municipal water and sewer utility revenue bonds continue to exhibit ratings stability (*for more information, see "Funding Long-Term Needs Remains The Biggest Risk For U.S. Municipal Water And Sewer Utilities," published Jan. 31, 2012, on RatingsDirect, on the Global Credit Portal*). The stability is there regardless of federal funds, which seem to be in shorter supply these days. In fact, even the somewhat paradoxical goal of conserva-

tion for utilities can benefit credit quality. While there are many key factors that are important to credit quality, Standard & Poor's believes that having a secure, firm, long-term water supply and the capacity and willingness to make tough decisions regarding rates continue to be two important credit factors.

### Utilities Have No Lack Of Infrastructure Needs

In 2011, the EPA conducted its once-every-four-years survey of water utilities across the U.S. The aim of the questionnaire was to help the agency gauge the cost of infrastructure requirements for the nation's drinking water systems for 2011 to 2030 and report the results to Congress. The previous survey, in 2007, and the associated report in 2009, identified more than \$334 billion in infrastructure investment—just to maintain the existing infrastructure. The EPA sur-

veyed all 584 (as of 2007) large public water systems (which served a population of greater than 100,000), 2,266 medium systems (serving between 3,301 and 100,000 people), and 600 small systems (less than 3,300) with response rates of well above 90% in each group.

The EPA's main goal with the latest assessment was to figure out how to allocate funds for the DWSRF programs in fiscal years 2014 through 2017. But it also provides insight into the specific needs and projected costs of the sector. Other attempts, such as from the Congressional Budget Office or the Water Infrastructure Network, to measure the sector's investment needs reported similarly large, if not larger, costs. An American Water Works Association report from February 2012 estimated it could be more than \$1 trillion by 2035.

However, long-term water supply projects don't necessarily meet the EPA's definition of being necessary to serve the existing customer base, so DWSRF funding excludes most new dams and raw water reservoirs. The survey also excludes projects needed to meet demand beyond the existing customers (for instance, growth utilities expect or speculate on), even if current supply and demand are in sync. Because speculative assumptions could be the basis of those supply enhancement projects, the \$334 billion estimate does not capture total drinking water system needs but only those that the agency believes are more directly and immediately measurable within their definitions of eligibility. The 2011 survey results are not yet available.

What is new to the 2011 survey was little more than a sidebar in 2007: climate readiness. The survey does not seek to create a measurement of supply adequacy; rather, it asks management for a subjective determination as to whether the utility's supply is adequate to meet demand, as well as a listing, but not a summary, of projects that are "climate ready." Examples include projects related to



enhancing water quantity or quality that fell due to climate change and projects to protect against increased flooding vulnerabilities. Because it is a subjective sampling, the survey results might not reflect all long-term water supply needs and could under-represent the total investment necessary for all projects.

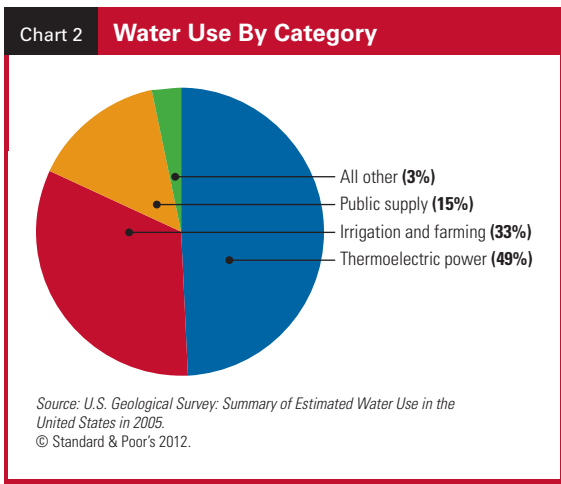
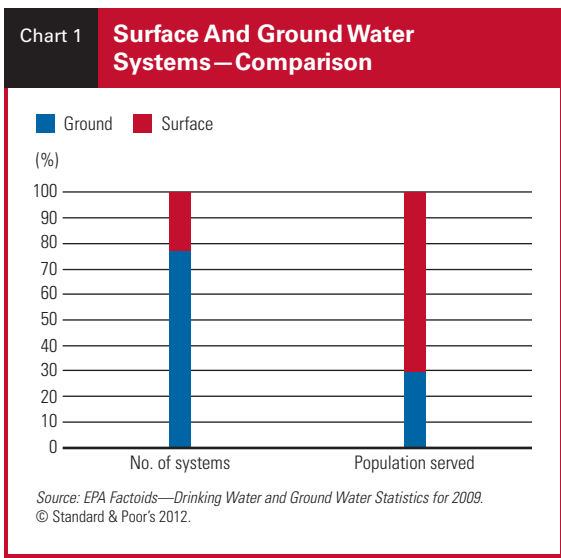
Federal participation in funding these projects, aside from EPA appropriations to the states for the DWSRF and CWSRF, to which the states also provide funding, is limited. Bills to lift the private activity bond cap for water and sewer projects have stalled in each of the past two legislative sessions. The Build America Bonds program, which spurred a huge spike in municipal bond issuance ahead of its Dec. 31, 2010, expiration, is unlikely to come back in light of deficit reduction efforts. The Kerry-Hutchinson-Warner Bill would potentially create a self-supporting public-private partnership that would work like the U.S. Export-Import Bank, although the proposal would start with \$10 billion in public money (with at least that in private participation) and would also fund transportation and energy projects (see “A National Infrastructure Bank Could Support Investment-Grade U.S. Project Finance Ratings,” published Sept. 9, 2011). Invariably, utility managers will be left with the difficult decision of asking local ratepayers for more if they are to get any project funded, regardless of purpose.

### Ground Water Still Dominates For Utilities

According to the EPA and the U.S. Geological Survey (USGS), of the approximately 51,000 community water systems in the U.S., almost four out of five use ground water as its main or even sole source of supply. However, most of those systems are small; almost 43,000 of these utilities serve a population of 3,300 or less each (see chart 1). In terms of total population, a system in which surface water is the primary or sole source of raw water serves 70% of the U.S.

From a credit standpoint, Standard & Poor’s does not endorse one type of supply over the other, because each has its benefits and drawbacks. For example, ground water typically has much lower capital investment and operating costs and is less likely to suffer in drought. However, ground water is generally finite; drilling more wells is simply like putting more straws in the same glass of water. Ground water that does not naturally recharge from some surface source might also degrade (into brackish water or, if near the coast, from salt water intrusion). Subsidence could also occur, which means the land above the well could sink or even collapse.

On the other hand, surface water is generally more expensive to treat to Safe



Drinking Water Act standards, both in terms of operational costs and how capital-intensive the infrastructure requirements can be. For many utilities in the U.S., the source might not be near the utility. That leads to high pumping costs and water losses from evaporation and soil absorption. Surface water is also more susceptible to drought. However, it is more plentiful and more likely to be

system on the order of the California State Water Project or the New York or Washington Aqueducts would require political willingness, environmental and legal approvals, and easements (in which governments would use the land without owning it). Even then, many would likely view it as too costly. Large-scale water storage and delivery projects can take, literally, a generation to finish.

robust sales. It could also lead to managing through a drought.

### Utilities Face The Paradox Of Utility-Led Conservation

Even if not mandatory, strong long-term financial and operational planning at the local and regional level can foster operational certainty and can lead to credit stability for utilities. Many utilities have active long-term water supply, conservation, and risk management plans. Sometimes these are from management's voluntary efforts. In other cases, regulations are the reason. Many states, for example, require local utilities to at least identify future water supply sources. California, Texas, and Arizona have some of the strongest, typically requiring that the plans are also updated regularly, often coordinated based on common population centers and watersheds.

While not every state has comprehensive drought, supply, or conservation policies, most have at least stated goals. Some state water plans include explicit drought management plans. In other states, contingency planning for drought is a separate effort, possibly even synchronized with water conservation awareness. The EPA has published guidelines on water conservation. The federal government itself has a self-imposed mandate for its own agencies and facilities to be conservation-conscious. Some states, such as Georgia, have even incorporated conservation codes as requirements for a utility to be considered for CWSRF loan eligibility.

Many municipal utilities have had different types of resource efficiency programs for decades. For waterworks and sanitary sewer utilities, plumbing codes, outdoor watering restrictions, and ongoing public education campaigns also establish conservation patterns. Regardless, the end goal seems counterintuitive: Utility management establishes policies and or incentives to encourage its customers to buy less of its service. So how can utilities maintain a stable financial risk profile in these circumstances?

## We have observed that one of the most common—but certainly not the only—reasons for a utility to miss its financial targets in a fiscal year is because of weather.

naturally recharged via snowpack runoff, rain, and stream flows.

While we don't expect the USGS to have updated consumptive use data until 2014, the general distribution has been remarkably consistent: electric power generation accounts for half of all water use in the U.S., and agriculture another 30% (see chart 2). Domestic use, which includes residential, commercial, and industrial (including industry with its own dedicated supplies), is at 15%. Growth pressures exist within each sector. In the south and west, many cities continue to grow. And the U.S. is in the early phases of the next wave of power plant construction. Many electric utilities, however, have deferred the decision to construct new baseload generation due to a combination of factors, including lower demand from the recession and demand-side management, as well as looming environmental regulations. On the other hand, much new natural gas-fired generation, including combined cycle plants, has been announced or gone to construction, especially with prices below \$3 per million Btu.

However, unlike the power grid, in which electricity moves across regions via transmission lines, water supplies tend to be close to the users. To build a new multistate water conveyance

### Weather Can Affect Financial Risk Profiles

In a typical year in the U.S., it is not uncommon for regions to have a pronounced or prolonged drought, or suffer from excessive precipitation. Even if the actual climatologic and hydrologic conditions end up being exactly what the utility's management had assumed in its original budget, other factors (such as economic volatility) can affect operating revenues. From a practical standpoint, predicting weather for the next fiscal year can be difficult. Scientists might predict El Nino or La Nina patterns and Arctic oscillations, but that does not guarantee operational or financial certainty for utilities that depend on consistent water supply.

We have observed that one of the most common—but certainly not the only—reasons for a utility to miss its financial targets in a fiscal year is because of weather. Even utilities in temperate climates can have most of their revenues arrive only May through September. This is especially true in the Sun Belt. Should milder temperatures and above-normal precipitation happen, water sales and therefore operating revenues could fall below budget. Conversely, a relatively hot, dry summertime could lead to

Standard & Poor's does not endorse a particular type of rate structure, nor a certain strategy towards rate adjustments. However, a credible history of adjusting rates proactively is a factor that continues supporting rating stability. This generally means that:

- Financial performance demonstrates reasonable consistency and is likely to be able to meet all revenue requirements; and
- The financial risk profile, comparably speaking, is commensurate with the rating.

Many utilities have implemented water conservation rate structures. The most common we have seen is the inclining block rate structure, where the more water the retail ratepayer uses, the more that ratepayer pays per unit cost. While this encourages conservation (as well as lower sales), it can also allow the utility to identify customers who consume a lot of water regardless of supply conditions. Depending on the utility, these sales at the margin can help offset losses from lower sales to other customers.

### Conservation Can Benefit The Bottom Line

A long-term benefit to the balance sheet can sometimes offset the near-term impact to the income statement from conservation. We have observed that successful conservation programs have led to avoided, or at least deferred, capital costs for the utility. The utility might also be able to downsize to-be-built pumping and distribution infrastructure assets; consistently lower variation between average and peak day demand usually means smaller pipes and pump stations, all other things equal. Less capital-intensive requirements for infrastructure could mean less borrowing, given that capital expenditures are typically 35% to 70% debt-funded for most municipal utilities that we rate.

Lower water sales, whether from conservation or climatology, don't necessarily have to lower a utility's pledged revenues, either. Aside from personnel, the largest operating costs

for most utilities are usually electricity (for treatment and pumping) and chemicals (for treatment). Even without a dollar-for-dollar offset, if a utility sells less water, it might still find some corresponding relief in its operating budget. That, in turn, can factor directly into financial risk profile stability, especially for utilities that have fixed revenue requirements regardless of operating revenues, such as debt service, take-or-pay expenses, or off-balance-sheet obligations. Two of the most common rate structures we have observed are either one with flat fees, or one with a base charge plus volumetric rate (a rate based on per-unit consumption). Either can allow utility management to maintain a consistent financial risk profile commensurate with the ratings, so we don't view either approach as more credit positive.

### Planning Is Vital For Rating Stability

Standard & Poor's incorporates many factors into its ratings on U.S. municipally owned utilities. Consistently strong enterprise and financial risk profiles that are likely to remain so are the foundations for credit stability. It is unlikely that utility management can materially affect local or regional economic characteristics. Standard & Poor's believes, however, that management can take actions to support the ratings, such as long-term operational and financial planning, transparent dialogue with ratepayers about tough decisions, and otherwise acting in a manner that reduces risk and manages the volatility that they all inevitably will face to some degree. **CW**

For more articles on this topic search RatingsDirect with keyword:

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# U.S. Municipal Water And Sewer Utilities

## Funding Long-Term Needs Remains Their Biggest Risk

### Overview

- Our almost 1,300 ratings on U.S. municipal water, sewer, and drainage utility revenue-secured debt remain relatively high, with the most common rating at 'A+', and the outlook mostly stable.
- We made fewer rating changes in 2011 than in 2010, and the upgrade-to-downgrade ratio decreased to 5-to-1 from 10-to-1.
- Financial profile changes, in some cases due to weak local economies, were the primary factor behind our rating actions in 2011.

**D**ebt issuance declined for the U.S. water, sewer, and drainage utility sector last year. Overall, Standard & Poor's Ratings Services believes ratings in the sector will remain stable. Still, the sector needs infrastructure investment due to aging systems; regulatory issues; and migrating populations to the south and west, stressing existing water supplies in those regions. Utilities will have a tough year addressing these issues due to funding constraints. Even as local economies start to recover, however, utilities will still need to allocate limited capital dollars among competing high priority projects.

We believe the funding of long-term needs will pose the biggest test for utilities. We also see several other issues, both short and long term, for 2012. Utilities will need to meet annual revenue requirements given the struggling national economy, as well as the local service areas' economic fundamentals, since they relate to assumptions for consumption patterns of existing customer bases and any potential new metered accounts. Meeting annual revenue requirements might also prove tougher given annual climatology and hydrology patterns and trends. Moreover, utilities have to maintain regulatory compliance and fund employee-related obligations such as pension and other postemployment benefits (OPEB).

With federal and state assistance limited at best, we believe utility managers will likely ask more of their customers, especially in the form of rate adjustments.

### Managing Risk And Financing Issues

In our opinion, while few utilities can realistically change the macroeconomic conditions in which they operate, strong risk management of financial and operational needs will likely be the key factor supporting rating stability. It's easy enough for utility managers to identify risks and system needs. However, it's more difficult to fund them. Decisions about annual operating budgets in general, and specifically rate adjustments, are tough enough to make in a normal year in which demand assumptions based on the economy, growth, precipitation, climate, and such are grounded in reality; in a year where there is a recession, drought, and such, however, it is even harder to make these decisions. Therefore, once the American Recovery & Reinvestment Act (ARRA) money was exhausted and federal budget decisions in Washington focused on reductions, it became evident to us that if utilities were to make system

investments, funding would likely need to fall squarely on ratepayers' backs.

We believe stability is somewhat inherent in this sector. That's because utilities are generally self-reliant and funded solely by user charges. This continues to hold true. We have observed that annual operating budgets for this sector do not depend on intergovernmental transfers in the same way a local school district or even the utility's affiliated general government can. Therefore, where substantial state aid cuts might have sliced large swathes from tax-backed budgets, cuts have had less of an effect on utilities. Therefore, these challenges, while potentially considerable, are not, in our view, beyond the utilities' abilities to address.

Furthermore, it is our opinion that utility systems will likely feel pressure to raise local service rates in the coming years. We understand those rate adjustment decisions will probably compete with other inflationary pressures for scarce dollars. We also believe appropriately scoped and timely rate adjustments could largely mitigate risks. In some cases, it might be even easier for city councilors, commissioners, or utility board members to pass rate increases rather than raising taxes in a weak or barely recovering economy. Simply, the public perception of rate increases might be more benign or politically palatable than tax increases. We, however, take these risks into account in our ratings.

### Ratings Should Stay Stable In 2012

Standard & Poor's maintains revenue bond ratings on about 1,270 U.S. municipal or quasipublic utilities that

provide some combination of water, sewer, and drainage services. These do not include tax-backed or other non-utility revenue debt that an affiliated general government might have issued on the utility's behalf.

The sector's most common rating remains 'A+', and nearly all of the ratings currently maintain a stable outlook. We believe this trend is likely to continue in 2012 (*see table*). In addition, we maintain medium investment-grade or higher ratings on the majority of the issuers in the sector. The ratings distribution remains nearly unchanged compared with 2010.

### Keeping Up With Infrastructure Requirements

#### Funding

With federal and state assistance limited at best, we believe utility managers will likely ask more of their customers, especially in the form of rate adjustments. In our view, in 2012 and beyond, rate increases will likely be a major funding source for many utilities' key projects, as well as their ability to maintain consistent finances, which we believe is important to rating stability. In our experience, the utilities most successful in asking more of their customers are active in meaningful and substantive long-term planning for operating and capital budgets, as well as educating the public to build awareness and support.

While higher capital market borrowing costs did not play out as utility leaders feared in 2011, municipal volume was off by more than 25% compared with 2010 levels despite historically low borrowing costs. We, however, believe it's unfair to compare 2011 debt issuance to 2010 issuance because market activity was extraordinarily high in 2010 due to a fourth-quarter avalanche of Build America Bonds so issuers could take advantage of federal subsidies before they expired. Once the sector realized the 111th Congress would not extend the direct-payment Build America Bond subsidy program beyond its Dec. 31, 2010, expiration, many

issuers accelerated their bonding plans and issued debt in the third or fourth quarters of 2010 rather than in 2011.

Despite all the bond issuances of the past two years, we believe the sector still has infrastructure needs to fund in 2012 and beyond. Many local governments, however, are likely to prioritize their limited capital, especially in difficult economic circumstances. Therefore, they will probably fund essential services ahead of other projects that officials might characterize as less critical or even discretionary.

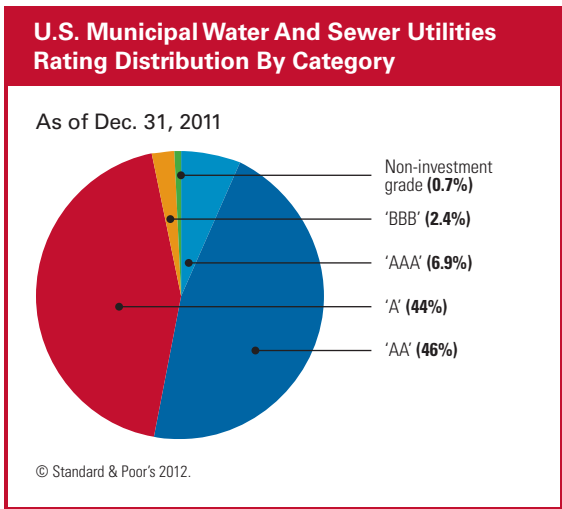
In fact, many widely published studies and anecdotes—such as those from the American Society of Civil Engineers, the U.S. Environmental Protection Agency (EPA), and industry-related professional organizations—have recently noted there is a need to continue to fund critical water, sewer, and drainage infrastructure. Even if the cost of borrowing for many issuers might be higher, whether because of a lack of subsidies or generally higher interest rates, we believe the utilities' essential service nature will eventually overcome any near-term decisions to defer revenue bond issuance.

In 2011, the EPA conducted its once-every-four-years survey of water utilities across the nation. The EPA intended the eight-page questionnaire to provide data so it could gauge the cost of infrastructure requirements for the nation's drinking water systems for the next 20 years, from 2011 to 2030; in turn, the EPA would report the data to Congress. While it might be some time before the EPA reports the 2011 survey results, the 2007 study identified more than \$334 billion of investments just to maintain the existing infrastructure's integrity. Because long-term water supply projects are harder to measure under the EPA's definitions of what is needed to serve existing customers, those projects are generally not included in the costs.

Survey results also help the EPA allocate clean water and drinking water state revolving funds (SRFs) to the states as well as identify the sector's general needs. While SRF allocations

spiked temporarily in 2009 and 2010 due to the ARRA, the general trend has been for SRF appropriations to be flat, if not slightly declining. This means low-cost state loans might be harder for utilities to acquire.

Whether Congress implements a federal option remains up in the air since federal discussions currently appear to center on federal debt and the Budget Control Act of 2011. A bill cosponsored by Senators Kerry and Hutchinson, however, is one possibility; it would create the American Infrastructure Financing Authority, in essence a public-private partnership that would provide loans and loan guarantees for public infrastructure projects, including water, energy, and transportation. The bill is currently still in committee, but federal priorities might be elsewhere in 2012.



**A Snapshot Of Standard & Poor's Rating Actions Taken In The U.S. Municipal Water And Sewer Utility Market**

	— Year-end Dec. 31 —	
	2011	2010
Total number of ratings	1,270	1,252
% of ratings that changed during the year (upgrade or downgrade)	8.9	14.5
Upgrade-to-downgrade ratio	4.7 to 1	10.4 to 1
Number of positive outlooks	13	2
Number of non-stable outlooks	25	17

### Economic recovery

From a municipal utility's point of view, growth has positives and negatives. It creates more revenue-paying customers and higher densities (more customers within the same geographical space); therefore, it makes the utilities much more efficient. Growth also creates more accounts and gallons sold that utilities can spread their fixed costs across. It, however, can also drive up capital expenditures. And for some utilities, growth can create an overreliance on nonrecurring revenue, such as impact or connection fees.

## We believe pensions and OPEB obligations represent material long-term risks to governments.

As economic growth slowed in many places in the U.S. from 2007 to 2010, in some cases, we saw income statements take a dramatic turn for the worse as connection fee revenue growth stopped. In extreme circumstances, recurring revenue also dried up due to housing market woes. Standard & Poor's recently noted in its 2011 economic outlook and the U.S. S&P/Case-Shiller Home Price Index (20 cities) that while housing sales and starts appear to be stabilizing, foreclosures and pressure on home values will likely remain an issue. In fact, Standard & Poor's attributes all of the downgrades in 2011 to the weakening of utility finances, specifically debt service coverage (DSC) and available liquidity.

In some cases, it was steady erosion due to the economy. In other cases, some utilities had over-relied on new connection fees just to generate the bare minimum of net revenue available for debt service. Once revenue growth stopped, however, the bottom line suffered. For the entire sector of issuers Standard & Poor's rates, however, both

of these instances have generally proven to be the exception.

### The Long-Term Challenges

#### Regulatory issues

The 1996 amendments to the Safe Drinking Water Act were some of the biggest changes to drinking water since the law's 1974 creation. The regulatory process, however, is not static. New rules and updates continue. The EPA's new strategy is to address drinking water contaminants as a group—rather than one at a time. The EPA hopes new technology can broadly address man-

cially. The best available technology includes the acknowledgement that the science must be economically achievable to meet or get below the maximum contaminant level of more than 80 contaminants identified in national primary drinking water regulations. Fortunately, water and sewer treatment technology generally has a long and proven record with newer techniques also operating at utility scale. Therefore, we view technology risk in this sector as very low.

Over the past decade, we have seen the most prominent example of regulatory impacts in systems dealing with sanitary or combined sewer overflows that led to Clean Water Act of 1972 (CWA) violations. Aging infrastructure, growth-related bottlenecks, and inflow and infiltration are the main overflow culprits; these problems can be expensive to address. Standard & Poor's maintains ratings on a number of mid-size and large cities dealing with some kind of regulatory mandate for overflow remediation.

As a response, in October 2011, the EPA released a new planning process that targets urban areas where the violations are most common and prominent. The idea is that sanitary and storm sewer system improvements for some cities could address more than one problem, allowing the municipalities to make better use of capital and still be compliant.

Municipal systems such as District of Columbia Water & Sewer Authority (AA/Stable); Atlanta (A/Stable); Austin, Texas (AA/Stable); Northeast Ohio Regional Sewer District (AA+/Stable); Kansas City, Mo. (AA/Stable); Los Angeles (AA/Stable); and Honolulu (AA/Stable) are among the many large systems that are facing, or have already faced, multibillion dollar capital plans for sanitary or combined sewer overflow remediations. CWA-driven improvements carry the force of law to be completed within a determined period. Such fixes, however, usually compete with all of the other identified and approved capital projects for the utility's limited dollars.

Large-scale regional regulatory mandates will also probably continue to

dates. While various studies and reports on pharmaceuticals, chromium-6, hydraulic fracturing (fracking), and even fluoride in the water are more of a "headline" risk rather than something measureable and material to credit quality, they serve as a reminder that utilities should not take regulatory compliance for granted.

In November 2011, the EPA announced that it would not deliver its final research plan on fracking until 2014 and that it would take any regulatory or legislative action well after that, if at all. We do not believe anything the EPA identified as new initiatives in the most recent EPA strategic plan through 2015 could have an effect on the sector's credit quality since the focus areas are primarily goals and master plans rather than specific regulations.

The water industry's response to regulations is similar to that of utilities regulated by the Clean Air Act of 1963, which Congress has amended several times since. The industry generally supports regulations as long as the science the regulations address exists and is practical, both operationally and finan-



have an effect on utilities. As far back as the 1980s, six states plus the District of Columbia have had to address more-stringent wastewater treatment plant permit requirements because they discharge their treated wastewater into the Chesapeake Bay watershed and its tributaries. Because of regulatory deadlines that stated utilities had to address many of the newest effluent limitations by 2010, we saw increased wastewater treatment capital expenditures strictly for those efforts in recent years. The EPA constantly reminds utilities operating in common watersheds and deltas that they need to be good environmental stewards of those bodies of water, but the utilities bear the costs of doing so themselves. In December 2011, the EPA finalized its strategy for coastal areas along the Gulf of Mexico for ecosystem restoration; the initial federal outlay was just \$50 million.

#### Pension and OPEB obligations

We believe pensions and OPEB obligations represent material long-term risks to governments. Although 2011 and 2010 helped those fiduciary funds or trusts to rebound, the corpus of the assets compared with actual obligations, especially as baby boomers start to retire, in many cases still shows a big gap. Utilities are often beholden to the ultimate decisions of city councils, commissions, or other local officials on those subjects since utility employees usually participate in larger and often civil service retirement systems.

Officials can make the full annual required contribution to the pension or risk a larger unfunded liability; if they don't make the contribution, they can always hope for extraordinary rates of return in the pension fund to make up for not paying the annual required contribution. Or they could try to contain the growth of existing liabilities by reducing benefit levels for all newly hired government employees. While pension and OPEB obligations are not necessarily always competing for immediate requirements, such as debt service, the risk remains of having such obligations

become a larger percent of the budget over time; we will continue to monitor this issue.

#### Climatology, hydrology, and long-term water supply

While climatology, hydrology, and long-term water supply are all slightly different concepts, they are highly interrelated and remain important to credit quality. In our experience, the most common reason in any year for a utility to miss its budgeted DSC ratio is due to weather-related events.

Since many U.S. utilities make the lion's share of water sales between Memorial Day and Labor Day, a temperate summer with more rain than normal can quickly cause a utility to deviate from budgeted operating revenue. Conversely, a very hot and dry summer can be a boon to the bottom line as long as the utility has the water supply and the corresponding infrastructure to accommodate the increased demand. Each year, some regions of the U.S. experience droughts, sometimes prolonged and pronounced. As of January 2012, the seasonal drought outlook by the National Weather Service's Climate Prediction Center indicates the persistence or even worsening of droughts in Gulf Coast states and the desert Southwest with drought conditions likely to develop in Nevada and Southern California. Such was the case in 2011 in Texas, where a record drought devastated raw water reservoirs and some sectors of the economy, such as agriculture and ranching.

Conversely, 2011 was kind to a different high-profile water supply as substantial Rocky Mountain snowpack pushed Lake Mead's, in Nevada, level up by 30 feet. As of January 2012, the lake was at 57% of capacity compared with below 40% just several years ago. That U.S. Bureau of Reclamation storage system is critical to a number of Colorado River states for their drinking water supply. It remains highly regulated and periodically contentious; it could have—no pun intended—a trickle-down effect on municipal systems that take water from it, mainly in the form

of higher operating costs but also planning and water conservation purposes.

Sometimes litigation is the de facto solution to regional problems. In June 2011, Georgia saw temporary relief in the so-called "Tri-State Water Wars" by suing over the use of Lake Lanier, a key supply source to Atlanta. The courts ordered the Army Corps of Engineers to develop a new allocation plan by mid-2012, a decision we will closely monitor. In January 2012, however, Georgia Gov. Nathan Deal announced the state would sell \$300 million in general obligation bonds over four years for the development of new and expanded water sources.

Many other states have collaborative, if not mandated, water supply planning processes. We believe this is positive for credit, even if the effect on utilities is not immediately measurable given that it can take decades—as much as a generation—to put a new surface water supply source into place. Even with implementing water reuse systems or water conservation ordinances and building codes, it takes time to reap the rewards.

We have observed that highly rated utilities tend to have a well-developed long-term planning process and strong risk management. Risk management might include allowances for contingencies and emergencies, such as approved drought management plans or connections with neighboring systems. In our experience, however, most rated utilities have a long-term plan in place, even if they typically implement projects within those plans just in time to avoid overbuilding or "white elephant" (something that is expensive to have, hard to get rid of, and not returning its value) projects. **CW**

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## U.S. Flood Insurance

# While The Government Is Treading Water, Private Insurers Are Just Getting Their Feet Wet

### Overview

- Flood insurance in the U.S. is predominately provided by the federal government, limiting the effects on the financials of private insurers; however, this practice is currently under scrutiny.
- Private insurers have cited difficulties in modeling the risk, generating sufficient premiums, and overcoming adverse selection as reasons for low participation levels.
- Private insurers are still exposed to flood through coverage provided above federal policy limits, crop insurance, and ambiguity following catastrophic events around whether wind or water caused damages.
- The role of the private sector may increase in the future given proposed legislation, recent advances in catastrophe modeling and capital markets, and the current indebtedness of the NFIP.

**W**hose earnings and balance sheet are most at risk when catastrophic flood losses hit the U.S.? The federal government's are. In the U.S., private insurance companies exclude flood coverage under most residential and commercial property insurance forms. Automobile insurance excludes flood coverage unless the insured elects the more costly comprehensive coverage. Given the current coverage structure, U.S. floods have limited impact on earnings, capital, or, ultimately, credit ratings on private insurance companies. Although the U.K., Germany, and others have privatized insurance coverage for flood losses, in the U.S. such coverage is nationalized through the National Flood Insurance Program (NFIP). The future of the program is uncertain, however, and the proposed amendments may encourage private participation.

## The Public Option

Congress created the NFIP, a division of The Federal Emergency Management Agency (FEMA), in 1968 to provide subsidized, federally backed flood insurance for commercial and personal property in the U.S. In exchange, property owners pledge to promote

floodplain management and work to reduce flood-related costs using preventative measures such as elevating homes and building with flood-damage resistant materials. At year-end 2010, the NFIP had more than 5.6 million policies in force for a total of more than \$1.2 trillion of total insured

property. In return, the federal government received more than \$3.3 billion in premiums from homeowners and commercial property owners in 2010. Although the coverage is not compulsory on a nationwide basis, coverage is mandatory for property owners located in Special Flood Hazard Areas (SFHA). FEMA defines SFHAs as areas that will be inundated by a flood event having a 1% chance of being equaled or exceeded in any given year, also referred to as the 100-year flood.

Since inception, the program has paid more than \$38 billion in losses on more than 1.3 million claims. This number skyrocketed in 2005 after Hurricane Katrina, which alone cost the NFIP \$16.2 billion dollars on more than 167,000 claims. The policies tend to be concentrated in areas along the coast and major rivers. The most policies are in Florida (2.1 million), Texas (677,000), and Louisiana (485,000).

## The Struggle For Private Insurers

So, why don't insurance companies want a bigger piece of the pie? Private insurers in the U.S. have cited flood modeling as one source of difficulty. Landscapes are constantly changing due to development, and protective

Table 1 National Flood Insurance Program Historical Data

	Number of policies	Growth in number of policies (%)	Premium collected (mil. \$)	Total coverage (bil. \$)	Number of losses	Total losses (mil. \$)
1978	1,446,354	N/A	111.3	50.5	29,122	147.7
1979	1,843,441	27.5	141.5	74.4	70,613	483.3
1980	2,103,851	14.1	159.0	99.3	41,918	230.4
1981	1,915,065	(9.0)	256.8	102.1	23,261	127.1
1982	1,900,544	(0.8)	354.8	107.3	32,831	198.3
1983	1,981,122	4.2	384.2	117.8	51,584	439.5
1984	1,926,388	(2.8)	420.5	124.4	27,688	254.6
1985	2,016,785	4.7	452.5	139.9	38,676	368.2
1986	2,119,039	5.1	518.2	155.7	13,789	126.4
1987	2,115,183	(0.2)	566.4	165.1	13,400	105.4
1988	2,149,153	1.6	589.5	175.8	7,758	51.0
1989	2,292,947	6.7	632.2	265.2	36,245	661.7
1990	2,477,861	8.1	672.8	213.6	14,766	167.9
1991	2,532,713	2.2	737.1	223.1	28,549	353.7
1992	2,623,406	3.6	801.0	236.8	44,650	710.2
1993	2,828,558	7.8	890.4	267.9	36,044	659.1
1994	3,040,198	7.5	1,003.9	295.9	21,583	411.1
1995	3,476,829	14.4	1,140.8	349.1	62,441	1,295.6
1996	3,693,076	6.2	1,275.2	400.7	52,677	828.0
1997	4,102,416	11.1	1,509.8	462.6	30,338	519.5
1998	4,235,138	3.2	1,668.2	497.6	57,349	886.3
1999	4,329,985	2.2	1,719.7	534.1	47,247	755.0
2000	4,369,087	0.9	1,723.8	567.6	16,362	251.7
2001	4,458,470	2.0	1,740.3	611.9	43,589	1,277.0
2002	4,519,799	1.4	1,802.3	653.8	25,312	433.6
2003	4,565,491	1.0	1,897.7	691.8	36,838	780.5
2004	4,667,446	2.2	2,040.8	765.2	55,826	2,232.1
2005	4,962,011	6.3	2,241.3	876.7	212,897	17,714.8
2006	5,514,895	11.1	2,604.8	1,054.1	24,595	640.7
2007	5,655,919	2.6	2,843.4	1,141.2	23,132	612.4
2008	5,684,275	0.5	3,066.7	1,197.7	74,300	3,452.3
2009	5,700,235	0.3	3,187.1	1,232.4	30,839	773.1
2010	5,646,735	(0.9)	3,353.8	1,245.5	27,923	727.9

N/A—Not applicable.

Source: Federal Emergency Management Agency.

Table 2 Top 10 NFIP WYO Program Participants

(As of year-end 2010)	
(Mil. \$)	Direct premiums written
Fidelity National*	371.0
State Farm	317.6
Allstate	311.0
Hartford	298.5
Travelers	205.6
Selective	191.0
Assurant	184.2
Zurich	123.7
Nationwide	118.0
Harleysville	107.5

\*Fidelity National has since sold its NFIP operation to WRM America. NFIP—National Flood Insurance Program. WYO—Write your own.



levees are susceptible to human error. The NFIP has also illustrated the difficulty in producing current and accurate modeling for flood exposure. FEMA began a multiyear mapping modernization program in 2003 when, according to a March 2011 Congressional Research Service report, 70% of maps used in the U.S. were more than 10 years old. Some of the delay could also be attributable to funding constraints, however. Whereas catastrophe modeling agencies have sophisticated flood models for many European countries, models for the U.S. are generally still developing. Funding could have a role here as well. Insurance companies use hurricane and earthquake models to underwrite, price, and manage their aggregate risk exposure and properly allocate capital. Catastrophe modeling agencies have little incentive to develop similar models for floods without such a customer base.

Some are concerned that the costliness of charging actuarial rates would dissuade buyers from purchasing coverage. According to a June 8, 2011, Congressional Budget Office report, FEMA estimates one-fifth of the policyholders are paying 40% to 45% of actuarial rates. More than one million policyholders would fit into this category. Amid high unemployment and the general economic downturn in the U.S., insuring for a 100-year flood may not be the highest priority for policyholders—especially if premiums more than double to their true actuarial rate. Additional private insurer price increases could come from the need to cover the cost of capital and generate a profit for shareholders—a task with which the federal government is not charged.

Private insurers may be unable to generate sufficient premiums due to adverse selection (*see table 1*). The table shows that when significant losses occur, policy purchases increase; however, the growth tapers off and sometimes even turns negative as time passes. For example, in the aftermath of Katrina the policy count increased

6.3% in 2005 and 11.1% in 2006. The following four years had an average increase of 0.6%, with growth in 2010 even turning negative with a decrease of 0.9%. Perhaps the most drastic example is in the wake of Tropical Storm Claudette, Hurricane Frederic, and flooding in numerous states in 1979. After an uptick in policies of 27.5% in 1979 and 14.1% in 1980, 1981 saw a decrease of 9% followed by another decrease of 0.8% in 1982. This type of behavior could make it harder for insurance companies to price adequately for flood coverage.

### **Private Insurers Still Share Some Of The Burden**

Private insurers play some role in mitigating the risk of flood losses in the U.S. NFIP policies are administered mostly through the Write Your Own Program whereby 87 private insurance companies act as selling agents for the NFIP in return for an expense allowance by the federal government to make up for the costs incurred in the process (*see table 2*).

Because the insurance companies do not take on the flood risk, they offer this coverage as a supplement to their standard homeowner and commercial property policies. Although the insurance companies write the policies on their own paper, the premiums and all losses incurred are passed through (ceded) to the federal government, while insurance companies take in fee income for their services. Therefore, from a credit rating perspective, no capital is at risk.

Although it would not significantly affect credit ratings, U.S. insurance companies still take on some flood exposure. Private insurers can insure both residential and commercial properties with values of more than the NFIP limits of \$250,000 and \$500,000, respectively. In most cases, however, the NFIP policy is the first layer of protection and bears the brunt of the damage. Typically a more valuable commercial property would have a higher deductible, and the NFIP policy can actually serve as fill-in to pay that

amount. In its current format and as long as flood insurance coverage is provided within a well-diversified portfolio geographically and by product, it is unlikely that one major flood would cause material ratings pressure.

Aside from coverage for flood damage to commercial and residential structures, insurance companies also insure farmland and crops. Here, the federal government also has a hand in providing coverage but in a co-participation capacity. Whereas the government acts as the first layer of protection for structural flood coverage through the NFIP, private insurers typically retain most of the risk in crop insurance through “multi-peril crop insurance,” and the government takes on increasingly larger portions as the severity increases. Here, instead of passing along all premiums and losses to the government, private insurers retain most of both the premium and the risk.

## More important for insurance companies are the prospects of future participation by the federal government.

As the name suggests, multi-peril crop insurance covers many perils in addition to flood, including drought, frost, and fire (see “*Crop Insurance Is Volatile, But Profitable*,” published Dec. 15, 2011, on *RatingsDirect on the Global Credit Portal*). Direct premiums written for the crop insurance market in 2010 were \$7.7 billion, more than double the premiums for the NFIP. Writing crop insurance enables insurance companies to diversify their portfolios away from the coastal hurricane-prone exposures while still handing over the most severe catastrophic losses to the federal government. Therefore, crop insurance performance remained strong in 2005 amid heavy losses for insurance companies with exposures to Hurricanes Katrina, Rita, and Wilma.

### Flood Versus Wind: Murky Waters For Insurers

Another difficulty insurers face regarding flood insurance is that private insurance companies could still be exposed to flood claims even when they have specifically excluded coverage for this peril in their policies. When major hurricanes hit the coast it is difficult to determine whether wind or water caused the damage. This is important as wind is generally covered by private insurer policies whereas flood is covered by government policies. In the aftermath of Katrina in 2005, various insurance companies were defendants in multiple lawsuits alleging they failed to pay covered wind damages they categorized as flood, causing the government to pay the bill. Some alleged storm surge was not included in the flood exclusion and therefore should be covered. Although insurance com-

panies were mostly dismissed from the allegations, earnings or even capital could be at risk if rulings adversely affect insurance companies.

### The Future Of Flood Insurance

More important for insurance companies are the prospects of future participation by the federal government. With a current outstanding Treasury loan of more than \$17 billion to the NFIP, the program is currently under scrutiny. Many solutions have been proposed, including revamping the NFIP, restructuring it so that the government only acts as a reinsurer (or the government purchases reinsurance), and securitizing the risk through the catastrophe bond market to tap into capital markets. The NFIP

is currently on temporary extension and set to expire May 31, 2012.

A recent bill, The Flood Insurance Reform Act of 2011 (HR 1309), was passed by the House of Representatives on July 12, 2011, and a similar bill is currently pending in the Senate. On Feb. 9, 2012, Senate Majority Leader Harry Reid and Minority Leader Mitch McConnell were urged by Senators David Vitter and Jon Tester to expedite passage of the bill. The letter to Reid and McConnell was signed by a bipartisan group of 41 senators. Among other reforms, HR 1309 of the House extends the NFIP to 2016, introduces a five-year phase-in of up to 20% annual increases to the actuarial rate, and establishes a Technical Mapping Advisory Council to enhance flood insurance rate mapping. The bill also promotes private insurers’ participation in the program by requiring the study of privatizing the program, the assessment of private company requests for proposals to assume a portion of the risk, and authorizing the purchase of reinsurance for the federal program.

Although private insurers historically have struggled to take on flood risk, there have been many advances in modeling, capital markets, and risk-transferring products since 1968 when the NFIP began. Although private insurers’ current exposure is only on the books as a small operating profit and minimal capital at risk, a more pronounced role may surface in the near future. Since inception, the NFIP has maintained a goal of more private-company participation, and the current political and economic environment could be a catalyst for change. **CW**

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## Credit FAQ

# How Water Shortages In Eastern England Could Increase Costs For U.K.-Based Utilities

**T**he east of England is currently experiencing a drought, with reservoir levels already 20% lower than normal. What's more, we believe the region is likely to face severe water shortages over the longer term due to significant changes in rainfall patterns on account of climate change and a steadily increasing population. Among other detrimental effects, this could lead to water shortages, increased energy prices, and flood risk. It could also lead to operating and financial challenges for utilities and energy-intensive businesses operating in the region.

**Editor's Note:** Standard & Poor's Ratings Services would like to acknowledge the contributions to this article of Aled Jones and Candice Howarth of the Global Sustainability Institute at Anglia Ruskin University, as well as that of Liesel van Ast of Trucost PLC.

Standard & Poor's Ratings Services, together with the Global Sustainability Institute at Anglia Ruskin University and environmental research organization Trucost PLC, have conducted joint research into the drought in the east of England. This research highlights that without increased investment into managing both demand and infrastructure (in the form of increased storage capacity, new water sources, reduced leakage, or a higher penetration of water meters), water and power companies operating in the east of England are likely to face both continued water shortages and increasing operating and capital costs. We believe these costs could harm the utilities' credit quality over the long term if not appropriately mitigated.

In this FAQ, we answer investors' questions about how the water shortage in the east of England could affect utilities' credit quality.

## The Environment Agency reports that groundwater levels in the east of England are currently lower than in 1976...

**Q.** *How severe is the current water shortage affecting the east of England?*

**A.** In our view, it's very severe. The Environment Agency reports that groundwater levels in the east of England are currently lower than in 1976—the year commonly associated with the most severe drought in the U.K.

On Feb. 20, 2012, the U.K. government hosted a drought summit at which water companies and other interested parties met to formulate ways to avert a severe water crisis in the most vulnerable regions of England, including the east. Delegates at the summit were told that a year-and-a-half of low levels of rainfall have left the soil so dry and reservoirs and river levels so low that the water industry believes curbs on water use are now likely (*see chart 1*).

**Q.** *Are the current drought conditions just a short-term problem?*

**A.** No. The east of England has been a water-stressed area for the past 30 years. Last year, Anglian Water PLC (*see note 1*)—which provides water and wastewater services to the east of England and Hartlepool—applied for two drought permits for reservoirs located in the Nene catchment area following very low rainfall of 453 millimeters (mm) over the year. This is equivalent to 75% of the 1961 to 1990 U.K. average rainfall of 603 mm. (We use the 1961 to 1990 U.K. average as our baseline reference period for the comparisons that follow.)

Furthermore, we believe that climate change could have a significant and adverse influence on rainfall in the east of England in the short, medium, and long term. According to the Department of Environment, Food, and Rural Affairs' (Defra's) U.K. Climate

Projections 2009 (UKCP09), the average summer rainfall will drop approximately 7% by 2020 and 21% by 2080 under its medium greenhouse gas (GHG) emissions scenario A1B (*see note 2*). This is one of three scenarios outlined under UKCP09, each of which makes different assumptions for factors including GHGs and land use.

**Q.** *How will climate change affect rainfall in the future?*

**A.** According to UKCP09, the total average annual rainfall for the east of England will remain approximately the same until 2030. However, we understand that the spread of precipitation across the year is likely to change dramatically as a result of climate change.

From 1970 to 2000, the average annual rainfall in the east of England was 603 mm, with a relatively even spread of 306 mm in winter and 297 mm in summer. However, by 2030, UKCP09 forecasts 8% more rainfall in winter and 8% less rainfall in summer across its low, medium, and high GHG emissions scenarios. Winter rainfall is important for recharging reservoirs and aquifers (natural underground water storage locations). By 2050, according to UKCP09, there will be 15% less summer rainfall and 15% more winter rainfall on average.

At the extreme, by 2050, there is a 10% probability of 37% less rainfall in the summer and 30% more in winter (*see chart 2*). We note that the amount of rainfall is not necessarily an accurate predictor of the deployable water output, because this depends on various factors involved in capturing rain—including catchment area characteristics, previous rainfall patterns, and availability of water treatment.

The potential change in water availability throughout the year is exacerbated by differing demands in each season. In a typical year in the east of England, demand for water in the summer is 6% higher than in the winter. In a dry year, summer demand is approximately 9% higher, according to Anglian Water. This has significant implications for the storage and transport of water throughout the region.

**Q.** *How are the water utilities addressing the effects of climate change in the east of England?*

**A.** Anglian Water's mitigation plans for the east of England are set out in its 25-year Strategic Direction Statement (SDS), published in 2009.

The SDS identified population growth and climate change as the two most significant challenges facing Anglian Water. As a consequence, the company is targeting £13 billion of investment before 2035, £1 billion of which will address the effects of climate change directly. The investment is directed toward the:



- Resilience and reliability of water and wastewater services;
- Security and conservation of water resources; and
- Growth in demand across the east of England.

In January 2011, Anglian Water expanded its SDS plans through its Climate Change Adaptation Report. It submitted this report to the U.K. government as required by the Climate Change Act 2008. This detailed the company's climate change risk assessment methods and the actions to be taken to manage those risks, such as demand management and infrastructure investment.

Other water companies in the south east of England, such as Thames Water Utilities Ltd. and Southern Water Services Ltd. (*see note 1*), have also increased spending on drought measures. Thames Water is spending £1 billion per year between 2010 and 2015 on capital works, of which one-quarter relates to drought and water management measures.

**Q.** *What other plans do the utilities have to conserve water in light of a rising population?*

**A.** The East of England Regional Economic Strategy 2009, published by the East of England Development Agency (EEDA), shows the 2012 population for the east at 5,766,600, with projected growth of between 0.5% and 0.9% per year.

Although the EEDA's East of England Implementation Plan shows that average household water usage is reducing—largely due to a switch to water meters from ratable bills—there is some way to go to reach the target set by the water industry's own resource management plans. That target is 122 liters per person per day by 2030, representing an 18% reduction on today's level. However, based on current usage trends, the industry expects only a 4.5% reduction per person. U.K. government targets are toward the lower end of these projections (*see note 3*).

Assuming a projected population growth of 0.8% per year, together with the current trajectory of household water usage per person of 150 liters per day, we estimate that demand for household water in the east of England will rise by about 10% by 2030.

Population growth will also increase nonhousehold water demand (i.e., production, manufacturing, and services), which will further increase demand overall. However, water efficiency measures, such as installing less water-intensive industrial processes, may counter some of this growth and therefore it's difficult to model nonhousehold demand with any accuracy. For the purposes of our calculations, we therefore assume that nonhousehold demand will remain roughly constant.

However, we note that the majority of the population increase is likely to be concentrated in areas of high density, which are already experiencing high water stress. Consequently, the 10% increase in demand we project by 2030 is likely to be an underestimate, unless water can be more easily transported across the region.



**Q.** What pressure will changes in water resources place on local water companies?

**A.** Water shortages could lead water companies to pump more water from rivers into the reservoirs. Pumping more

water could increase the energy and carbon intensity of water provision.

Population in the Anglian Water region has grown by some 20% since 1989. However, the same amount of water is put into supply today as in

1989 (1.2 billion liters a day). This is largely due to the company's water management measures, such as metering, leakage control, and water efficiency. Nevertheless, the company estimates that it will require capital investment of almost £12 billion to deliver its long-term strategy to exploit new abstraction points and reservoirs and implement its water efficiency measures between 2010 and 2035.

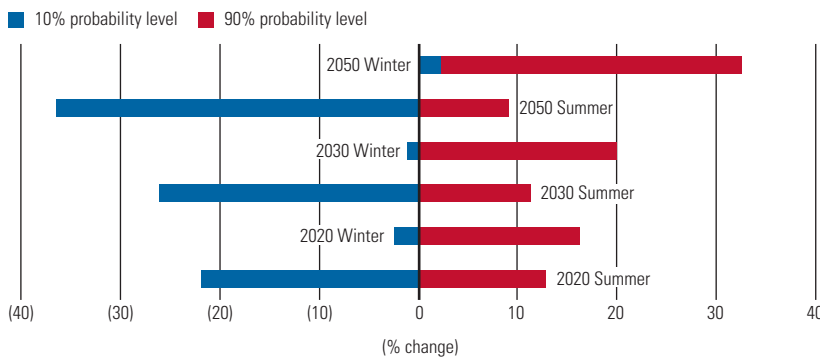
Using UKCP09, Anglian Water projects a total additional requirement relative to potential supply of 49.6 ml of water per day by 2036 to 2037. This shortfall would be concentrated in four of its 11 water resource zones. The prediction is based on surface water yield calculations, river flows, and groundwater reservoir replenishment rates.

Positively, Anglian Water has identified about 19 new water abstraction sources and reservoirs, as well as demand management solutions. The latter include water efficiency measures for domestic customers, such as water audits and the installation of water-efficient domestic appliances in 40,000 homes in the past two years. The company estimates that these measures are saving an average of 40 liters of water per household per day. In addition, 87,000 water meters have been fitted in the past two years, out of a target of 183,000 by 2015. The Anglian Water region has 67% meter penetration, the highest figure among major U.K. water companies.

**Q.** What steps is Anglian Water taking to protect its credit quality in the face of such large investments?

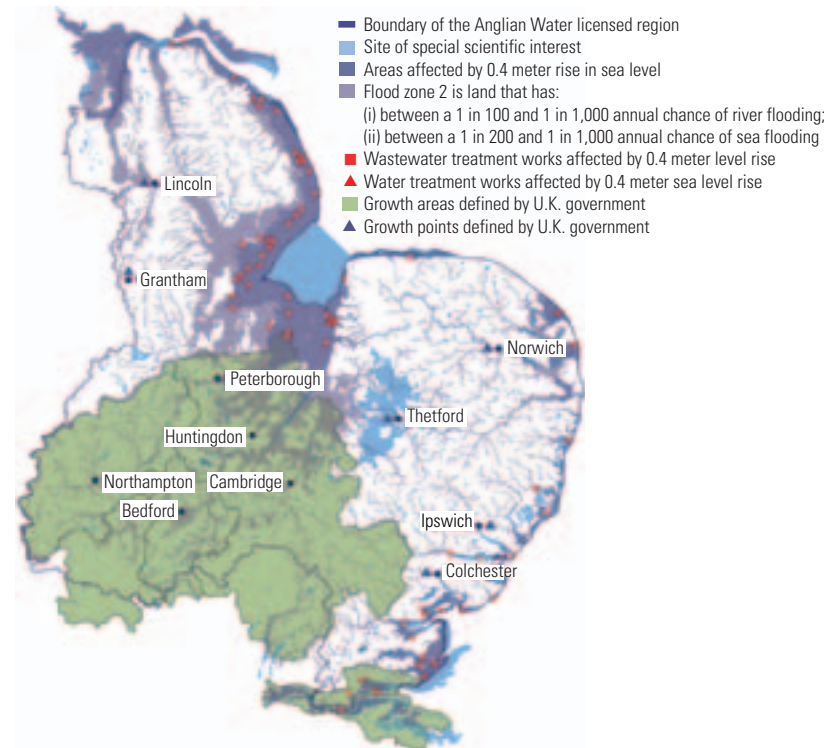
**A.** Anglian Water has little prospect of generating positive net cash flows (after capital expenditures [capex]) before 2035, in our opinion. It therefore expects to rely on the debt markets to finance its capex program. Under the regulatory framework operating in the water sector in England and Wales, Anglian Water would typically seek to have such capex approved in its asset management plan and then added to its regulated asset base. This would subsequently allow the company to increase its regulated tariffs and pass on the cost of asset depreciation to its customers, thereby

**Chart 2 Potential Change In Precipitation In The Anglian Water Catchment Area 2020 To 2050**



Source: U.K. Department of Environment, Food and Rural Affairs' Climate Projections 2009 (UKCP09). © Standard & Poor's 2012.

**Chart 3 Anglian Water's Assets Vulnerable To 0.4 Meters Above Sea Level**



Sources: Anglian Water PLC's Strategic Direction Statement published 2007; Environment Agency 2004; Communities of local government websites. © Standard & Poor's 2012.

protecting its credit quality. However, we understand there remains some uncertainty over the timing and flexibility of the tariff increases, as well as over the assumptions underlying the asset management plans submitted to the regulator, Ofwat.

Ofwat plans to change the way it sets price limits in the future to take account of factors such as population growth, climate change, and the increasing scarcity of water resources. Abstraction charges will adjust to reflect the relative scarcity and abundance of water, or competing water demands.

Although the environmental costs of water use and infrastructure will increasingly be included in water pricing in the U.K., we believe that power generators and energy-intensive firms could face more immediate financial risk from water use through business disruption and changes in abstraction licensing conditions.

**Q.** *How could water shortages affect power companies and future electricity tariffs?*

**A.** Infrastructure that locks in high levels of resource dependence and pollutants could face higher-than-forecast costs, lowering future cash flows and returns on investment. Water shortages may well increase both the cost of power and electricity tariffs.

For example, EDF Energy PLC (A/Negative/A-1) runs Sizewell B, a nuclear pressurized water reactor, and the largest power station on the east coast in Suffolk, with the capacity to generate 1,191 megawatts (MW). The plant's water use equates to less than 2% of the total water supplied by Essex and Suffolk Water per year. (Essex and Suffolk Water is owned by Northumbrian Water Ltd. [BBB+/Stable/—].) Trucost, an environmental research company, calculates that if mains water were priced to reflect local water use as a percentage of annually renewable freshwater resources (95%), the Sizewell plant could incur water scarcity costs totaling an additional £1.7 million per year, based on 2010 water consumption. (Water scarcity costs reflect the financial impact that water extraction has on freshwater replenishment,

ecosystem maintenance, and the return of nutrients to the water cycle. Trucost estimates this by modeling standardized cost data relative to water scarcity.) As Sizewell was shut down for several months in 2010, costs are likely to be higher in years when it is fully operational. Rising water stress in the east could increase the plant's scarcity costs to almost £2 million a year by 2025, according to Trucost.

RWE Npower PLC (part of RWE AG; A-/Negative/A-2) owns the second-largest power station in the region, Tilbury B in Essex. The plant has a capacity of 1,063 MW and is located in a catchment area that is very short of water. Water scarcity costs for RWE Npower could total more than £51 million annually. This is based on the power station's estimated water usage in 2010, and Trucost's calculation of the higher price per cubic meter, reflecting the additional the cost of usage and assuming 100% take-up of water availability.

Trucost has applied water scarcity costs to the estimated water consumption of a further seven power plants in the east of England in 2010, based on average water use for the different processes used. Together with Sizewell B and Tilbury B, the power stations account for 94% of electricity generated in the east. According to Trucost, if all of the plants were to internalize water scarcity costs and pass them through in higher power prices, median industrial electricity prices could increase by 5.7% from 2011 levels. These calculations exclude the lower external environmental costs of cooling water, which is returned to the water course untreated.

Tilbury B power station is due to switch from coal to operate on 100% biomass fuel between 2012 and 2015, which could increase water use. With the switch in fuels at Tilbury B and higher future water scarcity costs for Sizewell B and RWE Npower's Great Yarmouth power station in 2025, Trucost believes that water scarcity costs for all nine power plants analyzed could push up future power prices by more than 6%. RWE Npower has applied to continue operating the Tilbury biomass plant beyond 2015. However, on Feb. 27, 2012, two out of

three of Tilbury's biomass storage units suffered fire damage. Should this damage lead RWE Npower to revert to an earlier plan to replace the biomass plant with a less water-intensive combined cycle gas turbine alongside a small open cycle gas turbine, the average industrywide electricity price rise driven by water scarcity costs could be limited to less than 6%. Such a move, however, could increase GHG emissions from the plant and lead to higher carbon costs instead.

**Q.** *Apart from shortages, what other water risks are facing the east of England?*

**A.** One of the main water risks facing the east of England is flooding. Across the U.K., the government expects flood damage costs to reach up to £27 billion per year by 2080 from £1 billion per year today. From 2010 to 2011, its budget for flood risk management was £629 million.

Flooding from rivers is likely to be limited. However, by the 2030s, the east of England is likely to see an increase in precipitation on the rainiest day of the year of 7.8% (averaged over the three UKCP09 scenarios). When set against the backdrop of an overall increase in winter precipitation, increased rainfall on the wettest day of the year will in our view increase the likelihood of surface water flooding.

In addition, a rise in the sea level could intensify flood risk. Much of the east of England lies below sea level and on a floodplain. One-fifth of the region is low-lying, while Norfolk and Suffolk have some of the fastest-eroding coastline in Europe. Norfolk is most exposed to flooding, with 25% of properties at risk. Properties are also at risk from floods in Essex and Cambridgeshire. These risks are set to increase, with the coast of east England likely to see a rise in the sea level of at least 44.7 centimeters (cm) by the 2080s, in the government's base-case scenario (which does not include ice melt projections).

Anglian Water has two water treatment works and 58 wastewater treat-

ment works located in coastal floodplains less than 40 cm above sea level and is therefore at risk of coastal flooding by 2080 (*see chart 3*). The projected asset value at risk for Anglian Water is up to £2.4 million by 2020 and £7.5 million by 2080, based on the UKCP09 medium greenhouse gas emissions scenario and its moderate flood risk. We believe that Essex and Suffolk Water (under the aegis of Northumbrian Water) is likely to have similar assets at risk. Water companies are not currently required to pay for flood defenses, although they do invest in sewers that alleviate surface water flooding, which leads to extra capex requirements.

Anglian Water is investing in 20 flood defense schemes at key water treatment sites as part of its five-year, £1 billion program to address the effects of climate change.

Power plants using tidal/seawater for cooling are also exposed to flood risk, such as storm surges and a rise in the sea level. For instance, following the 2011 earthquake in Japan and subsequent water contamination at Fukushima Dai-ichi Nuclear Power Plant, a stress test was conducted at the Sizewell B nuclear power station to assess risks from drought and flooding. Drought was not considered a hazard because EDF Energy receives water from Essex and Suffolk Water, but the generator is nevertheless currently considering several enhancements to the plant, including improvements in flood protection.

**Q.** *Are there any potential remedies that could help alleviate water shortages in the east of England over the longer term?*

**A.** Measures that we consider could potentially alleviate the stress on water consumption include central and local government taking a coordinated approach to water management, and the inclusion of adaptation measures, such as flood protection, in water tariffs.

Anglian Water has integrated climate change adaptation into its business plan-

ning process for the current 2010 to 2015 asset management period. Ofwat has approved flood protection schemes, water supply resilience schemes, and water efficiency initiatives for implementation. The company is considering other long-term options to secure water, such as major winter storage schemes, water re-use, and groundwater recharge schemes. The U.K. government's Water White Paper, published in December 2011, supported Anglian Water's approach to water resilience, suggesting to us that funding for water efficiency measures may be easier to secure in the future.

Nevertheless, we believe further research is needed to understand the value of water restrictions, together with clear national guidance—particularly in terms of planning and design of water transfer schemes. Without increased national and local focus on the management of water demand, infrastructure investment alone may not be sufficient to resolve predicted long-term water shortages. **CW**

#### Notes

- (1) Anglian Water is financed by Anglian Water Services Financing PLC, whose class A debt we rate 'A-' and its class B debt 'BBB'.  
Thames Water Utilities Ltd. is financed through Thames Water Utilities Cayman Finance Ltd., whose class A bonds we rate 'A-' and its class B bonds 'BBB'.  
Southern Water Services Ltd. is financed through Southern Water Services (Finance) Ltd., whose class A bonds we rate 'A-' and its class B bonds 'BBB'.
- (2) Scenario A1B is one of three emissions scenarios used in the preparation of the UKCP09 projections. For more details, see the Defra Web site <http://ukclimateprojections.defra.gov.uk/content/view/full/868/531/>
- (3) "Future Water—The Government's Water Strategy for England" (Defra), 2008.

For more articles on this topic search RatingsDirect with keyword:



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## Standard & Poor's Fixed Income Research

The first three pages of this section display data compiled by Standard & Poor's Global Fixed Income Research, provider of analytical and timely information on Standard & Poor's rating actions, new issuance activity, and secondary market yield spreads.

- Rating actions are tracked and analyzed. Credit trends are followed daily across seven broad industry sectors and numerous subsectors.
- New-issuance volume and pricing trends in the primary market for both investment grade and high-yield bonds in the corporate-industrial sector, telecommunication, utility, yankee, banking and financial institutions/insurance are analyzed.
- Secondary market yields and spreads for investment-grade and high yield corporate bonds are tracked and analyzed.

For additional information, contact Diane Vazza, managing director of Global Fixed Income Research at Standard & Poor's.

(1) 212-438-2760

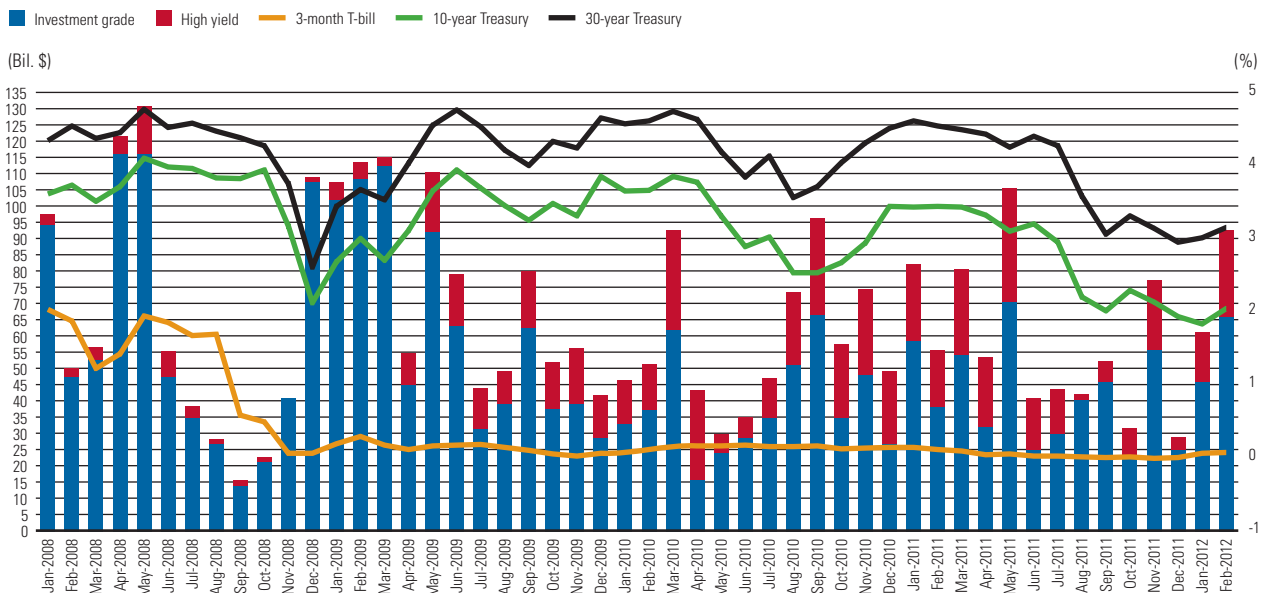
diane\_vazza@standardandpoors.com

### Rating Actions

Sector	Action	—This Week—		—YTD 2012—	
		No.	Mil. \$	No.	Mil. \$
Industrial	Upgrade	8	11,886	36	57,183
	Downgrade	3	2,012	31	48,170
Telecommunications	Upgrade	0	0	1	275
	Downgrade	0	0	2	1,499
Utility	Upgrade	0	0	3	18,093
	Downgrade	2	5,355	3	8,355
Banking	Upgrade	0	0	0	0
	Downgrade	0	0	0	0
Financial Institutions/Insurance	Upgrade	0	0	0	0
	Downgrade	1	900	5	7,763
Sovereign	Upgrade	0	0	0	0
	Downgrade	3	307,920	15	1,735,527
International	Upgrade	5	58,101	19	91,897
	Downgrade	5	18,049	80	1,203,698

Data as of Feb. 29, 2012. The rating action data are for issuer credit ratings. International includes all sectors outside the U.S. Source: Standard & Poor's Global Fixed Income Research.

## Corporate Issuance Volume And Treasury Yields

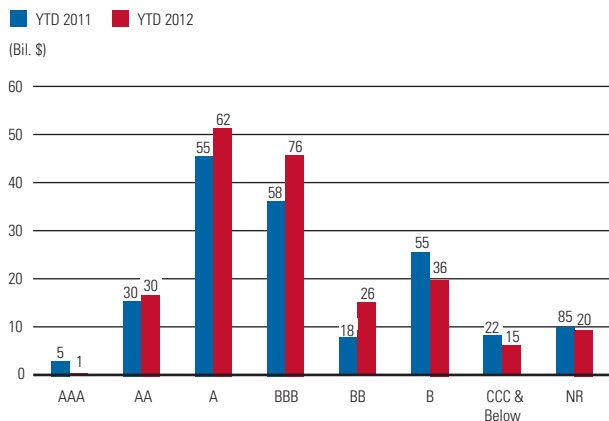


Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market.

Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

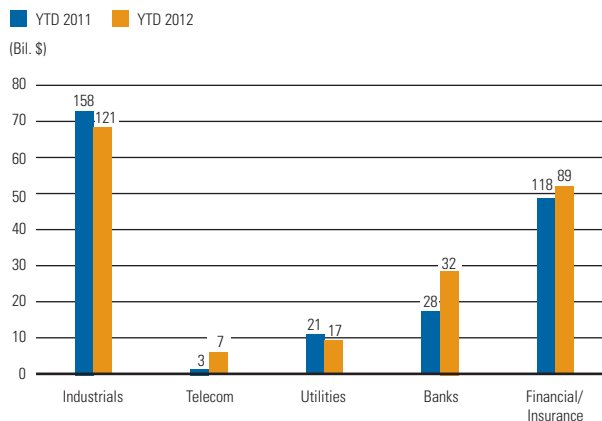
## Number Of New Issues And Dollar Volume

### By Rating Category



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market. Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

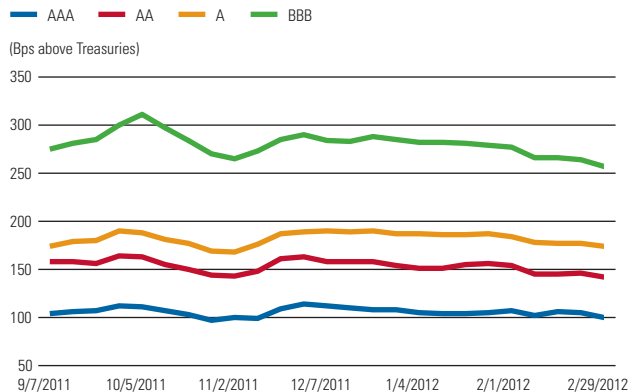
### By Sector



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market. Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

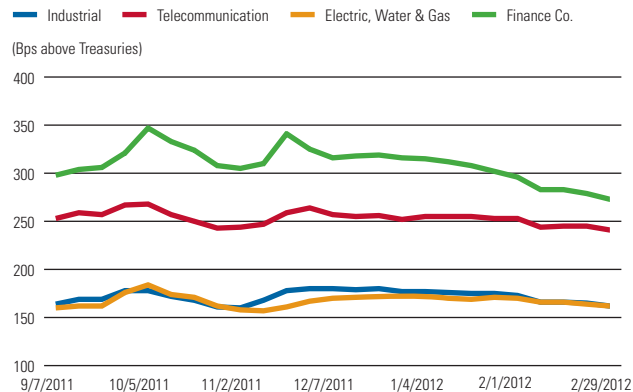
## Spread To Treasuries By Rating Category

### U.S. Industrial Credit Trends By Rating Category



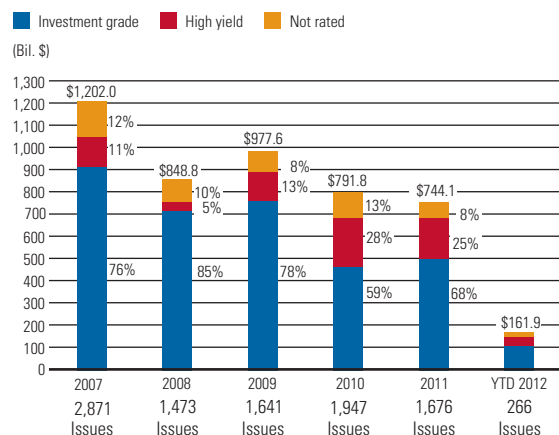
Includes Yankee bond issues. Nine plus years to maturity and minimum \$100 million outstanding. Source: Standard & Poor's Global Fixed Income Research.

### Sector Relative Value Rating Category 'A'



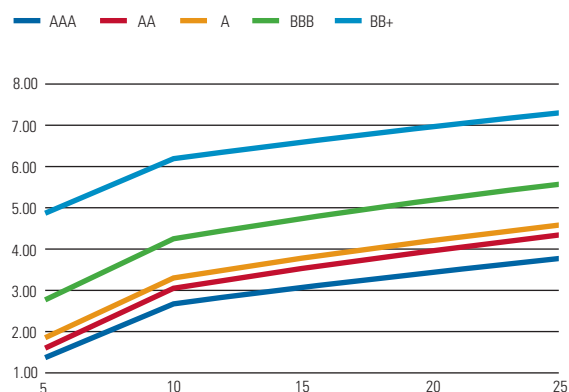
Five plus years to maturity and minimum \$100 million outstanding. Source: Standard & Poor's Global Fixed Income Research.

## U.S. Corporate Bond Issuance



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market. Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

## U.S. Industrial Bond Yields



Data as of Feb. 29, 2012. Source: Standard & Poor's Global Fixed Income Research.

## Macroeconomic Data From Global Insight

Global Insight is a leading provider of financial and economic information used by industry, government, and financial institutions to assess business conditions and monitor emerging trends.

For additional information on Global Insight products and services, call Michael Minor (1) 212-884-9511.

### Wholesale Price Inflation (% Change-1 Yr.)

	Jan-2012	Dec-2011	Nov-2011
U.S.	1.92	1.91	1.92
U.K.	1.26	1.26	1.26
Germany	1.17	1.17	1.17
Japan	1.04	1.04	1.04

Data presented as monthly averages. Source: Global Insight.

### Long-Term Bond Rates (%)

	This week	One week ago	One year ago
U.S.	1.97	2.02	3.47
U.K.	2.14	2.25	3.74
Germany	1.85	1.95	3.26
Japan	0.98	0.98	1.29

Data presented as weekly averages. Germany is current yield. Other data are yield to maturity. Source: Global Insight. Data for German short-term bond rates have been discontinued.

### Short-Term Interest Rates (%)

	This week	One week ago	One year ago
U.S.	0.48	0.50	0.27
U.K.	0.91	0.91	0.70
Japan	0.15	0.15	0.15

## Standard & Poor's Rated U.S. Money Fund Indices

	7-Day net yield (%)	30-Day net yield (%)	7-Day gross yield (%)	30-Day gross yield (%)	Maturity (days)	Total assets (bil. \$)
<b>Money Fund Indices (Period ended 2/28/2012)</b>						
'AAAm'/Government	0.01	0.00	N.A.	N.A.	44	N.A.
'AAAm'/Taxable	0.03	0.03	N.A.	N.A.	44	N.A.
'AAAm'/Tax-Free	0.02	0.02	N.A.	N.A.	27	N.A.
<b>Government Investment Pool (GIP) Indices* (Period ended 2/24/2012)</b>						
GIP Index/All	0.09	0.09	0.22	0.22	44	69.0
GIP Index/Government	0.05	0.05	0.14	0.14	45	71.0
GIP Index/General Purpose Taxable	0.11	0.11	0.24	0.24	44	68.0

\*Comprised of 'AAAm' and 'AAm' rated government investment pools. N.A.—Not available. Sources: Standard & Poor's; Rated Money Fund Report, a service of iMoneyNet, Inc.

## Sovereign Ratings And Country T&C Assessments

Standard & Poor's Ratings Services currently rates 128 sovereign governments and has established transfer and convertibility (T&C) assessments for each country with a rated sovereign, as shown in the table below. A T&C assessment is the rating associated with the likelihood of the sovereign restricting nonsovereign access to foreign exchange needed for debt service. For most countries, Standard & Poor's analysis concludes that this risk is less than the risk of sovereign default on foreign-currency obligations; thus, most T&C assessments exceed the sovereign foreign currency rating. Foreign currency ratings of nonsovereign entities or transactions generally can be as high as the T&C assessment if their stress-tested operating and financial characteristics support the higher rating. For more information, please see "*Corporate And Government Ratings That Exceed The Sovereign Rating*," published monthly on *RatingsDirect*.

If a sovereign, through membership in a monetary or currency union, has ceded monetary and exchange rate policy responsibility to a monetary authority that the sovereign does not solely control, the T&C assessment reflects the policies of the

controlling monetary authority, vis-à-vis the exchange of its currency for other currencies in the context of debt service. The same applies if a sovereign uses as its local currency the currency of another sovereign. A T&C assessment may change sharply if a sovereign introduces a new local currency, by entering or exiting a monetary/currency union, or through some other means. This is because the new local currency, and in some cases the new monetary authority, may operate in very different monetary and exchange regimes. The T&C assessment does not normally reflect the likelihood of change in a country's local currency.

Also included below are recovery ratings for selected sovereigns. Standard & Poor's sovereign foreign-currency recovery ratings reflect its opinion on the extent to which a sovereign government will be able and willing to repay nonofficial foreign-currency debtholders post-default. For historical information on all of these ratings and assessments, please see "*Sovereign Rating And Country T&C Assessment Histories*," published monthly on *RatingsDirect*. Ratings as of Feb. 29, 2012. **CW**

COUNTRY	—SOVEREIGN RATINGS (LT/OUTLOOK/ST)—		SOVEREIGN FOREIGN CURRENCY RECOVERY RATING	TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY		
Abu Dhabi	AA/Stable/A-1+	AA/Stable/A-1+		AA+*
Albania	B+/Stable/B	B+/Stable/B	4	BB-
Andorra	A/Negative/A-1	A/Negative/A-1		AAA*
Angola	BB-/Stable/B	BB-/Stable/B		BB-
Argentina	B/Stable/B	B/Stable/B		B
Aruba	A-/Stable/A-2	A-/Stable/A-2		A-
Australia	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Austria	AA+/Negative/A-1+	AA+/Negative/A-1+		AAA*
Azerbaijan	BBB-/Stable/A-3	BBB-/Stable/A-3		BBB-
Bahamas	BBB/Stable/A-3	BBB/Stable/A-3		BBB+
Bahrain	BBB/Negative/A-3	BBB/Negative/A-3		BBB
Bangladesh	BB-/Stable/B	BB-/Stable/B		BB-
Barbados	BBB-/Negative/A-3	BBB-/Negative/A-3		BBB
Belarus	B-/Negative/C	B-/Negative/C	4	B-
Belgium	AA/Negative/A-1+	AA/Negative/A-1+		AAA*
Belize	CCC+/Stable/C	CCC-/Negative/C	4	B-
Benin	B/Stable/B	B/Stable/B		BBB-*
Bermuda	AA-/Stable/A-1+	AA-/Stable/A-1+		AAA
Bolivia	B+/Positive/B	B+/Positive/B		B+
Bosnia and Herzegovina	B/Watch Neg/B	B/Watch Neg/B		BB-
Botswana	A-/Stable/A-2	A-/Stable/A-2		A+
Brazil	A-/Stable/A-2	BBB/Stable/A-3		A-



COUNTRY	—SOVEREIGN RATINGS (LT/OUTLOOK/ST)—		SOVEREIGN FOREIGN CURRENCY RECOVERY RATING	TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY		
Bulgaria	BBB/Stable/A-3	BBB/Stable/A-3		A
Burkina Faso	B/Stable/B	B/Stable/B		BBB-*
Cambodia	B/Stable/B	B/Stable/B		B+
Cameroon	B/Stable/B	B/Stable/B		BBB-*
Canada	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Cape Verde	B+/Stable/B	B+/Stable/B		BB
Chile	AA/Positive/A-1+	A+/Positive/A-1		AA
China	AA-/Stable/A-1+	AA-/Stable/A-1+		AA-
Colombia	BBB+/Stable/A-2	BBB-/Stable/A-3		BBB+
Cook Islands	B+/Stable/B	B+/Stable/B		AAA*
Costa Rica	BB/Stable/B	BB/Stable/B	2	BBB-
Croatia	BBB-/Negative/A-3	BBB-/Negative/A-3		BBB+
Curacao	A-/Stable/A-2	A-/Stable/A-2		A-
Cyprus	BB+/Negative/B	BB+/Negative/B	4	AAA*
Czech Republic	AA/Stable/A-1+	AA-/Stable/A-1+		AA+
Denmark	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Dominican Republic	B+/Stable/B	B+/Stable/B	3	BB
Ecuador	B-/Positive/C	B-/Positive/C	4	B-
Egypt	B/Negative/B	B/Negative/B	3	B
El Salvador	BB-/Stable/B	BB-/Stable/B	3	AAA*
Estonia	AA-/Negative/A-1+	AA-/Negative/A-1+		AAA*
Fiji	B/Stable/B	B/Stable/B	4	B
Finland	AAA/Negative/A-1+	AAA/Negative/A-1+		AAA*
France	AA+/Negative/A-1+	AA+/Negative/A-1+		AAA*
Gabon	BB-/Stable/B	BB-/Stable/B	4	BBB-*
Georgia	BB-/Stable/B	BB-/Stable/B	4	BB
Germany	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA*
Ghana	B/Stable/B	B/Stable/B	4	B+
Greece	SD	SD	4	AAA*
Grenada	B-/Stable/C	B-/Stable/C	4	BBB-*
Guatemala	BB+/Negative/B	BB/Negative/B	3	BBB-
Guernsey	AA+/Stable/A-1+	AA+/Stable/A-1+		AAA*
Honduras	B/Positive/B	B/Positive/B		BB-
Hong Kong	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Hungary	BB+/Negative/B	BB+/Negative/B	3	BBB
Iceland	BBB-/Stable/A-3	BBB-/Stable/A-3		BBB-
India	BBB-/Stable/A-3	BBB-/Stable/A-3		BBB+
Indonesia	BB+/Positive/B	BB+/Positive/B	3	BBB-
Ireland	BBB+/Negative/A-2	BBB+/Negative/A-2		AAA*
Isle of Man	AA+/Stable/A-1+	AA+/Stable/A-1+		AAA*

COUNTRY	—SOVEREIGN RATINGS (LT/OUTLOOK/ST)—		SOVEREIGN FOREIGN CURRENCY RECOVERY RATING	TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY		
Israel	AA-/Stable/A-1+	A+/Stable/A-1		AA
Italy	BBB+/Negative/A-2	BBB+/Negative/A-2		AAA*
Jamaica	B-/Negative/C	B-/Negative/C	3	B
Japan	AA-/Negative/A-1+	AA-/Negative/A-1+		AAA
Jordan	BB/Negative/B	BB/Negative/B		BBB-
Kazakhstan	BBB+/Stable/A-2	BBB+/Stable/A-2		BBB+
Kenya	B+/Stable/B	B+/Stable/B		BB-
Korea	A+/Stable/A-1	A/Stable/A-1		AA-
Kuwait	AA/Stable/A-1+	AA/Stable/A-1+		AA+
Latvia	BB+/Positive/B	BB+/Positive/B	3	BBB+
Lebanon	B/Stable/B	B/Stable/B	4	BB-
Libya	NR	NR		
Liechtenstein	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA*
Lithuania	BBB/Stable/A-3	BBB/Stable/A-3		A
Luxembourg	AAA/Negative/A-1+	AAA/Negative/A-1+		AAA*
Macedonia	BB/Stable/B	BB/Stable/B	3	BB+
Malaysia	A/Stable/A-1	A-/Stable/A-2		A+
Malta	A-/Negative/A-2	A-/Negative/A-2		AAA*
Mexico	A-/Stable/A-2	BBB/Stable/A-3		A
Mongolia	BB-/Positive/B	BB-/Positive/B		BB
Montenegro	BB/Negative/B	BB/Negative/B		AAA*
Montserrat	BBB-/Stable/A-3	BBB-/Stable/A-3		BBB-*
Morocco	BBB/Stable/A-2	BBB-/Stable/A-3		BBB+
Mozambique	B+/Stable/B	B+/Stable/B		B+
Netherlands	AAA/Negative/A-1+	AAA/Negative/A-1+		AAA*
New Zealand	AA+/Stable/A-1+	AA/Stable/A-1+		AAA
Nigeria	B+/Positive/B	B+/Positive/B		B+
Norway	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Oman	A/Negative/A-1	A/Negative/A-1		AA-
Pakistan	B-/Stable/C	B-/Stable/C	3	B-
Panama	BBB-/Positive/A-3	BBB-/Positive/A-3		AAA*
Papua New Guinea	B+/Negative/B	B+/Negative/B		BB
Paraguay	BB-/Stable/B	BB-/Stable/B		BB
Peru	BBB+/Stable/A-2	BBB/Stable/A-3		A-
Philippines	BB+/Positive/B	BB/Positive/B	3	BB+
Poland	A/Stable/A-1	A-/Stable/A-2		A+
Portugal	BB/Negative/B	BB/Negative/B	4	AAA*
Qatar	AA/Stable/A-1+	AA/Stable/A-1+		AA+
Ras Al Khaimah	A/Stable/A-1	A/Stable/A-1		AA+*
Romania	BB+/Stable/B	BB+/Stable/B	3	BBB+

COUNTRY	—SOVEREIGN RATINGS (LT/OUTLOOK/ST)—		SOVEREIGN FOREIGN CURRENCY RECOVERY RATING	TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY		
Russia	BBB+/Stable/A-2	BBB/Stable/A-3		BBB
Rwanda	B/Positive/B	B/Positive/B		B
Saudi Arabia	AA-/Stable/A-1+	AA-/Stable/A-1+		AA+
Senegal	B+/Negative/B	B+/Negative/B	4	BBB-*
Serbia	BB/Stable/B	BB/Stable/B	4	BB
Singapore	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Slovak Republic	A/Stable/A-1	A/Stable/A-1		AAA*
Slovenia	A+/Negative/A-1	A+/Negative/A-1		AAA*
South Africa	A/Stable/A-1	BBB+/Stable/A-2		A
Spain	A/Negative/A-1	A/Negative/A-1		AAA*
Sri Lanka	B+/Stable/B	B+/Stable/B	4	B+
Suriname	BB-/Stable/B	BB-/Stable/B		BB
Sweden	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Switzerland	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
Taiwan	AA-/Stable/A-1+	AA-/Stable/A-1+		AA+
Thailand	A-/Stable/A-2	BBB+/Stable/A-2		A
Trinidad and Tobago	A/Stable/A-1	A/Stable/A-1		AA
Tunisia	BBB-/Negative/A-3	BBB-/Negative/A-3		BBB
Turkey	BBB-/Positive/A-3	BB/Positive/B	3	BBB-
Uganda	B+/Stable/B	B+/Stable/B		BB
Ukraine	B+/Stable/B	B+/Stable/B	4	B+
United Kingdom	AAA/Stable/A-1+	AAA/Stable/A-1+		AAA
United States	AA+/Negative/A-1+	AA+/Negative/A-1+		AAA
Uruguay	BB+/Stable/B	BB+/Stable/B	2	BBB
Venezuela	B+/Stable/B	B+/Stable/B	4	B+
Vietnam	BB-/Negative/B	BB-/Negative/B	3	BB-
Zambia	B+/Stable/B	B+/Stable/B		B+

\*These T&C assessments are for countries that are either members of monetary or currency unions or use as their local currency the currency of another sovereign. Because of this, the assessment shown is based on Standard & Poor's analysis of either the monetary authority of the monetary/currency union or the sovereign issuing the currency. Thus, for European Economic and Monetary Union (EMU) members (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain), the T&C assessments reflect our view of the likelihood of the European Central Bank restricting nonsovereign access to foreign exchange needed for debt service. Similarly, the T&C assessments for countries with rated sovereigns in the Eastern Caribbean Currency Union (Grenada and Montserrat) reflect the current and projected policies of the Eastern Caribbean Central Bank. Likewise, the T&C assessments for countries with rated sovereigns in the West African Economic and Monetary Union (Benin, Burkina Faso, and Senegal) are based on the policies of the Central Bank of West African States, and the T&C assessments for countries with rated sovereigns in the Central African Economic and Monetary Community (Cameroon and Gabon) are based on the policies of the Bank of Central African States. As for countries that use the currency of another, the T&C assessments of El Salvador and Panama are equalized with that of the United States, while those of Abu Dhabi and Ras Al Khaimah are equalized with that of the United Arab Emirates, Andorra and Montenegro with EMU members, the Cook Islands with New Zealand, Guernsey and the Isle of Man with the United Kingdom, and Liechtenstein with Switzerland.

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**McGRAW-HILL**



## United States Boeing Co.

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### Affirmed

#### Credit Profile

##### ISSUER CREDIT RATING

**Boeing Co.**  
Corp credit rtg A/Stable/A-1

##### CORPORATE CREDIT RATINGS HISTORY

July 29, 2009	A/Stable/A-1
April 10, 2009	A+/Watch Neg/A-1
Jan. 29, 2009	A+/Negative/A-1

##### BUSINESS RISK PROFILE

Strong

##### FINANCIAL RISK PROFILE

Modest

##### DEBT MATURITIES

(As of Dec. 31, 2011, including Boeing Capital)

2012	\$2,356 mil.
2013	\$1,358 mil.
2014	\$1,324 mil.
2015	\$840 mil.
2016	\$1,041 mil.

#### Rationale

The ratings on Chicago-based Boeing Co. reflect its position as one of two global producers of large commercial aircraft and one of the largest U.S. defense contractors as well as its exceptional liquidity. The ratings also reflect Standard & Poor's Ratings Services' expectations of much improved cash generation starting in 2012 and the gradual strengthening of currently subpar credit protection measures. Although the company has begun to deliver its new 787 and 747-8 airplanes, risks remain related to profitably ramping up production. The ratings also take into account risks from the long-term effects of changes in U.S. defense spending and substantial postretirement liabilities. We categorize Boeing's business risk profile as "strong" and its financial risk profile as "modest," as our criteria define the terms.

Global passenger air traffic increased 5.9% in 2011, despite a weak economic recovery and high oil prices, and growth should continue in 2012 although it will vary by region. Airline profitability declined in 2011 but should remain positive in 2012 absent a significant increase in oil prices or a global economic downturn. The rise in passenger traffic, as well as the introduction of new, more fuel-efficient narrowbody aircraft by both Boeing and Airbus SAS, resulted in a significant increase in orders for large commercial

aircraft in 2011, and both manufacturers have announced production rate increases on most aircraft models. Aircraft orders likely will be lower in 2012 but could still modestly exceed deliveries as airlines continue to replace older, less fuel-efficient aircraft.

Boeing's commercial airplanes (BCA) segment (53% of sales in 2011, but likely closer to 60% in 2012) secured 805 net orders in 2011, up from 530 in 2010 but still less than the average of more than 1,000 per year in 2005-2007. This strong demand caused backlog to increase to \$293 billion (six to seven years of production) from \$256 billion at the end of 2010 and prompted Boeing to increase production rates on all of its models. The company delivered 477 aircraft in 2011, which was less than initial expectations because it was only able to deliver three 787s and nine 747-8s. The company expects to increase deliveries significantly in 2012, to 585-600 total, because of higher production of the 737 narrowbody and 777 widebody families. It also plans to up deliveries to 35-40 each of the 787 and 747-8.

After encountering a variety of problems with its development of the important 787 midsize jetliner, deliveries began in September 2011, more than three years behind schedule. However, the company was only able to deliver three aircraft by the end of the year due to it taking longer than planned to modify aircraft already

Note: The business profile designation in the credit profiles of selected full analyses reflects Standard & Poor's assessment of the level of business risk of each issuer, based on industry fundamentals and the company's competitive position. Designations range from well above average, indicating limited business risk, to well below average, indicating a high level of business risk. Financial policy assessment presents Standard & Poor's view of management's financial risk orientation.

completed to the final certification standard. Now that deliveries have begun, the key risks remain completing and delivering the more than 40 aircraft already built, increasing production profitably without straining the supply chain, and finishing development of the larger 787-9 version. Boeing also announced that it needs to deliver 1,200 787s to fully amortize development and other deferred costs. This initial accounting lot is more than 3x the size for previous new aircraft, indicating it will be a number of years (at current planned production rates) before the program turns a profit on an accounting or cash basis. Deliveries of the cargo version of the 747-8 began in October 2011, and Boeing expects to make its first delivery of the passenger version in the next few months.

In August 2011, Boeing formally launched new versions of its 737 nar-

rowbody family, called the 737 MAX, with more fuel efficient engines from CFM International. The company had initially said it was leaning towards an all new narrowbody family after Airbus announced its A320 new engine option (NEO) in December 2010. It appears to have decided to offer the 737 MAX after American Airlines Inc., which currently has an all-Boeing fleet, agreed to acquire 130 A320 NEO aircraft. American also agreed to acquire 100 737 MAX, as well as 100 existing model 737s, but the order has not been finalized in part because of the airline's bankruptcy in late 2011. We expect American will go ahead with the purchases, as it needs to replace its large fleet of less fuel-efficient MD-80 aircraft. Southwest Airlines Co. will be the launch customer for the 737 MAX, after ordering 150, with first delivery

expected in 2017. Boeing has more than 1,000 commitments from 15 customers for the 737 MAX. In addition to the Southwest order, other firm orders include 201 for Indonesian airline Lion Air and 100 for Norwegian Air.

Aircraft financing was sufficient to support deliveries in 2011, despite some European banks, which have historically been a large player in the market, pulling back due to the ongoing European sovereign debt crisis. We expect export credit agencies, commercial banks, aircraft lessors, and public capital markets to remain the main sources of third-party financing, which generally have better terms than that from Boeing Capital Corp. (BCC) and should be sufficient to support planned deliveries. However, a further disruption to the global credit markets due to a sovereign default in Europe or a

**Table 1 Boeing Co.—Peer Comparison**

	—Fiscal years ended Dec. 31, 2011—			
	Boeing Co.	General Dynamics Corp.	Raytheon Co.	Lockheed Martin Corp.
Industry sector: Aerospace and defense				
Rating as of Feb. 23, 2012	A/Stable/A-1	A/Stable/A-1	A-/Stable/A-2	A-/Negative/A-2
Currency (mil.)	US\$	US\$	US\$	US\$
Revenues	68,203.0	32,677.0	24,857.0	46,499.0
EBITDA	8,576.8	4,677.4	4,212.2	6,216.8
Net income from continuing operations	4,011.0	2,552.0	1,867.0	2,667.0
Funds from operations (FFO)	9,941.8	3,482.5	3,330.6	4,412.0
Capital expenditures	1,928.2	820.9	621.8	814.0
Free operating cash flow	1,841.6	2,725.6	2,732.8	4,576.0
Discretionary cash flow	597.6	2,052.6	2,144.8	3,481.0
Cash and short-term investments	5,000.0	1,500.0	1,000.0	1,000.0
"Surplus cash"	6,727.0	1,149.0	3,000.0	2,582.0
Debt	20,047.2	7,214.9	6,785.1	14,206.5
Equity	2,858.8	13,232.0	8,340.0	1,001.0
<b>Adjusted ratios</b>				
EBITDA margin (%)	12.6	14.3	16.9	13.4
EBITDA interest coverage (x)	15.2	23.7	18.3	15.4
EBIT interest coverage (x)	13.0	20.2	15.9	12.6
Return on capital (%)	35.3	20.0	24.5	32.8
FFO/debt (%)	49.6	48.3	49.1	31.1
Free operating cash flow/debt (%)	9.2	37.8	40.3	32.2
Debt/EBITDA (x)	2.3	1.5	1.6	2.3
Total debt/debt plus equity (%)	87.5	35.3	44.9	93.4

global economic slowdown could require more financing from BCC. BCC has only funded a modest amount of new deliveries in the past few years (\$239 million in 2011 and \$72 million in 2010), resulting in a shrinking aircraft portfolio. BCC's financing commitments totaled \$15.9 billion as of Dec. 31, 2011, but it likely will only have to fund a very small portion. It has committed financing for American Airlines' order for the current-generation 737s, but American could ultimately obtain the funding from third-party lenders, which consider the aircraft desirable collateral.

Almost half of Boeing's sales come from its defense, space, and security (BDS) segment. In recent years the segment has contributed more stable revenues and earnings than the cyclical commercial aircraft business—BDS sales were flat in 2011—but it's facing pressures as the U.S. government cuts

back on military spending. In the fiscal 2010 and 2011 defense budgets, the Obama Administration identified a number of large Boeing military programs to cancel or reduce, although the fiscal 2012 budget did not propose any major changes.

The recently announced fiscal 2013 defense also cancels or reduces a number of programs, although no major Boeing programs were cancelled. President Obama has requested \$525 billion for the base budget. This is \$6 billion less than the fiscal 2012 budget approved by Congress, but \$45 billion less than the DoD planned last year. In fact, planned spending over the next five years is about 9% less than what the government had previously expected to spend over the period. The planned amounts do not include the possible \$600 billion of additional cuts starting in calendar 2013 as part of the sequestration process in the Budget Control Act of

2011, but we don't expect Congress to implement that full amount.

The previous program cancellations and reductions will likely result in sales declining 5%-6% in 2012. Without major international orders, the company will end production of its C-17 cargo aircraft once it fulfills current orders. In addition, the Army has significantly restructured its Brigade Combat Team Modernization program (BCTM, formerly the Future Combat System, which had been Boeing's most important segment program and on which it had been the lead system integrator) and has cancelled the manned ground vehicle portion. Major Boeing programs that the defense budget continues to support are the F/A-18 fighter (benefiting from delays on the Joint Strike Fighter program), the CH-47 helicopter, and the P-8 maritime patrol aircraft. In February 2011, the company won a contract from the U.S. Air Force to build 179 KC-46A

Table 2 **Boeing Co.—Financial Summary**

Industry sector: Aerospace and defense					
(Mil. \$)	—Fiscal year ended Dec. 31—				
	2011	2010	2009	2008	2007
Rating history	A/Stable/A-1	A/Stable/A-1	A/Stable/A-1	A+/Stable/A-1	A+/Stable/A-1
Revenues	68,203.0	63,667.0	67,621.0	60,206.0	65,572.0
EBITDA	8,576.8	6,810.9	3,956.6	5,055.3	7,629.5
Net income from continuing operations	4,011.0	3,311.0	1,335.0	2,654.0	4,058.0
Funds from operations (FFO)	9,941.8	8,276.5	5,012.3	5,731.4	6,224.6
Capital expenditures	1,928.2	1,551.9	1,309.9	1,786.5	1,614.0
Free operating cash flow	1,841.6	1,126.6	3,884.4	(2,196.1)	7,840.6
Discretionary cash flow	597.6	(126.4)	2,664.4	(3,388.1)	6,744.6
Cash and short-term investments	5,000.0	5,000.0	5,000.0	3,279.0	5,000.0
Debt	20,047.2	16,510.2	12,178.1	14,423.3	1,263.5
Equity	2,858.8	2,058.8	1,187.8	(2,348.4)	7,758.4
<b>Adjusted ratios</b>					
EBITDA margin (%)	12.6	10.7	5.9	8.4	11.6
EBITDA interest coverage (x)	15.2	11.8	9.4	15.8	20.9
EBIT interest coverage (x)	13.0	9.7	6.2	13.1	19.0
Return on capital (%)	35.3	34.8	20.7	39.9	69.2
FFO/debt (%)	49.6	50.1	41.2	39.7	492.6
Free operating cash flow/debt (%)	9.2	6.8	31.9	(15.2)	620.5
Debt/EBITDA (x)	2.3	2.4	3.1	2.9	0.2
Debt/debt and equity (%)	87.5	88.9	91.1	119.4	14.0

aerial refueling tankers, which could be worth more than \$30 billion. The initial \$3.5 billion development contract is fixed-price, so Boeing would be largely responsible for cost overruns, but the tanker design is a derivative of the 767, so the risk should be manageable.

In contrast with the variability in BCA margins over the years (because of strikes, cost overruns, and several charges), BDS margins remained fairly stable at 9%-10% in recent years. Although BCA has better long-term growth prospects than BDS, margins at BCA will likely be modestly lower in 2012 and 2013 as Boeing makes initial 787 and 747-8 deliveries at very low margins. Consolidated EBITDA margins improved to 12.6% in 2011 from 10.9% in 2010 but will likely be lower in 2012 because of the lower margins at BCA.

The company's pension liability increased by \$6.7 billion to \$16.6 billion as of Dec. 31, 2011, due to modest asset returns and a 110-basis-point decline in the discount rate used to calculate the liability. Other retiree benefits are also substantial, at about \$7.9 billion. These liabilities, on a tax-adjusted basis, exceed Boeing's balance sheet debt and hurt key credit protection measures. However, funds from operations to debt (net of cash and short term investments in excess of \$5 billion) was stable at about 50% in 2011, as improved cash generation and higher cash balances offset the increase in total adjusted debt. Although total adjusted debt to capital (adjusted for excess cash) is high at almost 90%, total adjusted debt to market capitalization is quite moderate at 25%-30%.

**Table 3 Reconciliation Of Boeing Co. Reported Amounts With Standard & Poor's Adjusted Amounts (Mil. \$)**

—Fiscal year ended Dec. 31, 2011—										
Boeing Co. reported amounts	Debt	Shareholders' equity	Revenues	EBITDA	Operating income	Interest expense	Cash flow from operations	Cash flow from operations	Dividends paid	Capital expenditures
Reported	12,371.0	3,515.0	68,735.0	7,330.0	5,670.0	626.0	4,023.0	4,023.0	1,244.0	1,713.0
<b>Standard &amp; Poor's adjustments</b>										
Operating leases	1,023.2	—	—	43.8	43.8	43.8	165.7	165.7	—	266.2
Postretirement benefit obligations	15,921.8	—	—	1,500.0	1,500.0	—	(250.9)	(250.9)	—	—
Surplus cash and near cash investments	(6,272.0)	—	—	—	—	—	—	—	—	—
Capitalized interest	—	—	—	—	—	51.0	(51.0)	(51.0)	—	(51.0)
Share-based compensation expense	—	—	—	186.0	—	—	—	—	—	—
Captive finance activity	(2,996.8)	(749.2)	(532.0)	(483.0)	(194.1)	(155.2)	(110.0)	(115.0)	—	—
Reclassification of nonoperating income (expenses)	—	—	—	—	325.0	—	—	—	—	—
Reclassification of working-capital cash flow changes	—	—	—	—	—	—	—	6,177.0	—	—
Minority interests	—	93.0	—	—	—	—	—	—	—	—
FFO—discontinued operations	—	—	—	—	—	—	(7.0)	(7.0)	—	—
Total adjustments	7,676.2	(656.2)	(532.0)	1,246.8	1,674.7	(60.5)	(253.2)	5,918.8	0.0	215.2
<b>Standard &amp; Poor's adjusted amounts</b>	<b>Debt</b>	<b>Equity</b>	<b>Revenues</b>	<b>EBITDA</b>	<b>EBIT</b>	<b>Interest expense</b>	<b>Cash flow from operations</b>	<b>Funds from operations</b>	<b>Dividends paid</b>	<b>Capital expenditures</b>
Adjusted	20,047.2	2,858.8	68,203.0	8,576.8	7,344.7	565.5	3,769.8	9,941.8	1,244.0	1,928.2



## We expect revenues to increase 10%-15% in 2012, as much higher commercial aircraft deliveries offset lower defense sales.

Overall, we expect a modest improvement in credit protection measures in 2012. We expect revenues to increase 10%-15% in 2012, as much higher commercial aircraft deliveries offset lower defense sales. However, the increase is dependent on the company being able to both deliver the expected number of 787s and 747-8s and increase production on other models. Although margins will likely moderate, earnings should still improve in 2012. Cash generation is also likely to be much higher next year with higher deliveries but will be constrained by continued build-up of inventory on the 787. The improvement in credit ratios could accelerate next year as 787 production increases, but the company is also likely to resume share repurchases at that point, limiting the impact.

### Liquidity

Liquidity is exceptional. We expect sources of liquidity to exceed uses by at least 2x over the next 12-24 months, the minimum our criteria require for an exceptional assessment. In addition, we believe sources would exceed uses even if EBITDA were to decline by 50%.

Consolidated cash and equivalents totaled \$10 billion—of which \$941 million was at BCC—and short-term investments (mostly time deposits) totaled \$1.2 billion (\$300 million at BCC) as of Dec. 31, 2011. BCC issued \$750 million of senior unsecured notes in August 2011 to fund upcoming maturities. Full availability under committed credit facilities and demonstrated access to the capital markets also support Boeing's liquidity, which is more than sufficient for operating and financing requirements and strategic initiatives.

Cash from operations was better than we expected in 2011, increasing to \$4

billion in 2011 from \$3 billion in 2010. The improvement was due to increased earnings offsetting higher working capital caused by further inventory investments on the 787 and 747-8. We expect operating cash flow to exceed \$5 billion (after voluntary pension contributions of \$1.5 billion) in 2012, as a result of much higher deliveries of commercial aircraft. However, 787-related inventory (\$19.8 billion as of Dec. 31, 2011, which includes work in process, supplier advances, and other nonrecurring costs) will continue to expand in 2012, although at a slower pace than in 2011, as production ramps up. Capital expenditures are likely to increase to \$2 billion from \$1.7 billion in 2010. We believe cash generation should improve further in 2013 as 787 deliveries increase.

Dividends are material, at about \$1.2 billion a year, but they are likely to change little in the near term after rising steadily before 2009. Boeing suspended share repurchases in 2009 to help preserve liquidity and financial flexibility, but we believe the company could resume share repurchases once 787 production stabilizes and cash generation improves materially.

Boeing's debt maturities are moderate in 2012 at \$1.5 billion in 2012 but then decline to less than \$800 million a year for the next four years. BCC's debt maturities of almost \$900 million in 2012, which Boeing does not guarantee, are largely covered by its debt issue last year. Required pension contributions are minimal in 2012, but the company plans to make \$1.5 billion of voluntary contributions to address the significant underfunding. Retiree health care benefit payments are manageable at about \$500 million a year. Boeing's \$4.6 billion in unused, committed credit facilities (of which BCC may use \$1.5 billion) supple-

ment its internal liquidity. These facilities consist of a \$2.3 billion, 364-day revolving facility available for commercial paper backup, maturing in November 2012, and a \$2.3 billion, five-year facility maturing in November 2016.

### Major Rating Factors

#### Strengths:

- Market positions, as one of two global producers of commercial aircraft and a leading U.S. military contractor;
- Robust backlog and strong demand for commercial aircraft;
- Exceptional liquidity, with cash and short-term investments of \$11.3 billion as of Dec. 31, 2011; and
- Substantial cash generation over the next two years, as deliveries of new and existing jetliners increase

#### Weaknesses:

- Challenges raising production rates on existing aircraft models and modifying and delivering 787s already built;
- Likely lower sales and earnings in the defense segment because of military budget cuts; and
- Significant underfunded pension and retiree health care obligations resulting in somewhat subpar credit protection measures

### Outlook: Stable

Increasing commercial airplane deliveries, exceptional liquidity, and anticipation of further improvement in credit protection measures during the next two to three years support current credit quality. We could lower the ratings if further problems increasing production on existing aircraft models or the new 787 and 747-8 lead to material earnings charges or much lower cash generation, resulting in FFO to total debt consistently less than 30% (net of excess cash). Although we do not expect it in the next 12 to 24 months because of the risks related to ramping up production of the 787 and other models, we could raise the ratings if earnings and cash generation improve more than expected, enabling some debt reduction and resulting in FFO to total debt better than 55%. **CW**

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