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THE ROLE OF **ASSET MANAGEMENT** IN RESILIENCE PLANNING

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THE ROLE OF ASSET MANAGEMENT IN RESILIENCE PLANNING

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BLACK & VEATCH

Resilience has been put to the test over the past decade through significant events such as flooding, drought and financial strain – events that have tested the weak points in our critical human infrastructure and the organizations that manage it. The most fundamental test of resilience is dealing with unplanned events. These events test the ability to go from an optimized operating state to an operation that meets minimum service levels, and then recover back to the optimal operating state. This cycle demonstrates the relationship between asset management and resilience. Upon close examination, both asset management and resilience strive to achieve the optimal balance between cost, risk and performance.

The Black & Veatch 2015 *Strategic Directions: U.S. Water Industry* report is a compilation of data and analysis from an industry-wide survey of 454 utility, municipal, commercial, and community stakeholders. This year the report explored the concept of resilience, with a focus on the application of asset management in resilience planning, and this article draws on some of the key findings from the report. Results from specific questions posed in the survey are presented in the figures throughout the article.

KEY ISSUES FOR SOUTHWEST WATER UTILITIES

When it comes to resilience, aging infrastructure continues to be a perennial concern for water utilities, including those in the Southwest. It has ranked first among the top five water industry issues for the past four years. The other top five issues identified from the survey included managing operational costs, managing capital costs, water conservation, and water scarcity. Water and

wastewater utilities in the Southwest rated the importance of resilience as an industry issue higher than any other region in the United States. Figure 1 shows the top ten issues in the Southwest region (issues rated on a scale of 1 to 5).

Other challenges are justifying capital improvement programs and an aging workforce. The challenges are clear, and Texas utilities know that the solutions will require vision and innovation. In 2011, the Texas Water Development Board (TWDB) adopted Effective Management rating criteria for projects seeking funding through the Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) programs. A set of Effective Management criteria was adopted to address current and future challenges including escalating costs, aging infrastructure, regulatory requirements, and the

changing workforce. Effective Management also encourages the integration of sustainable planning elements into a project. The rating criteria contain elements within three categories: asset management planning, future asset management planning, and sustainable planning. Entities that undertake Effective Management initiatives qualified for additional ranking points and most importantly could achieve resilience and strategic planning for shocks and stresses, operational sustainability, and the financial strength to support their programs.

Recently, a large Texas water utility included the Envision® sustainable infrastructure rating system as a project element in one of the largest transmission pipeline projects of the region. Envision® is holistic framework for evaluating and rating the community, environmental, and economic benefits of

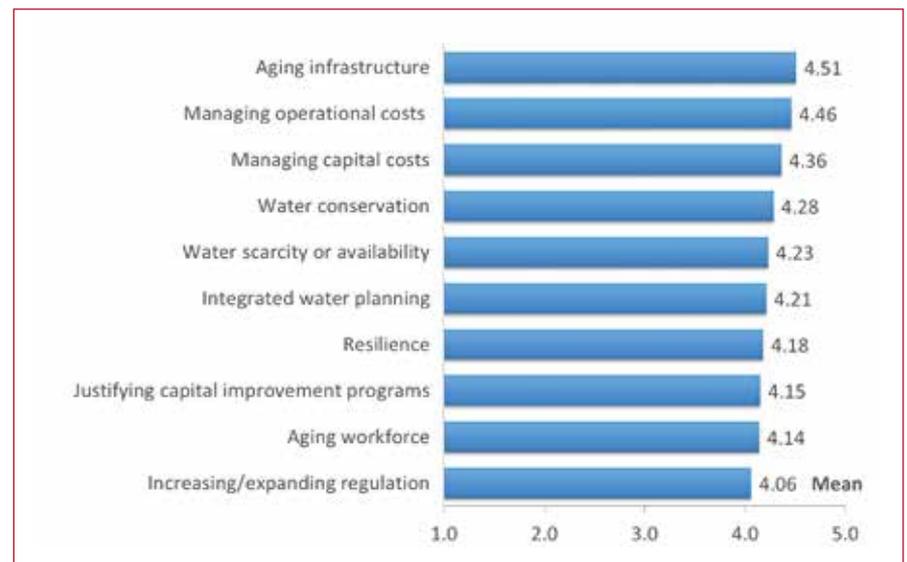


Figure 1: Top 10 water industry issues for the southwest



Figure 2: How Water Utilities are Measuring Resilience

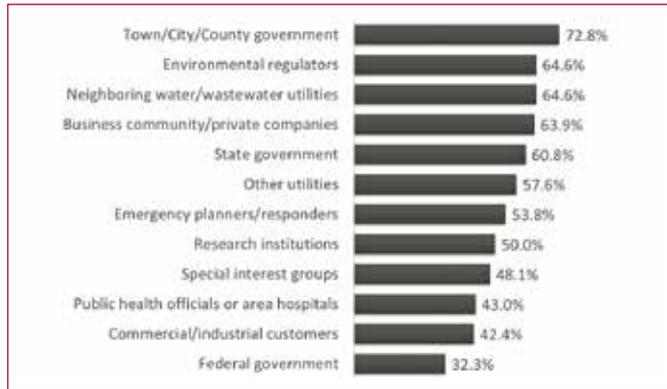


Figure 3: Non-utility stakeholders utilities are collaborating with to build resilience

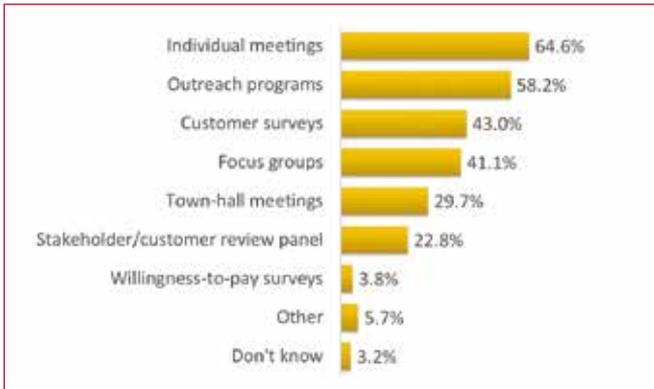


Figure 4: How water utilities are collaborating with non-utility stakeholders



Figure 5: Public Education/Community Outreach Programs

infrastructure projects, and it is collaboration between the Institute for Sustainable Infrastructure (ISI) in Washington D.C., and the Zofnass Program for Sustainable Infrastructure at the Graduate School of Design at Harvard University, Cambridge, Massachusetts. ISI was founded by the American Council of Engineering Companies (ACEC), the American Public Works Association (APWA), and the American Society of Civil Engineers (ASCE). For a list of projects that earned the Envision® award go to <http://www.sustainableinfrastructure.org/awards/index.cfm>

Texas utilities continue to include asset management components in facilities and pipeline projects, from inventory of assets, assessment of criticality, prioritization of capital projects, and development of asset management plans to training of staff. The devastating damage to Louisiana from two Category III Hurricanes, Katrina and Rita, brought resilience planning to the forefront for Louisiana utilities. Some of the new project components include workshops on hazard mitigation describing when hydrologic and hydraulic studies for water crossing projects are required and sensitivity analysis scenarios in master planning for varying system flows.

MEASURING RESILIENCE

Resilient systems have well thought-out operational and maintenance schemes with dedicated and trained professionals servicing them. These systems achieve maximum performance for typical conditions and have contingency plans involving the necessary labor and materials to deal with a multitude of possible scenarios. Resilient systems are also closely monitored and measured using asset and system performance metrics. The operational plans and monitoring help determine appropriate mitigation and adaption strategies, and lead to focused contingency plans. Resilient systems have also been assessed for a broad range of risks, from organizational elements such as staff succession planning and data security to infrastructure risks such as the likelihood and consequences of failures.

The Strategic Directions report shows that roughly one-third of utilities (32.6 percent) are measuring resilience. Figure 2 shows some of the main measures used, which include the number and frequency of service disruptions and the time taken to recover from the disruptions. The survey results show that more work needs to be done. However, the

agencies that are monitoring these elements are developing a beneficial understanding of the level of service provided to customers and how resilient their assets are in providing that level of service.

STAKEHOLDER CONSULTATION

Stakeholders may not always fully appreciate (or even want to know) the behind-the-scenes activities required to manage assets and maintain reliable service. But they will passionately engage the utility when the level of service is not being met or when they do not see value when their rates go up. Asset management and the related resilience components are therefore improved by engaging stakeholders with regular two-way communication. The survey indicated that 47 percent of respondents are providing public education and have two-way conversations with residential customers, while 41 percent are engaging with a wide range of non-utility stakeholder groups (see Figure 3). While this represents a good effort by nearly half of the survey participants, it leaves room for improvement – especially given the impact these challenges have relating to utility financing, potential lifestyle disruptions, and

other social concerns. It was encouraging that a wide range of stakeholders were being consulted related to resilience.

As shown in Figure 4, Stakeholders are consulted primarily through individual meetings (64.6 percent) and outreach programs (58.2 percent), but it is interesting to see that 22.8 percent are using stakeholder or customer review panels. A review panel is typically made up of representatives of a utility's customer base and, in some cases, other stakeholders who work collaboratively with the utility in developing the strategy, providing input and ensuring that stakeholder needs are taken into account. It is believed this approach will continue to increase in popularity among utilities. Only a small percentage of utilities (3.8 percent) are using willingness-to-pay surveys. This is an approach used by more mature industries to evaluate what levels of service customers value the most, and it asks what they might be willing to pay for an improved service, or if they want to pay less for a reduced level of service. This analysis can be used to calculate the cost/benefit of capital improvement projects and influence rate setting and is routinely used in the UK and Australian water industries.

Use of Customer Review Panels and Willingness-to-Pay Surveys – Leading International Practice

In the last round of water company asset management planning in England and Wales (referred to as PR14), the utility regulator Ofwat (<https://www.ofwat.gov.uk/>) required close collaboration between water companies and their stakeholders in developing the 5-year asset management plans for 2015-2019. Customer challenge groups consisting of customer representative organizations, businesses, and environmental regulators were formed to scrutinize each company's plans and customer engagement activity in developing the plans and to report back to Ofwat. Water companies had to engage with customers to obtain their opinions on service levels and rate increases (known as willingness-to-pay surveys) through telephone interviews, focus groups and face-to-face interviews.

Respondents were asked what is included in their public education/community outreach programs (Figure 5). The utility's website was the most widely used (90.4 percent), followed by community meetings (80.9 percent). Use of social media such as Facebook, Twitter and Instagram also scored highly (70.2 percent) as utilities are increasingly using technology to connect with their customers.

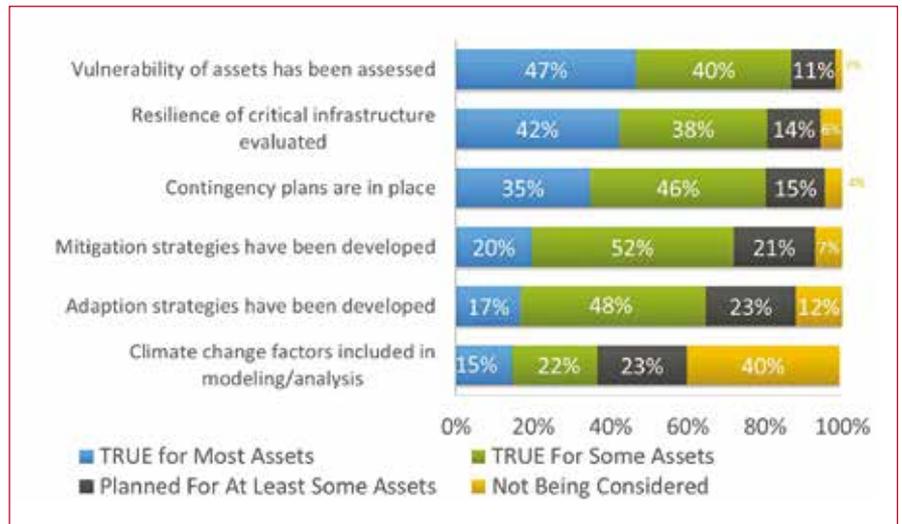


Figure 6: How asset resilience is incorporated into Capital investment planning

PLANNING FOR RESILIENCE

Incorporating resilience into asset management planning is becoming increasingly important. Planning for asset resilience starts with an assessment of the vulnerability of assets, followed by an evaluation of the resilience of the most vulnerable or critical assets. Forty-seven percent of respondents have assessed the vulnerability of most of their assets and 42 percent have evaluated the resilience of most of their critical assets (Figure 6). This is good progress, coupled with the results that most utilities reported assessing risk and vulnerabilities for at least "some" of their infrastructure. But it is also important to note that over half of the utilities surveyed may have major blind spots in regards to risk depending on the extent to which their critical assets fall under the category labeled "some" assets.

Emerging trend – scenario planning is a growing trend that mitigates risks in both master planning and asset management processes. Scenario planning includes developing multiple future scenarios (for both expected and unexpected/adaptable conditions). By considering all these scenarios and their related risks, mitigation measures and adaptable strategies can be developed. The application has been applied to a wide range of needs – from specific facilities to multi-state watersheds.

The next steps for those utilities that have identified risks and vulnerability include contingency planning, setting up mitigation strategies and evaluating how future conditions may change and impact the organization. Thirty-five percent of respondents reported that contingency plans are in place for

most assets, which is only slightly lower than the percentage of respondents who reported that they have assessed vulnerabilities and resilience. A larger drop-off occurred related to developing mitigation strategies and adaption strategies. Only 20 percent have developed mitigation strategies, and only 17 percent have developed adaption strategies for most assets. There is an important distinction between having contingency plans (which sit ready to deal with predicted events) and taking mitigating actions or adaptive strategies (that are more proactive in reducing future risks and the consequences of vulnerabilities).

A focus on mitigation measures and adaptable strategies offers the biggest opportunities for those utilities that have assessed their risks and vulnerabilities but have not advanced past the contingency planning step as part of their overall asset management/resilience planning.

Respondents were also asked to gauge the level of climate change activities specific to modeling for resilience. Planning for climate change involves considering climate change factors to analyze system performance and resilience, which is most often done using models. However, 40 percent of respondents are not including these factors in their modeling. Because of the low response rate on this question, further climate change survey questions were included to draw conclusions related to climate change and resilience.

CLIMATE CHANGE RELATED TO RESILIENCE PLANNING

Utilities were asked how they are considering climate change in relation to resilience. The first and third rows of the survey results in

Consideration of Climate Change and a Resilient Infrastructure in Planning	By Population Served		
	Under 100,000	100,000-999,999	1,000,000 or More
Our strategy considers the impacts of climate change	11.3%	5.4%	24.3%
Our strategy recognizes the need for asset resilience	21.4%	27.9%	18.4%
Our strategy considers climate change and the need for asset resilience	20.0%	24.0%	35.9%
We recognize these issues, but they are not considered in our strategic plan	22.5%	22.5%	10.7%
We do not recognize these as issues	11.3%	8.8%	2.9%

Table 1 How has climate change and the need for a resilient infrastructure been considered?

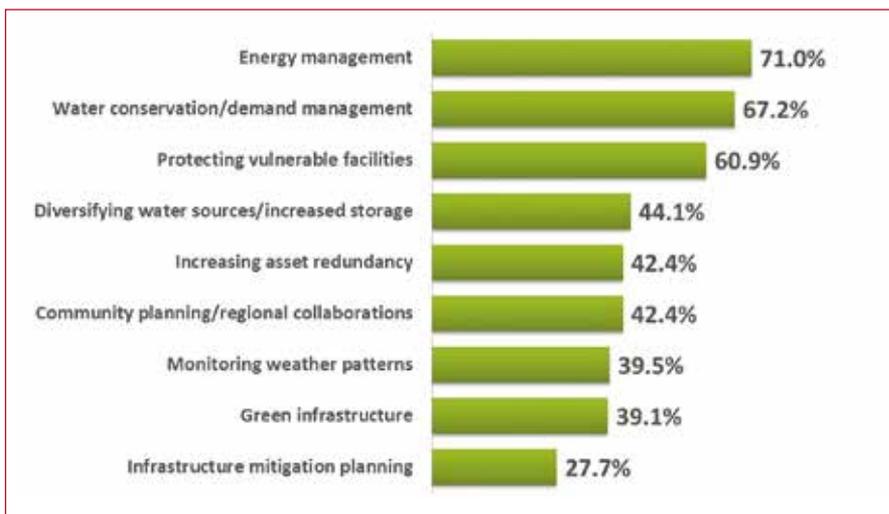


Figure 7: Mitigation strategies currently being implemented

Table 1 specifically called out whether climate change elements were included. The results show approximately 30 percent of small- and medium-sized utilities consider climate change while approximately 60 percent of larger utilities do (larger utilities defined as those serving a population of 1,000,000 or more). When adding in resilience in general (the second row of Table 1), the totals jump to approximately 50 percent for small- and medium-sized utilities and 80 percent for larger utilities. The lower response rate of small- and medium-sized utilities is of interest. This may be reflective of the belief among some U.S. utilities that climate change is less of an issue to their operations or the value is not there to spend limited dollars analyzing it. The differing opinions on climate change show up in a related survey question which asked respondents what the most significant sustainability issues are. Climate change was third from bottom of the list. However, 40 percent of non-utility

respondents to the survey identified climate change as the most significant sustainability issue after water conservation.

With the potentially significant impacts that changing weather patterns have on water supplies, flooding, and agency finances, utilities should be considering climate change in their planning processes. Small- and medium-sized utilities have the most room to advance in this area.

Respondents who indicated they are considering climate change in their resilience planning were also asked what mitigation strategies were used to address risks and vulnerabilities. The top mitigation strategies currently being implemented by water utilities are: energy management (71.0 percent), water conservation/demand management (67.2 percent) and protecting vulnerable facilities (60.9 percent). It is interesting that energy management was the top strategy being used, because in itself, energy management does not directly provide a new water supply

or reduce flooding. It does help optimize agency finances and promotes agencies doing their part to curb emissions linked to climate change – so there is absolutely a tie to mitigating these key vulnerabilities. The other elements offer a menu of strategies commonly used to address climate change risks. Their application is dependent on the utility’s specific circumstances and assets.

RESILIENCE CONCLUSIONS

Overall, identifying the need to improve resilience is just part of the equation. A core challenge for U.S. utilities is balancing the overall budget in the context of increasing pressure not to increase rates. Having a common approach to prioritize investments that will improve environmental, customer, health and safety, financial and resilience as investment drivers is essential. Increasingly, risk-based investment planning is being adopted to achieve this balance between system performance, cost and risk. Resilience and asset management are therefore inextricably linked, and building the foundation for resilience through asset management is both timely and essential for the success of modern infrastructure systems and organizations.

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