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OUTLOOK Economic Data and Commentary

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The Future of Water

Water is one of the most abundant resources on the planet, and it is a vital ingredient for life as we know it. On an individual level, we must drink water for basic survival, and we depend on it for myriad of other uses – bathing, cooking, watering the lawn and so much more.

Within the greater U.S. economy, water is an absolutely essential resource for almost every industry. Electric utilities and agriculture make up approximately 75 percent of the nation's total water usage. But what would happen if the nation's supply of water were to change dramatically and suddenly, as it has done in Australia over the last decade? How would individuals and businesses respond?

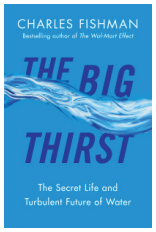
Those are some of the questions that journalist Charles Fishman sought to answer with his new book, *The Big Thirst*. Fishman explores our relationship with water, how it has changed over time and how it is likely to evolve in the future. OUTLOOK recently spoke with Fishman about his book and water.

OUTLOOK: You make the case that water is arguably the most important thing on the planet, yet it is taken for granted by most of us and is in many ways a mystery. What does that mean?

Charles Fishman: Water is just this marvelous substance. The same molecule that creates Niagara Falls also creates every delicate snowflake. You need water to make great wine and great coffee, and you need water to make concrete. We use it to launch the space shuttle, we use it to wash our dogs and we use it to baptize children. There is no substance that has that kind of versatility in practical terms and in emotional terms on our lives.

I haven't written a science book and it's not a scientific journey, but I really wanted to end up understanding our relationship with water, why we take water for granted and what we are going to need to do to change the way we manage water. If you are going to manage something, you've got to have a relationship with it. In historical terms, it's a very good relationship. We love water. People want to go to the beach and the swimming pool. They want to take a bath or sit in a steamy sauna. The fact that we have a relationship with water and a good strong emotional connection with water is important. We don't have the same kind of relationship with fossil fuels.

About this article



Charles Fishman is a journalist and best-selling author. His most recent book, *The Big Thirst*, is an in-depth look at our relationship with water and how it will change in the future. He is also the author of *The Wal-Mart Effect*. Fishman has won numerous awards, including three times receiving UCLA's Gerald Loeb Award. For more information about his new book, go to www.thebigthirst.com.

Charles Fishman is a journalist and best-selling author of *The Big Thirst.*

> Today, most Americans never think about water at all. It is economically central, the foundation of the economy, and yet it is free.

We don't have a relationship with carbon credits. We clearly don't have nearly enough of a relationship with mortgage-backed securities. We have an affection for water and a connection to it, and that's a great starting point in terms of getting us to think about water in new ways.

OUTLOOK: How has our relationship with water changed and developed over time?

CF: Today, the typical person in the U.S. doesn't think about water very much. One hundred years ago, everybody in America thought about water every day, if only to walk to the well to get a bucket of water.

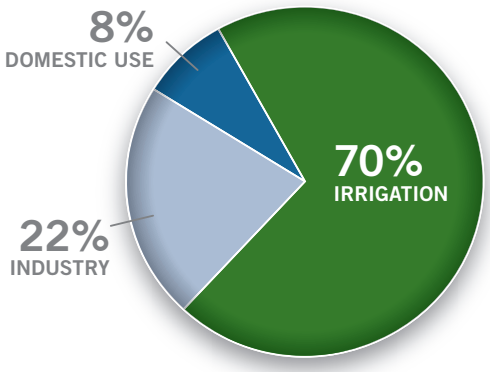
In human terms, until 100 years ago, our attitudes about water was much more conflicted and even erred on the side of negative. I went through every Shakespeare play looking for water references. He wrote 37 plays and every single one of them has water language, typically metaphorical, and almost 100 percent of those references are negative. That's because 300 years ago water was as essential as it is now, but it made people sick. That gave us a much more fraught relationship with the water supply; to be dependent on something that also sickens you puts you in a tough spot.

One hundred years ago, scientists and water engineers discovered you could clean water very, very effectively with simple sand filtration and chlorination. These ideas didn't exist before then in common practice. In the space of a decade, every major city in the U.S. was filtering the water it supplied to residents. The result was that, in the space of 40 years, life expectancy in the U.S. went up from 47 years to 63 years. That's incredible. It hadn't moved from 47 years for hundreds of years. The mortality rate of American infants was literally cut in half by cleaning up the water supply.

It also had a huge impact on economic growth and creativity. Clean water allowed for the growth of urban centers – where you aggregate lots of people who bump up against each other, talk to each other, come up with new ideas and create businesses, institutions, schools and universities around them. Clean water made all that possible. Cities weren't dangerous to your health in anything like the way they had been.

In political terms, it was a completely different era. Providing water infrastructure was seen as something that smart, talented elected officials did as a way of doing something good for their constituents and to take care

BREAKDOWN OF GLOBAL FRESHWATER USE



Source: United Nations Water Program

of their community. Those systems are really the systems we still rely on. They are brilliant, pioneering feats of engineering – finding and collecting water, cleaning it and distributing it to huge populations. The water community kind of took pride in being invisible. They were proud of the fact they provided a product that you never had to think about, never had to question and never had to imagine where it comes from. All of that created great success, but it also undermined the value and support for the system, because you don't really take care of something you don't see. People have no idea of the engineering and effort required to get them their water or of the resources required to maintain that. The very success of it – and the fact they were modest and silent about it – puts us in a position now where people don't understand what it takes to modernize the system.

Today, most Americans never think about water at all. It is economically central, the foundation of the economy, and yet it is free. We use it in all kinds of creative ways that would never have been imagined 100 years ago, but we think about it less and less.

OUTLOOK: How much water does the average American use per day and how has that changed over time?

CF: We're at the apex of what I call the "golden age" of water. A typical American at home uses 99 gallons of actual water on average every day. Flushing the toilet is the No. 1 use at home, but we also take baths, take showers, wash the dishes, wash clothes, cook and more. The 99 gallons is not that surprising to anyone who looks at their water bill a little bit.

Even more interesting are the hidden uses. The electricity that the typical American uses at home today requires 250 gallons of water a day to generate. Each American at home is using 10 gallons of real water every hour of every day just to keep the home well lit, the computers on and the flat screen TV working. Nobody thinks of their flat screen TV as having a tiny little water spigot running to it. Nationwide, electricity is the No. 1 consumer of water in the country at 49 percent.

Then you think about the food we eat. The general rule of thumb in the water world is that a calorie of food requires a liter of water to produce in the developed world. A typical American eating 1,800 calories, that's requiring something like 450 gallons to produce the food. People never think about it. They don't make any connection between water and food, and they never make any connection between water and electricity.

The U.S. uses more water in a day than we use oil in a year. We use more water in four days than the whole world uses oil in a year. That sounds like a lot of water and it is, but the good news is that we use less water than we did as a country in 1980. Thirty years ago, we used 440 billion gallons in

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a day. Now, in 2011, we use 410 billion gallons in a day. That's just amazing. The economy has doubled in size in the last 30 years, but we use less water to produce a $13 trillion economy than we did to produce a $6 trillion economy.

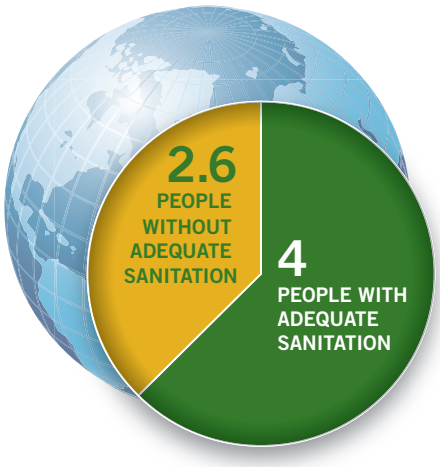
OUTLOOK: How have we been able to achieve those water savings?

CF: One important area is agriculture. Agricultural consumption of water is down 15 percent over that time. Yet farmers produce about 70 percent more food than they did 30 years ago. Farmers have almost exactly doubled their water productivity over the last 30 years through better irrigation techniques and other innovations. To me, that means that dramatic progress is possible.

Electric utilities and agriculture account for three quarters of the water use in the country. Both of those communities – to be fair – are under fairly significant pressure. The utility world is under pressure, because in the communities where these power plants sit, the power plant and community are competing for the same water resources. Electric generation typically produces water that is warmer than the water that went into the system, which has a real environmental impact. The electric utility world has done a fantastic job of reducing the amount of water it uses by recycling and by finding new, more efficient ways of cooling their plants. Farmers have been, to some degree, under the same pressure, competing with communities for ground water and aquifers. As a result, the farm community has done a great job of improving irrigation techniques.

To be completely honest, conserving at home is not the solution. The water that consumers use at home comes to only 7 to 8 percent of total daily consumption of water in the nation. You could eliminate all the water that Americans use at home and it wouldn't change big-picture water consumption dramatically. There are other places we could look, however, for efficiencies. A big issue is water that leaks away from water utilities. They lose one out of six gallons of water they pump to leaky pipes and old systems. Remember, many of these municipal water systems are close to 100 years old. Water utilities go to the trouble of acquiring the water from ground water sources or reservoirs, processing it, cleaning it and pumping it out only to let a sixth of it leak away. That's kind of silly.

GLOBAL SANITATION *(billions)*



Source: United Nations Water Program

OUTLOOK: Is it possible to measure the economic importance of water to the U.S. economy?

CF: It should be. The smart phone you hold in your hand requires this extraordinary water – the cleanest water on earth – as part of the manufacturing process. When you sit at the table to eat, there is nothing on that table that wasn't reliant on water for its production. It should be possible to measure something that was completely essential. The problem is that water is essentially free. We don't place an economic value on water.

Farmers pay the cost of getting water delivered to them in an irrigation canal or in terms of pumping it out of their own wells. The home water bill that people get – which averages $34 a month in the U.S. – that's just the cost of delivering the water from the water-treatment plant to your house – the men and women in the trucks and offices, the electricity, the pipes in the ground. The water is free. I think one of the most important problems with water is that we don't, in fact, put a good economic value on it.

Inconsistency is a problem, too. Las Vegas is an arid locale that only exists because of water from somewhere else far away, but the water bill in Vegas is less than half what someone pays in suburban Philadelphia, where water is plentiful. The price, even to an ordinary homeowner, doesn't in any way reflect the cost and reality of getting that water to you. That's why we don't maintain the water system and we don't use water more efficiently. If something is free, there's no price signal. It must mean it is unlimited.

OUTLOOK: How does the relationship with water for those of us in the U.S. differ from the developing world?

CF: In the developing world, people still think about water and the water supply every day. In India, for example, not one of the 35 largest cities has 24-hour-a-day water. They all get by on water for 90 minutes or two hours a day, and that's true literally in the top 35 cities in India, most of which are quite large. They are running this incredible economic miracle in India on 90 minutes of water per day.

In India, one out of six people in the country rely on water that is delivered every day by foot. That's almost 200 million people, the equivalent of everybody east of the Mississippi River in the United States. An ordinary person can't carry much more than 4 to 5 gallons of water on their head. That's just two toilet flushes for Americans. When you go into the developing world, you see people whose lives are shaped every day by the need to stand in line for water or walk for water.

Their lives are shaped by the priorities in their health, too, which is tied to the quality of their water supply. India spends 2 percent of GDP on treating diarrhea; that's $30 billion a year. India spends more treating diarrhea than the total economic output of half the nations of the world. There are even

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more devastating statistics about the health costs. In India, 5,000 children a day die from lack of water or bad water. That's a hard number to get your brain around, but that's the equivalent of 10 elementary schools of U.S. children wiped out every day just for lack of water. Just thinking about that is sort of nauseating.

There's obviously tremendous opportunity in the developing world to improve living conditions, health and even economic vitality through an improved water system. For instance, in the developing world, they use a tremendous amount of water to raise food. Seventy percent of the water that is used in the world every day is used for agriculture, but 50 percent of that is wasted. We could literally, in water terms, increase food production by 25 to 30 percent just by teaching developing-world farmers techniques to get the same yields or even better yields with less water and by changing the economic incentives to get them to do that.

OUTLOOK: In your book, you make the case that our relationship with water is shifting and changing, that the golden age of water is ending. To illustrate that point, you recount the stories of two communities – Barcelona, Spain, and Orme, Tennessee – that essentially ran out of water and had to take drastic measures, such as bringing water in by truck and by boat, to meet the water needs of their citizens. Why are those sorts of incidents on the rise?

CF: Whether we like it or not, water availability is changing. Both of those communities went through terrible droughts. The waterfall and spring that Orme relied on literally stopped flowing in the terrible drought that lasted from 2006 to 2008. They had to bring water in with the town's 40-year-old fire truck, one truck load at a time. There were only 50 families in the town, so they could do it and bridge themselves to a solution, which was a new water pipeline. Barcelona brought in tanker ships filled with water, which made no sense. One massive tanker only provided 62 minutes of water for the city.

These both illustrate the point that we are seeing a shifting availability of water compared to where we expect it to be and where we have built the tools necessary to gather it. I think it can be linked to climate change and shifting rain fall patterns. We are being reminded that our water systems are very robust, they're strong, but they are brittle, they are not nimble or flexible. If you have a water system built around rainfall falling and filling reservoirs in a particular place – well, if the rainfall goes away, then you are in serious trouble. That's happening all over the world.

In the developed world, the end of the golden age of water is also a function of population growth. You can't simply keep doubling the size of Phoenix, Arizona, and Las Vegas, Nevada – two places where there is no water. We are going to have to learn to use water much more smartly. We are coming to an end of this golden age of abundance, but if we are thoughtful about this, we'll transition right to an age of smart water.

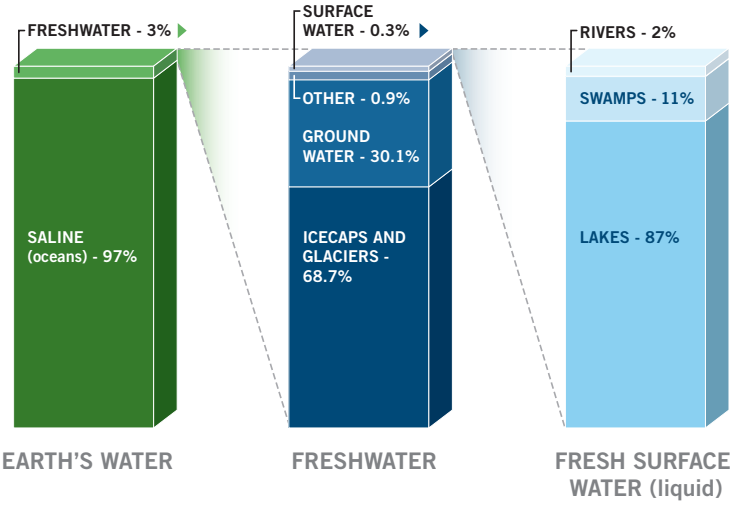
OUTLOOK: What would smarter water use look like? Are there any places doing it now?

CF: The best water that every major city in the developed world has is the water that's already in their system, in their pipes. There's no reason not to reuse and recycle wastewater. Las Vegas cleans to a very, very high level: 94 percent of the water that hits the drain anywhere in that town and sends it right back to the source – Lake Mead.

Orange County, Florida, 25 years ago put in place rules requiring all new developments to put in a reclaimed water system, a purple pipe system, for landscaping at the home level and also for parks, schools and public places. They didn't require you to retrofit your existing house with a purple pipe system. They just said, 'If you're building a new subdivision, then every lawn and every open space needs to be irrigated with recycled wastewater.' They also built the wetlands and treatment plants to support that recycled wastewater. Today, potable water and recycled wastewater in Orange County are supplied in almost exactly the same volume. They've literally doubled the size of the community without having to double the size of their potable water supply.

The key is looking ahead. Orange County didn't achieve results in a year, two years or five years. They said, 'We're going to be in trouble with water 30 years from now given the available water and our expected growth; we better do something so that our world looks different 30 years from now.' It is absurd to imagine re-plumbing whole communities that already exist with a purple pipe system, but if you are building subdivisions from scratch, then it doesn't cost significantly more money at all. Thinking ahead is really important moving from one era to another. I hope this kind of thinking in the developed world will jumpstart the developing world. I hope the era of smart water will trickle down to the developing world.

DISTRIBUTION OF THE EARTH'S WATER



Source: U.S. Geologic Service

OUTLOOK: What examples are we seeing of innovation and who is leading it?

CF: We hear about the global water crisis, but there is no global water crisis. There are literally hundreds of local water crises in all sorts of places around the world. There are no ways to connect the crisis in Atlanta, Georgia, with the crisis in Delhi, India.

But no matter where you visit in the world, people are grabbing hold of their own water problems; they are trying to solve them and they are innovating to solve them. People are not waiting for someone else to come in and solve the problem. They are saying, 'It's my community, it's my problem and I need to find a way of doing this.'

A good example is the IBM semiconductor plant in Burlington, Vermont. Management at the plant decided they needed to better manage their water use, because it takes very expensive kinds of water to manufacture micro-chips. Innovations in monitoring and fine-tuning water use has led to a 27 percent decline in water demand at the plant, which uses about 3.2 million gallons a day. Even though water use is down, semiconductor production is up by 33 percent and the plant is saving about $3 million a year. It actually gave IBM a competitive advantage in the world chip market. They did such a brilliant job of improving their own water efficiency that IBM has started a water division to teach other companies how to better use their water.

I think there's going to be a huge technological boom in things like desalination, in cleaning wastewater and things that will allow us to use water for a whole range of uses. The most important act is to first take a step back and say, 'How do we use water and can we find ways of using less to accomplish the same thing?'

OUTLOOK: Why do you use Australia for many of your case studies in the book? What can we learn from that country?

CF: Australia looks just like the United States. Their demographics are like the United States. The entrepreneurial spirit is like the U.S. It's a democracy. The per capita GDP is very close. They like the same movies, the same pop stars and the same books as we do. It feels very much like the U.S., with friendly people with cool accents.

They've had some flooding in the last six months, but in the last 10 years they have gone through a horrific drought, and water availability has had to change very dramatically. It changed in one direction – it went down. Australia has had to remake its water system in both urban communities and agricultural communities on an incredibly quick timeline. I went to Australia to get a feel for what the future would be like. I wanted to know what happens when a developed-world economy that doesn't ever think about water has a dramatic loss of water availability in a very short period of time. What do you

have to do to fix that from a political standpoint and an economic standpoint? What have the Australians learned about how to manage scarcity?

Australia has spent, in the last 5 years, the equivalent of half the Obama stimulus program, just on water. Every major city – with the exception of Darwin – is building an expensive, high-tech desalination plant. Brisbane has built a sophisticated, interconnected water piping system for the entire region so that no community in the region is in danger of running out of water. It is costing every Australian hundreds of hundreds of dollars just to fix the water system. Here in the U.S., the key takeaway is to look ahead. If you can do something to get ready for that so you don't have to spend that kind of money in a hurry to avoid disaster, then now is the time to be thinking about that.

OUTLOOK: As you've noted, water is essentially free. Will that have to change in the future?

CF: It doesn't have to change for people to look at things differently. Many of the people I talk to decided that changing water use saves enough money in both the water and all the ancillary costs to be worthwhile. They determined that it's a good investment in sustainable supply. In the big picture, though, I think we'll have to price water differently if we're going to make sure we have municipal water systems that work permanently and smartly, are modernized and have a good supply of water. If we're going to make sure we have water for agriculture and industrial needs, I think we'll have to price it differently.

Pricing is also a great way of managing scarcity. When there's a temporary but serious drop in supply of any commodity or item, pricing is typically the way you manage any type of scarcity. We don't do that with water, but we can't just change that overnight. We need to lay the groundwork now and set up systems in advance. You can't arbitrarily say the price of agricultural water for irrigation should be 30 percent higher or the price of home drinking water should be 20 percent higher. There is no set formula – it depends on each community's circumstance.

There are two things that are very important. In the municipal setting, water needs to be priced in such a way that everybody has access to a reasonable amount of water to get through the day, providing critical human needs like eating, cooking, cleaning and going to the toilet. Then, the rest of the water needs to be priced not based on what it costs to turn on the pump and pump it to you, but what it costs to get the next gallon out of the environment. If we had to build a new reservoir or a new piping system, what would the cost of that water be? You could build the price into the cost of the water so that systems are able to keep up, able to modernize and provide advance treatment for removal of things we don't want in our water. But then you could have another tier, which would be a little more expensive, for people who want lush green lawns and who are using 15,000 gallons of water a month on an

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acre of land. Those people should pay differently for that water. We should also provide a system so they are not using drinking water on their lawn.

In other industries – agriculture and power – water needs to be priced in such a way that the water supply is sustainable. You use price to encourage the type of water practices that keep water flowing forever, crisis periods notwithstanding. If an aquifer is being destroyed, maybe you should change the pricing structure and the rules on who can withdraw, at what pace and at what price. Then maybe you could bring it back to viability. But you can't just say we need to protect this vital natural resource and it's free. Those things just don't go together.

In the book, there's a whole chapter about this. A very smart and deeply experienced water economist from Australia lays out a system in which you let people buy the kind of water they need. They buy what he calls 'general security' water, the type of water we all have now, at a certain price. But if you are a hospital, a microchip plant or a luxury hotel in Las Vegas, you pay more for 'high-security' water, so that in a drought, the general security people, who have paid less, get less water and the high security people, who pay more in good times and bad, end up with a secure supply of water. They are paying more every day, but they are getting a different product, water with a more dependable source of supply even in times of scarcity. The money that is spent on high security water ends up going to sustain the system that we all rely on.

OUTLOOK: What's the future of water in the United States? How will our relationship with this vital resource change over time? Is there anything we should be doing from a public policy standpoint to address our changing water needs?

CF: First, we need conversation, explanation and leadership. No one at the city, county, state or federal level ever talks about water. We've been through a devastating economic downturn, so there's been plenty to talk about. I'm not sure that water should compete with the economy in the urgent moment. But people who run water utilities never talk about where the water comes from or what the state of our water supply is. Even worse than that, we have anti-leadership. Places like Atlanta came within 80 days of running out of water and having a devastating water crisis. The leadership in Atlanta is not saying, 'You know what? We're not doing this smartly. Let's change our long-term water use habits and development habits.' We need the people who understand the problem to start talking about it and to change the way they talk about water.

The point of that is to create public support for changing the water infrastructure, modernizing it and adapting it. We spend $21 billion a year just on bottled water. We spend $29 billion maintaining the entire water infrastructure of the nation. We spent almost as much on crushable, plastic bottles of water as we do on the water system that provides us with water 24 hours a day, 365 days a year. Obviously, in the big picture, there are resources to be used on the water system, but we're just misallocating them. The bottled water business is purely voluntary, it's pure indulgence. We are capable of spending money on water if we decided it is a priority. But the very start of this isn't taxes or something like that, it's a conversation and education.

Our relationship with water in the next 10, 20, 30 years, I hope it is much more visible, much more thoughtful, much more present. The average water bill in a U.S. home now is $34 a month, about $1 a day. We spend more than twice that on the cell phone bill. I would hope we'd be willing to say, 'If the water bill goes from $34 to $44 but my community is able to replace 100-year-old water pipes on a routine basis, that's actually a good value.'

I'm from an era where you could smoke on an airplane. If somebody lit a cigarette today in the seat next to you, you'd yank the cigarette out of their mouth, throw them on the ground and summon the air marshal. There was a huge change in attitude. I would hope we'll have the same kind of evolution in attitude with regard to water. We should not water lawns with purified drinking water. We should not be flushing toilets with purified drinking water. I hope we can move past that. Obviously we are not going to retrofit every home with a purple pipe system, but we are building millions of new homes every year. It should just become standard that those communities supply recycled wastewater for those kinds of purposes, for which it is perfect. I hope we move to an era where we pay different kinds of prices for different water, and we end up paying the right price for the right water for the right use.

Interest Rates and Economic Indicators

The interest rate and economic data on this page were updated as of 3/31/11. They are intended to provide rate or cost indications only and are for notional amounts in excess of $5 million except for forward fixed rates.

KEY ECONOMIC INDICATORS

Gross Domestic Product (GDP) measures the change in total output of the U.S. economy. The Consumer Price Index (CPI) is a measure of consumer inflation. The federal funds rate is the rate charged by banks to one another on overnight funds. The target federal funds rate is set by the Federal Reserve as one of the tools of monetary policy. The interest rate on the 10-year U.S. Treasury Note is considered a reflection of the market's view of longer-term macroeconomic performance; the 2-year projection provides a view of more near-term economic performance.

ECONOMIC AND INTEREST RATE PROJECTIONS

Source: Insight Economics, LLC & Blue Chip Economic Indicators				US Treasury Securities	
2010	**GDP**	**CPI**	**Fed Funds**	**2-year**	**10-year**
Q4	2.80%	2.60%	0.19%	0.50%	2.90%
2011	**GDP**	**CPI**	**Funds**	**2-year**	**10-year**
Q1	3.40%	3.40%	0.16%	0.70%	3.50%
Q2	3.40%	2.00%	0.15%	0.70%	3.50%
Q3	3.40%	2.00%	0.18%	0.80%	3.70%
Q4	3.40%	2.00%	0.20%	1.00%	3.80%

PROJECTIONS OF FUTURE INTEREST RATES

The table below reflects current market expectations about interest rates at given points in the future. Implied forward rates are the most commonly used measure of the outlook for interest rates. The forward rates listed are derived from the current interest rate curve using a mathematical formula to project future interest rate levels.

IMPLIED FORWARD RATES

Years Forward	3-month LIBOR	1-year Swap	3-year Swap	5-year Swap	7-year Swap	10-year Swap
Today	0.31%	0.46%	1.49%	2.39%	3.00%	3.52%
0.25	0.37%	0.58%	1.74%	2.57%	3.13%	3.62%
0.50	0.48%	0.80%	1.96%	2.80%	3.29%	3.74%
0.75	0.65%	1.12%	2.24%	3.01%	3.49%	3.90%
1.00	0.90%	1.44%	2.49%	3.22%	3.63%	4.00%
1.50	1.65%	2.09%	2.98%	3.59%	3.94%	4.25%
2.00	2.15%	2.63%	3.38%	3.88%	4.17%	4.42%
2.50	2.61%	3.06%	3.73%	4.12%	4.35%	4.58%
3.00	3.07%	3.48%	4.07%	4.36%	4.54%	4.74%
4.00	3.78%	4.17%	4.51%	4.70%	4.81%	4.94%
5.00	4.25%	4.61%	4.77%	4.90%	5.00%	5.06%

HEDGING THE COST OF FUTURE LOANS

A forward fixed rate is a fixed loan rate on a specified balance that can be drawn on or before a predetermined future date. The table below lists the additional cost incurred today to fix a loan at a future date.

FORWARD FIXED RATES

Cost of Forward Funds

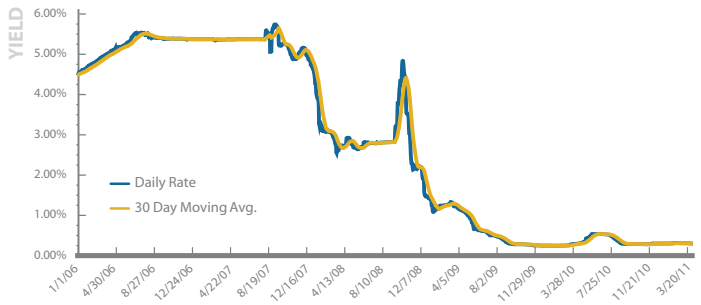
Forward Period (Days)	Average Life of Loan			
	2-yr	3-yr	5-yr	10-yr
30	10	10	10	7
90	25	26	25	17
180	48	50	48	32
365	109	106	97	63

Costs are stated in basis points per year.

SHORT-TERM INTEREST RATES

This graph depicts the recent history of the cost to fund floating rate loans. Three-month LIBOR is the most commonly used index for short-term financing.

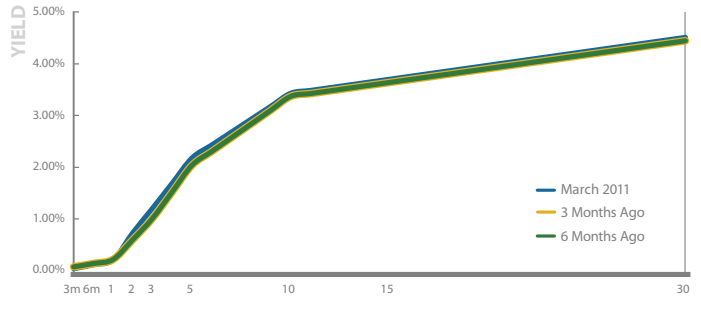
3-MONTH LIBOR



RELATION OF INTEREST RATE TO MATURITY

The yield curve is the relation between the cost of borrowing and the time to maturity of debt for a given borrower in a given currency. Typically, interest rates on long-term securities are higher than rates on short-term securities. Long-term securities generally require a risk premium for inflation uncertainty, for liquidity, and for potential default risk.

TREASURY YIELD CURVE



CoBank Announces Executive Appointments

Brett Challenger Named Senior Vice President of Energy and Water Banking Division.

Todd Telesz Named Senior Vice President of Power Supply Banking Division.

CHALLENGER

TELESZ

CoBank recently announced that Brett Challenger and Todd E. Telesz have been named senior vice presidents within the bank's Rural Infrastructure Banking Group.

Telesz and Challenger will succeed Jake Udris, senior vice president of the Energy and Water Banking Division, who recently announced his retirement after more than 28 years of service to the bank.

"We're extremely grateful to Jake for his enormous contributions to CoBank over almost three decades," Chief Banking Officer Mary McBride said. "Much of the growth we've experienced as a lender to rural infrastructure providers over that time period is due to his leadership, and we wish him nothing but continued success in the future."

Challenger and Telesz will replace Udris as part of a revised management structure within the bank's rural infrastructure portfolio. Challenger has been named senior vice president of the bank's Energy and Water Services Banking Division, overseeing relationship management, marketing and credit administration for customers in the energy, power and water industries. Telesz has been named senior vice president for the bank's Power Supply Banking Division, with responsibility for relationship management, marketing and credit administration for the bank's cooperative generation and transmission customers and investor-owned utilities. Both appointments were effective April 1.

"CoBank has built a leadership position as a trusted provider of credit and financial services to our rural infrastructure borrowers," said Paul Narduzzo, executive vice president of CoBank's Rural Infrastructure Banking Group. "With Brett and Todd assuming new leadership roles, we look forward to continued growth in market share in these critical sectors of the nation's rural economy."

About CoBank

CoBank is a $66 billion cooperative bank serving vital industries across rural America. The bank provides loans, leases, export financing and other financial services to agribusinesses and rural power, water and communications providers in all 50 states.

CoBank is a member of the Farm Credit System, a nationwide network of banks and retail lending associations chartered to support the borrowing needs of U.S. agriculture and the nation's rural economy. In addition to serving its direct borrowers, the bank also provides wholesale loans and other financial services to affiliated Farm Credit associations and other partners across the country.

Headquartered outside Denver, Colorado, CoBank serves customers from regional banking centers across the U.S. and also maintains an international representative office in Singapore. For more information about CoBank, visit the bank's web site at www.cobank.com.

Challenger joined CoBank in 2006 as a relationship manager in the bank's Energy and Water Banking Division. He most recently served as a sector vice president of the bank's energy services division. Before coming to CoBank, he served in leadership roles for Duke Capital Partners and Banc of America Securities. Challenger has a bachelor's degree in economics from the University of Colorado and an MBA from the University of Cincinnati.

Telesz has been with CoBank for nine years, serving as a sector vice president, relationship manager and credit manager in the bank's Energy and Water Banking Division. Before joining CoBank, he was a middle-market corporate lender for super-regional banks in Buffalo, NY, and Denver. He also was a founding member of a private equity firm focused on investing in economically distressed companies. Telesz holds a bachelor's degree in economics from the University of Pennsylvania, where he was a cum laude graduate of The Wharton School of Business.