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Credit FAQ:

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

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(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.)

The 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.

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.

Frequently Asked Questions

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

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).

Chart 1

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

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 1961-1990 U.K. average rainfall of 603 mm. (We use the

1961-1990 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.

How will climate change affect rainfall in the future?

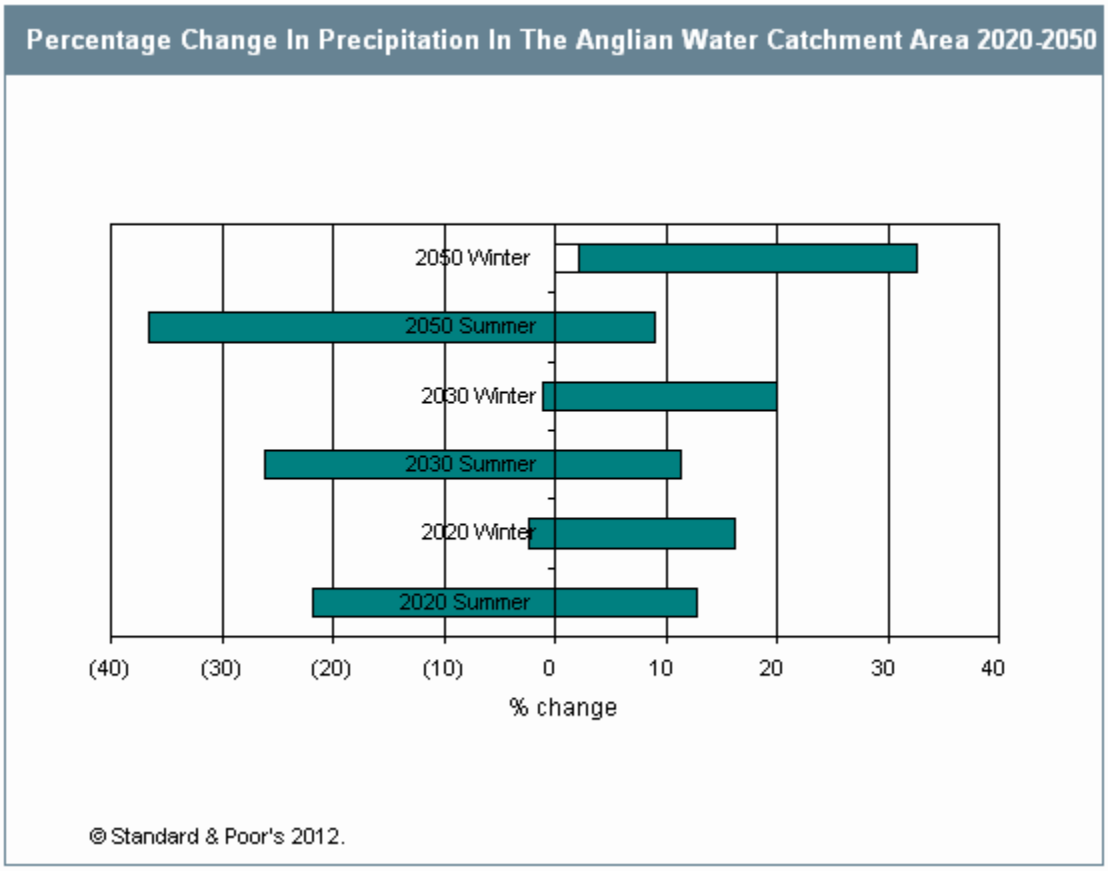
According to UKCP09, the total average annual rainfall for the east of England will remain approximately the same until 2030. However, we understand that the spread of precipitation across the year is likely to change dramatically as a result of climate change.

In 1970-2000, 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.

Chart 2



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

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.

What other plans do the utilities have to conserve water in light of a rising population?
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 (that is, 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.

What pressure will changes in water resources place on local water companies?
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 2036-2037. 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.

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

How could water shortages affect power companies and future electricity tariffs?
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 industry-wide 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.

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

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. In 2010-2011, 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).

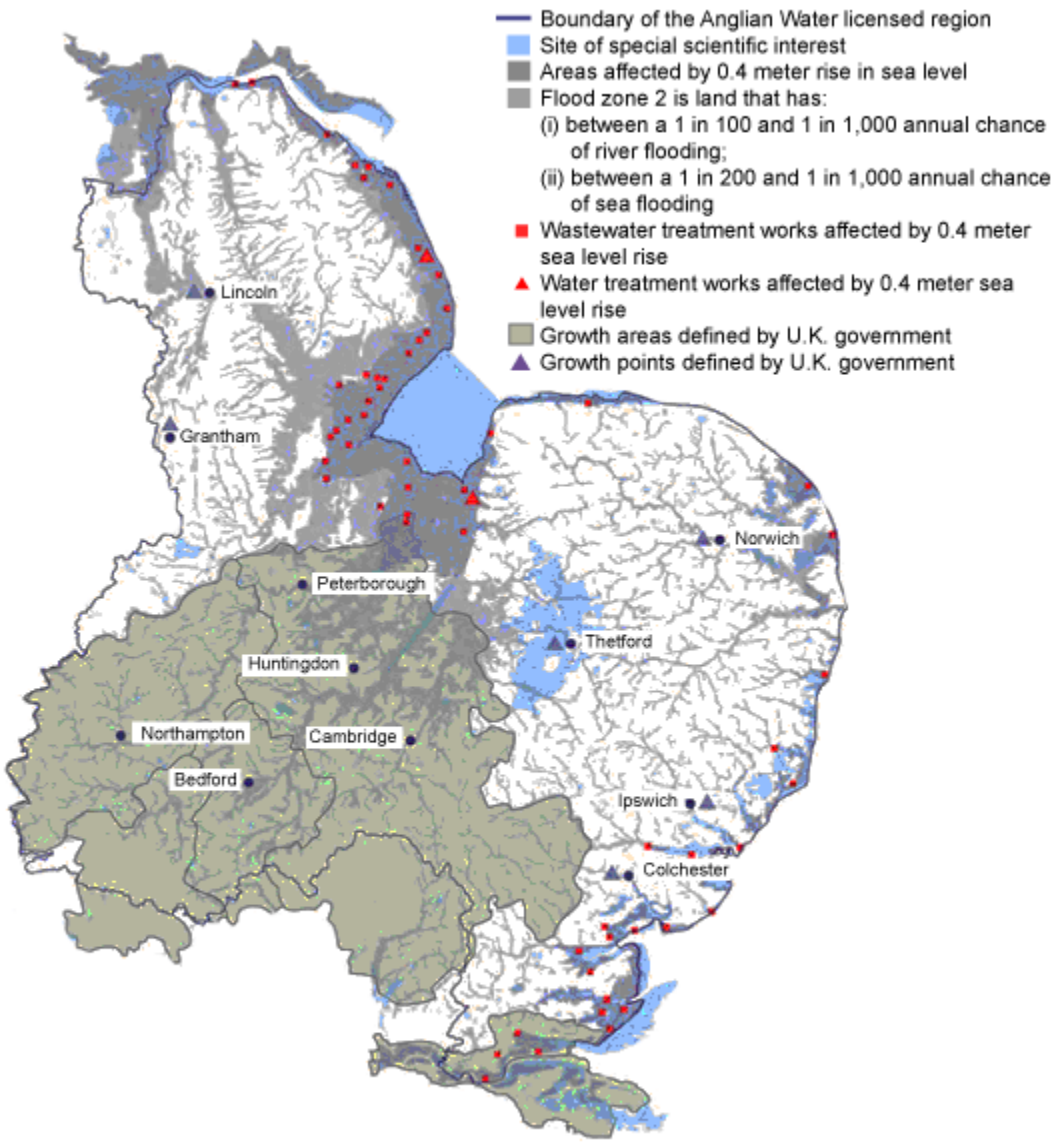
Anglian Water has two water treatment works and 58 wastewater treatment works located in coastal floodplains less than 40 cm above sea level and is therefore at risk of coastal flooding by 2080 (see chart 3). The projected asset value at risk for Anglian Water is up to £2.4 million by 2020 and £7.5 million 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-chi 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.

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.

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

Measures that we consider could potentially alleviate the stress on water 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 planning process for the current

2010-2015 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 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.

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/868/531/

3. "Future Water – The Government's Water Strategy for England" (Defra), 2008.

Related Criteria And Research

All articles listed below are available on RatingsDirect on the Global Credit Portal, unless otherwise stated.

- Peer Comparison: Regulation Provides Stability For U.K. Water Companies, But High Leverage Limits Their Room For Maneuver, Feb. 20, 2012
- Regulatory Reforms Could Increase Credit Risk For Water Companies In England And Wales, Nov. 15, 2011

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