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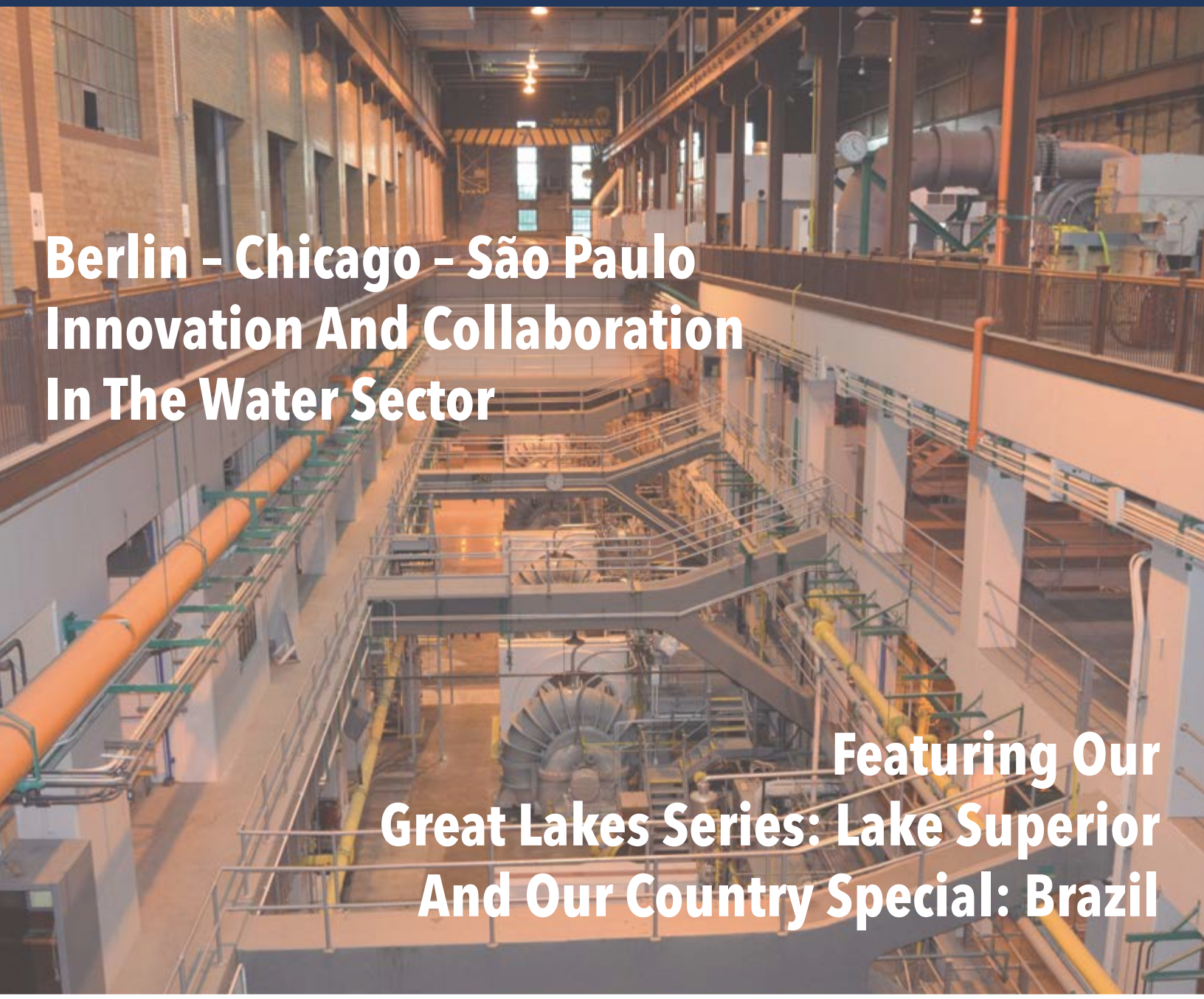
German American Water Technology Magazine

2014/2015



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Welcome

Chicago, October 2014

With the third edition of our popular German American Water Technology Magazine, we would like to put the spotlight onto new companies, innovative technologies, and future trends in the German and American water sectors.

Since its launch in 2012, GACC Midwest's German American Water Technology (GAWT) Initiative has travelled to many cities throughout the U.S. and Germany. Our GAWT Expert Roundtables series has already visited 9 U.S. states, traveling from Illinois, Indiana, and Iowa to Ohio, from Michigan and Minnesota to Missouri, and from Pennsylvania to Wisconsin. At our roundtables, we covered topics as diverse as municipal water infrastructure challenges, sustainable wastewater treatment in the food processing industry, and the water-energy-nexus.

In April 2013, we sent a U.S. delegation abroad to become acquainted with water technology and industry practices in Germany. More recently in June 2014, a group of eight German company representatives from the water sector visited Chicago as part of a business delegation organized by GACC Midwest together with German Water Partnership, introducing them to local industry stakeholders.

One highlight that week was our Sustainable Water Technologies Business Conference in Chicago, where over 90 attendees engaged in discussions on water technology innovations with experts from the City of Chicago, the Metropolitan Water Reclamation District, German Water Partnership, and many more.

The GAWT Initiative has set the stage for knowledge sharing and for the identification of industry best practices in the water sector in Germany and the U.S. Together, both countries represent large markets for research & development of new water technologies. Their cooperation is vital in order to address pressing global water supply and treatment challenges.

I would like to thank all of our sponsors, supporters, contributors, speakers, event attendees and everyone who has helped GACC Midwest build this platform and make it so successful. A very special thank you goes to the Consulate General of the Federal Republic of Germany Chicago and German Water Partnership for their support in the U.S. and Germany.

GACC Midwest is excited to continue the GAWT Initiative in 2015 and beyond. Let's keep tapping the water market together and take advantage of transatlantic synergies in the sector!

Please enjoy this unique read and keep up with the current!

President & CEO

German American Chamber
of Commerce of the Midwest, Inc.

Greetings From The German Ambassador Peter Wittig

Washington, October 2014

As climate change brings about new challenges for the international community, the importance of water resources has never been more crucial. As a natural resource, water is essential to sustaining Earth's ecosystem, to meeting the needs of a growing population.

The reality of climate change and its adverse effects on global water resources has grown increasingly dire. Due to extreme drought in otherwise fertile regions and flooding in populated areas, both rural and high-growth regions have been afflicted. Cities are also facing new challenges in the water sector that make the implementation of sustainable water technologies and infrastructure imperative.

New and sustainable technologies are needed for better water management and wastewater treatment. Many advances in this sector have become possible through innovation, boosted by collaboration among experts in different fields.

The German American Water Technology Initiative provides a transatlantic know-how, technology, and business exchange to improve the way current and future challenges in the water sector can be addressed on both sides of the Atlantic. The German Embassy proudly acknowledges this effort and supports this initiative as part of the Transatlantic Climate Bridge.

I would like to express my thanks to the German American Chamber of Commerce of the Midwest for building this much-needed and well-received platform.

Peter Wittig

Ambassador of the Federal Republic of Germany

It's All About Water – Quotes From The Industry

"A study released last month by UC Davis found [California's] economy has taken a $2.2-billion hit this year because of the drought."

Melanie Mason, www.governing.com, August 11, 2014

"Innovation comes from collaboration, it comes from teamwork, and it comes from being able to take visionary ideas and actually execute them with good engineering."

Walter Isaacson, www.salon.com, August 5, 2014

"By 2025, 1.8 billion people will live in regions that face "absolute water scarcity," reports the United Nations."

Heather Clancy, www.greenbiz.com, August 4, 2014

"A faucet that drips just once a minute will lose over 2000 gallons of drinkable water each year."

Springwise Entrepreneurial Magazine, www.springwise.com, August 1, 2014

"In the end, our society will be defined not only by what we create, but by what we refuse to destroy."

John Sawhill, thisbigcity.net, August 13, 2014

"The world is not 'running out of water,' but it is not always available when and where people need it."

Pancho Ndebele, Water Neutral, www.wbcsd.org, August 7, 2014

The primary problem with the language used by many global warming campaigners is that it's not relevant to people: It frames the climate and environment as separate from us. We see clumsy language like "healthy climate," "safe climate," and "impact on the climate" too often.

Jeremy Porter, grist.org, August 9, 2014

"If a person took 3 baths a day, it would take over 110 billion years to use all the water in the Great Lakes!"

U.S. Environmental Protection Agency, www.epa.gov, August 7, 2014

"There are an estimated 240,000 water main breaks per year in the United States."

American Society of Civil Engineers, www.infrastructurereportcard.org, August 13, 2014

"About 55 percent of bottled water in the United States is spring water […]. The other 45 percent comes from the municipal water supply, meaning that companies […] simply treat tap water—the same stuff that comes out of your faucet at home—and bottle it up."

Julia Lurie, www.citylab.com, August 12, 2014

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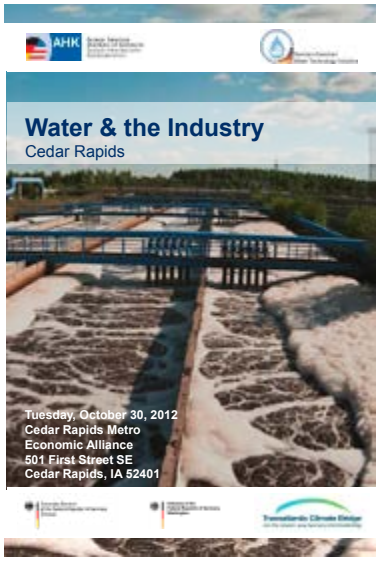

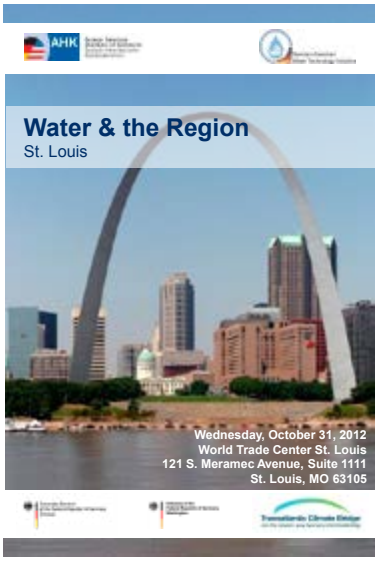

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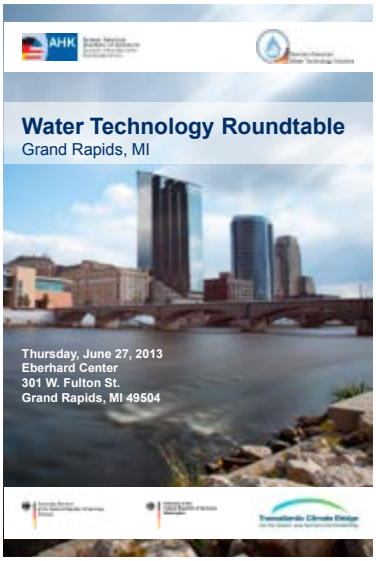

Imprint

Publisher & Editor

German American Chambers of Commerce
Deutsch-Amerikanische Handelskammern

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Notes

If you have any comments regarding articles in this magazine, please contact us.

The GAWT Initiative – Powering Progress In The German-American Water Industry Since 2012

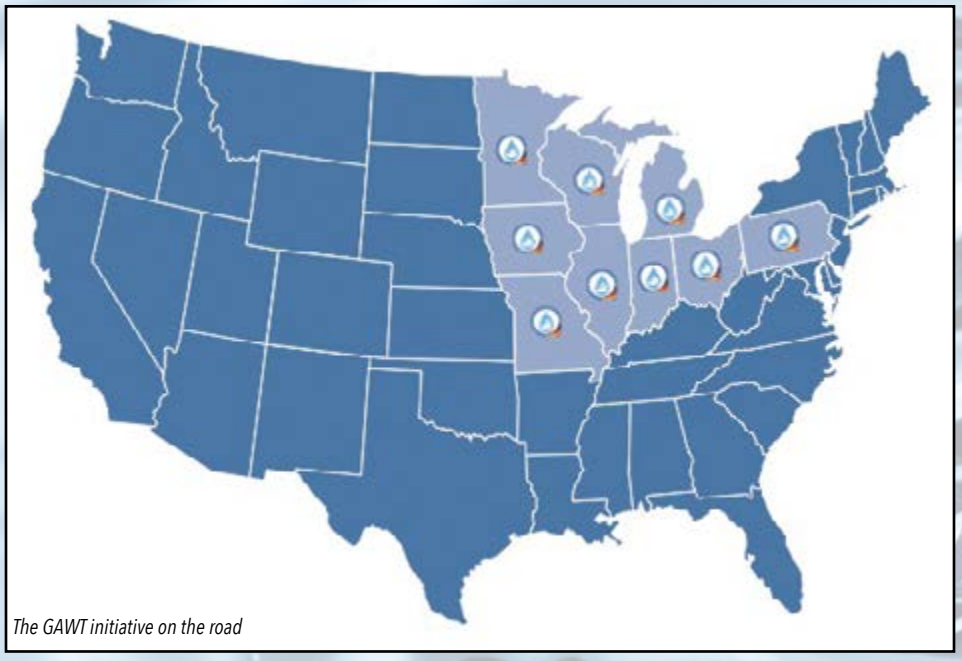
GACC Midwest

In 2012, a number of articles and reports from associations and organizations such as the American Society of Civil Engineers, the Center for Neighborhood Technologies, and the American Water Works Association were talking about water infrastructure issues, a lack of funding, the trend towards more sustainable solutions, and the need for investment in the U.S. water sector.

The increased potential for action and collaboration at the time inspired GACC Midwest to tackle the challenge as part of our dedicated mission to promote and support trade and investment between the U.S. and Germany. Since Germany and the U.S. are the most innovative countries globally when it comes to water technologies, and Germany is well-known for its best practice technologies in the sustainability field, it was a clear and exciting opportunity for us to extend our services to companies in the water sector.

Our sizeable and robust German American business network, combined with our vast breadth of technical and market insider knowledge, allowed us to create the German American Water Technology (GAWT) Initiative.

We started out with nothing more than a list of seven contacts from the U.S. water sector – and within just two years, we have already achieved major successes: our water contact list has grown to over 1,000 individuals in the U.S. and Germany; we have partnered with globally-recognized organizations in the water sector such as German Water Partnership, the Council of Great Lakes Governors, and the Water Council; we have been traveling throughout the U.S. hosting expert roundtables in 9 cities in 9 different states; we have taken U.S. delegations to Germany and brought German delegations to the U.S. to promote collaboration and knowledge sharing in the water sector. And we are thrilled to continue our mission also in the upcoming years because water is not only essential for life, it is also essential for a healthy economy.



The GAWT initiative on the road

GAWT Roundtable in Indianapolis, IN in March 2014

Networking at the GAWT Roundtable in Indianapolis, IN in March 2014

Networking at the GAWT Roundtable in Indianapolis, IN in March 2014

It may be obvious that water is crucial for water-intensive industries such as paper manufacturers, food processing industries, and agriculture. However, the fact that more than 90 percent of all water withdrawals in the U.S. are used for energy generation, water supply, and food production demonstrates that the entire economy is indirectly affected by changes in the water sector. The dependency of the economy on water and a well-functioning, efficient, and sustainable water infrastructure becomes obvious.

Deputy Consul General Mario Soos at the GAWT Roundtable in Indianapolis, IN in March 2014

Mayor Greg Ballard, Mayor of Indianapolis, at the GAWT Roundtable in Indianapolis, IN in March 2014

One of this year's highlights was the expert roundtable in Indianapolis, IN, which was held to discuss efficient water infrastructure as a driver for a healthy local economy. With a final count of about 60 participants, this roundtable broke the attendance record of all water roundtables held so far. Special guests at the roundtable included Indianapolis Mayor Greg Ballard and Deputy Consul General Mario Soos, who have both been continued supporters of more action towards increased sustainability.

Water clusters are increasingly becoming an important tool for knowledge sharing and collaboration between companies, academics, and policy makers involved in the water sector. There is no doubt that water is one of the most pressing topics of the 21st century, and many regions and communities aim to strengthen their local water sector businesses by supporting the implementation of such clusters.

One of the most advanced regions for the creation of a water cluster is Minnesota, where the support for, and engagement of, local businesses in the water sector is particularly strong. It was a great honor for GACC Midwest to have Senior Manager Dr. Petra Stieninger speak at Minnesota's first Water Technology Business Summit in March this year. Over 150 water experts came together in Eagan, MN to discuss the importance of this growing industry, identify opportunities for collaboration, learn how to build the water cluster, and provide solutions for current water problems on a global level.

The discussion on finding global solutions for local problems continued two months later in Chicago, when the GAWT Initiative hosted a German business delegation of eight companies active in the water sector in June. During the one week program, we discussed current water sector issues in the U.S. and Germany including leaking pipes, the need for more sustainable water technologies, and the present lack of funding. A tour through Chicago's Stickney Water Reclamation

Tour through the Stickney Water Reclamation Plant in Chicago with a German delegation

Plant – the largest of its kind worldwide – allowed us to gain insights into the way wastewater is treated here in Chicago. Throughout the week, our delegation participants also had the opportunity to meet with potential business partners in the region.

Tour through the Stickney Water Reclamation Plant in Chicago with a German delegation

Our Sustainable Water Technologies Business Conference in June highlighted how new technologies can help make the water sector more sustainable and discussed the latest developments and trends in the German and U.S. water markets. Throughout two panels of excellent expert speakers and several technology presentations from our delegation participants, we discovered innovative products and technologies from Germany and discussed their potential for application in the U.S. market.

In late July, we tapped the water market again in beautiful Pittsburgh, PA, which has become a shining beacon of reinvention in the rustbelt region. The region's lakes, rivers, and streams which once helped power America's Industrial Revolution continue to support diverse industrial and recreational uses. Today, Pittsburgh's regional water market is estimated to exceed $500 million, and employs more than 3,000 people. During the roundtable, our German and U.S. expert speakers discussed water sector challenges and together, we explored market opportunities through sustainable innovation with a highly-engaged audience.

While these events give you a brief glimpse into the busy year we've had with our initiative, there's still more to come! To keep up with the current for the remainder of the year, there is one more GAWT Roundtable coming. On October 28, 2014, we will be in Cincinnati hosting the last event of this year's roundtable series together with Confluence – the Water Technology Cluster of the Ohio River Valley Region.

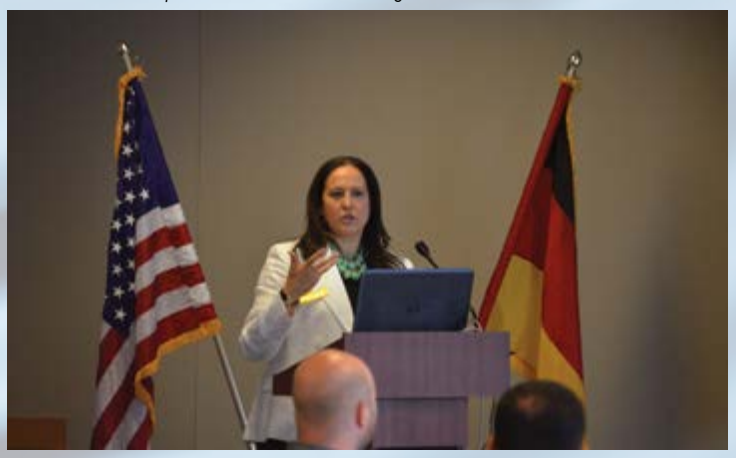





Sustainable Water Technologies Business Conference in Chicago in June 2014

Aaron Koch, Deputy Commissioner for Sustainability at the City of Chicago, presented Chicago's Green Stormwater Infrastructure Strategy at GACC's Sustainable Water Technologies Business Conference in Chicago in June 2014

We were honored to have Commissioner Mariyana T. Spyropoulos from the Metropolitan Water Reclamation District speak at our conference in Chicago in June 2014



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International Night Reception at Weftec 2013 in Chicago

And we are already busy planning our future programs to continue and expand upon the progress we've made so far through the GAWT Initiative. Together with our initiative partners in Germany and the U.S., we are currently developing ideas for new projects next year – including transatlantic delegation programs, expert roundtables, conferences, and much more.

International Night Reception at Weftec 2013 in Chicago

And of course, we are certainly looking forward to the 2015 WEFTEC – North America's largest water technology trade show – which will take place in Chicago next fall. Naturally, we will be hosting another international night reception while WEFTEC is in town and we invite you all to join us at this special occasion next year to network, mingle, and celebrate the continued and future successes of our GAWT Initiative.

German American Water Technology Initiative

If you are interested in hosting an event with us, or if you would like us to bring the GAWT Initiative to your city, please contact us!

For more information on our GAWT Initiative, visit our website at www.gaccmidwest.org/en/water

German Water Partnership With A Regional Section North America

Claudia Iberle, Advisor North America & Mexico, German Water Partnership

Serving as an umbrella brand for its roughly 350 members, German Water Partnership (GWP) strives to create a network not only within its membership, but also and especially with associations and clusters of the international water sector in order to support both solving the world's water problems and facilitating business.

In the pursuit of these objectives, GWP has continued to intensify its activities in North America during the last year. In November 2013, GWP established its Regional Section North America & Mexico. Within this section, GWP members who are interested in entering or becoming established in the American water market share their experience and coordinate their activities in order to promote German technologies and expertise.

The strong cooperation with the German American Chamber of Commerce of the Midwest, which gives special focus to water issues, is definitely a key to the expansion of the GWP network in this region. Based on this cooperation, a delegation of German water companies visited Chicago in June 2014 in order to meet decision makers, planning agencies, companies and operators in the local sector. With the objectives of sharing experience, learning about each country's water management, and initializing business contacts, the delegation's journey was very successful. In particular, the technical roundtable and the conference organized by GACC Midwest led to discussions highly relevant to future cooperation and business on both sides. The efforts of the German American Water Technology Initiative to organize thematic roundtables on current water issues produce many such discussions, and are highly appreciated by the participating German expert speakers.

The conference about sustainable water technologies during the German delegation's visit in Chicago was well attended and highly informative.

For the coming year, it is our plan to strengthen the network that we have started to create in the Great Lakes region. In this regard, we especially wish to welcome an American delegation here in Germany in order to foster our cooperation on both sides of the Atlantic Ocean.

But as a very next step, our regional section will be active at the WEFTEC, presenting its products on a German panel at the Global Center. You are warmly invited to join us there!

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Fueling Growth: Water And Business Growth

William Sarni, Director and Practice Leader Enterprise Water Strategy, Deloitte Consulting LLP

How do companies with ambitious global growth strategies secure the water they need to fuel business growth in a world where simply paying more for water will not work?

The answer resides in why and how companies align their water stewardship strategies to support their business growth strategies. This alignment is built upon two key actions. First, companies that synchronize water stewardship strategy with growth strategy can benefit from considering and quantifying water's full business value, moving beyond the price of water to take into account water's various impacts on operations, value chain, brand, and growth prospects. Second, companies that depend on water would also benefit from proactively leading collective action initiatives with stakeholders across their value chain within the watersheds in which they operate. Actions in these two areas go well beyond most companies' current thinking on water management, which focuses primarily on water efficiency and reuse and recycling within their operations.

Competition for water is growing more intense, as the steadily increasing world population and the industrialization of emerging markets puts the world's finite water supply under greater strain. This increased competition for water, coupled with droughts and the impacts of climate change, effectively drives increased water scarcity, as there is less water per person – and per organization – available to meet growing needs.

A key challenge for companies where water is an essential resource requirement is that their ability to directly "control" access to water as a resource is very limited. This is because water is fundamentally a shared resource to which ownership cannot easily be assigned. Public policy, regulations, and stakeholder influence (for example, the presence or absence of "social license to operate") all impact a company's ability to access water and, as a result, limit its ability to "control" access to water.

Current thinking and actions: Stuck in water management

Recent reports from two organizations provide insight as to how companies view and manage water-related risks and, in general, how far they need to go to achieve alignment between their water stewardship strategies and business growth strategies.

The CDP Water Program (www.cdp.net) provides a wide view of how companies across a range of industry sectors view water risks and opportunities. The most recent report, from 2013, is based upon the water disclosures of 184 Global 500 corporations. Based upon the results of the 2013 water disclosure survey, the report indicates that seventy percent of the responding companies have identified water as a "substantive business risk." However, according to CDP, despite the vast majority of companies reporting that water represents a substantive business risk, most companies are primarily focused on managing water within their own operations. They are not engaging with their entire value chain and other key stakeholders.

A recent report by VOX Global and the Pacific Institute also provides information on how companies view water risk, how they are managing these risks, and their current thinking about the potential impacts on business growth. Consistent with the 2013 CDP Global 500 report, the VOX Global/Pacific Institute report states that "water challenges are not just a future concern, but a current problem that already affects many businesses." According to this report, 79 percent of responding companies claim that they currently face water challenges, while 84 percent believe they will face water challenges in the next five years. Survey respondents also made the connection between these challenges and their bottom line: Nearly 60 percent of responding companies indicated that water is poised to negatively affect business growth and profitability within five years, while more than 80 percent say it will affect their decision on where to locate facilities over that time period.

However, there is an apparent disconnect between the widespread recognition of current and increasing water risk and the respondents' anticipated actions to address the issue. Many respondents do not plan to increase the breadth and scale of their water risk management practices. According to the report, "nearly 70 percent of responding companies said their current level of investment in water management

is sufficient." This attitude is inconsistent with the respondents' belief that water challenges "will significantly worsen in the next five years." The report points to "a failure to adequately evaluate the true cost of water" as one potential reason for this disconnect, and further states: "Though survey respondents noted the importance of integrating water into their business strategy, it may be premature to assume that all have done so."

The reports from CDP and VOX/Pacific Institute suggest that:

- The companies responding to their surveys acknowledge that water is a current and projected business risk that is projected to worsen.
- Most companies are primarily focused on water management—that is, on water efficiency and reuse/recycling within their direct operations as opposed to their value chain.
- Most believe they have a "sufficient" level of investment in "water management."
- Companies do not appear to have adequately evaluated the business value of water or potential business value at risk from water risks.
- There is apparently little to no connection between water risk, stewardship strategies, and business growth strategies.

Aligning water strategy with growth strategy: What is missing in the corporate agenda?

Drawing on the observations in the CDP and the VOX/Pacific Institute reports, there are two major actions required to align water strategy with business growth strategy: expanding collective action and quantifying the business value of water.

Expanding collective action

One way to overcome the "tragedy of the commons" is through collective action by informed stakeholders whose aim is to sustainably manage a common resource, even if, in some cases, they sacrifice short-term interests to obtain a long-term benefit. To take the broadest view, the "collective" needed to sustainably manage water encompasses everyone; after all, we all need it to live and to support the health of our ecosystems. More narrowly, the importance of stakeholder action and opinion is amplified in regions where water is scarce. Local populations in such areas are acutely sensitive to the uses—or misuses—to which the area's water supply is put. Moreover, the actions of others within the watersheds in which a company operates can have a direct impact on the business's access to water. Add to this the intense scrutiny that water is beginning to receive from investors, regulatory agencies, governments, nongovernmental organizations, and other parties—scrutiny that is now enabled and accelerated through social media networks—and the need for collective action becomes evident. Only by engaging with other stakeholders on water-related issues, and working with them to safeguard water's long-term availability, can a company that depends on water protect its long-term growth prospects.

Understanding water's value, not just its price

As long as water is essentially free, few business stakeholders will likely see a reason to invest in protecting this resource. When water costs money, on the other hand, businesses begin to pay more attention both to its price and to strategies for keeping it low.

Factoring water costs into growth projections, however, is only a first step. This is because, in many or even most instances, the actual business value of water exceeds its market cost. Whereas the cost of water includes only the direct and indirect costs of provisioning water, the value of water is derived from its uses and affected by factors such as quality and the reliability of supply. Water's full value to a company can be calculated as its full economic cost plus the financial impact of actual and potential fluctuations in water quantity and quality; regulatory risks; and reputational risks.

Companies could benefit from calculating, to the extent possible, the current and potential business value at risk from water risks. This calculation should quantify the impact of physical, regulatory, and reputational risks related to water across the value chain. The calculation of revenue at risk from current and potential business disruption provides a clearer view of the value of water than current or projected water costs. It is important to develop a quantitative understanding of the value of water within the context of what is required to sustain operations as well as future growth. The impact of water risks on business continuity across the value chain provides more insight on the value of water to a business operation than the current or projected cost of water. By understanding the value of water in this way, leaders can address long-term water-related risks and make informed decisions about the investments necessary to support future business growth.

A "license-to-grow" model

Considering water as a scarce resource necessary for growth brings into sharp focus the particular issues organizations must face when operational or economic logic is insufficient to support business growth. According to resource-based theory, firms can either retain their current business model or alter it to accommodate more or less reliance on scarce resources. Where water scarcity is concerned, we have observed that firms generally follow the trajectory described by the maturity model. They change their business models to go from addressing the issue at an "own company" level, to addressing it at

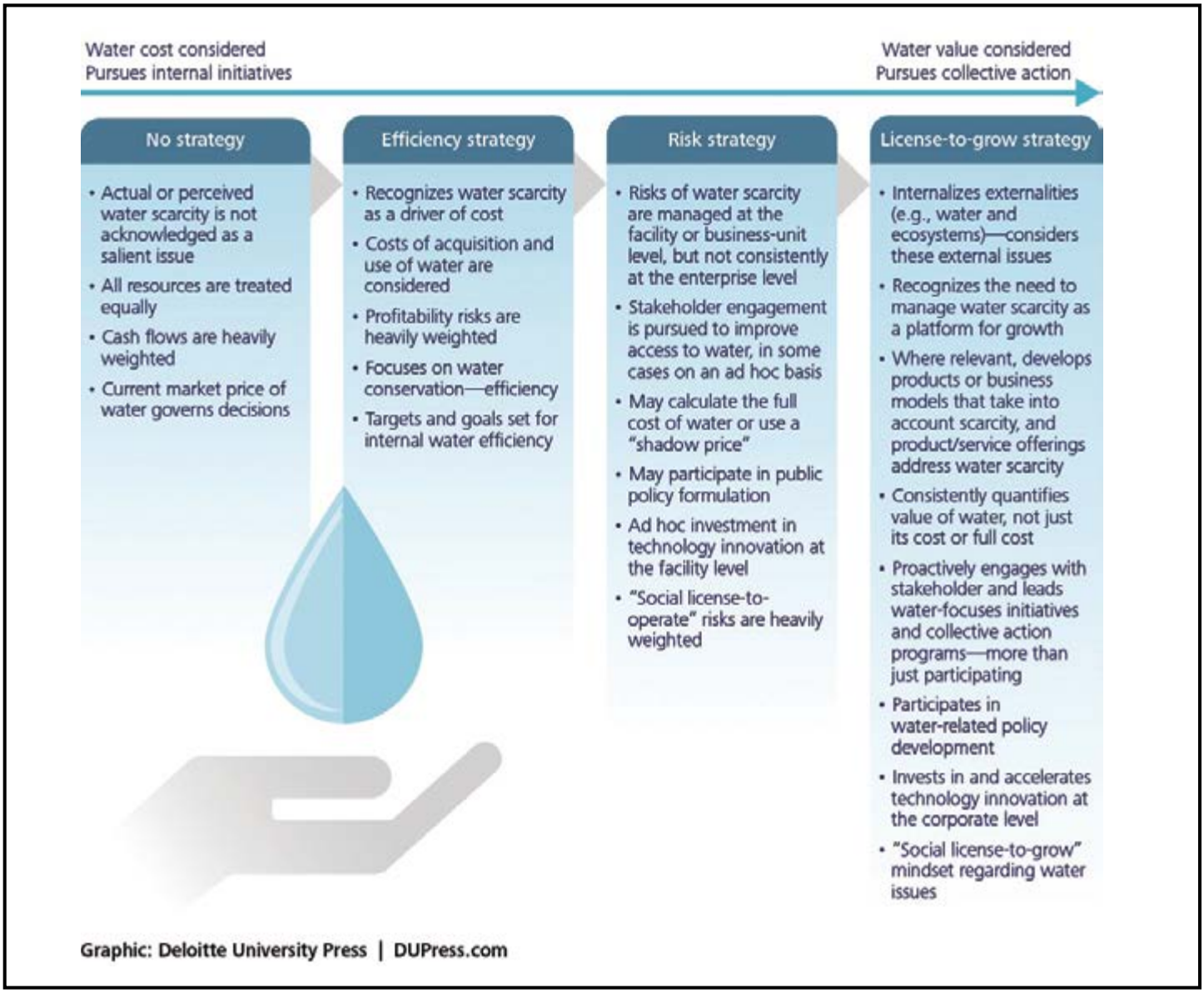
a stakeholder level with a focus on risk, to addressing it at a stakeholder level with a focus on growth. Illustration of the maturity model and attributes of a "license to grow" mindset is provided below.

Managing water scarcity and driving growth: What are the critical business decisions?

Companies whose operations and growth depend on water should also be aware of where they fall along the stages of maturity outlined in "Fueling Growth: You Can't Always Buy What You Need": the extent to which water scarcity may drive changes to the company's business model, and the extent to which the company engages beyond its core business operations to work with external stakeholders to manage critical water scarcity. Understanding where a company sits on the maturity model can help frame the steps needed to address water risk and to align its water strategy with its business growth strategy. For instance, a company that recognizes that it is operating at an efficiency strategy level, but whose future growth prospects depend heavily on access to water, can plan to move to a risk strategy level through relatively modest investments in stakeholder engagement, perhaps piloted in one or several business units. Or it could seek to leapfrog to the license-to-grow level through more dramatic changes, such as by leading collaborations at the corporate level with other water users in watersheds coupled with a quantification of the value of water to support its business growth strategy.

Most importantly, these companies should consider moving to a strategy that includes proactive collective action engagement with stakeholders to secure resources for all, making decisions based on the resource's value, rather than its market price. This license-to-grow strategy goes beyond a "social license to operate" risk mitigation mindset.

Water strategy maturity model



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For companies looking to leverage their water strategy to drive business growth, I recommend asking the following questions as they relate to the value chain:

- What or who do water prices depend upon?
- How likely are prices to fluctuate and why?
- What are the water scarcity risks common to all users?
- What water scarcity-related risks are particular to one's own company?
- How severe are these risks to the way the company does business today?
- How severe are these risks to prospects for future growth?
- What is the value of water to the company's business and growth strategy?
- Where will engagement with stakeholders increase the overall value of this resource to the firm (including increases in value driven by risk and cost reductions)?

You can't always buy what you need, but with an understanding of the business value of water and an enterprise-wide strategy to engage with stakeholders, you may be able to secure a long-term supply of the water you need to support business growth.

About Deloitte

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Source:

Condensed from "Fueling Growth: You Can't Always Buy What You Need" Deloitte Review, July 2014 Issue 15, Deloitte University Press

DE Services - Take Your Business Global - Now!

GACC Midwest has been supporting German and American companies in transatlantic business for over 50 years.

Profit from our extensive experience in both American and German business environments and our vast industry knowledge. Our intercultural, bilingual team specializes in effectively initiating German-American business relationships and establishing German companies in the U.S. We represent and support companies both in the short and long-term, focusing all of our efforts on ensuring a successful future for your company in the German-American business world.

To ensure professional support, GACC Midwest – under the service brand DEinternational – has developed a wide range of services to assist German and U.S. companies in their efforts to expand internationally.

Market Entry & Business Development Services

Our market entry and business development services support your market entry in the U.S. or Germany and set the foundation for your long-term success. With market analysis, targeted search for business partners, a virtual office, site selection services or trade show support, we facilitate your market entry activities.

Market Study

A market study provides you with essential information about market size, market developments, competitors, distribution and sales structures as well as product requirements specific to the US or German market. Before you decide to pursue a new market or location, an in-depth analysis of the target market is essential.

Business Partner Search

Is your company looking for new strategic partners to market your products or services? We offer efficient and practical solutions to help companies build up their business activities quickly and effectively through a targeted partner search.

Virtual Office

Our virtual office service provides an initial step towards establishing your U.S. presence and serves as an interface between your company in Germany and in the U.S.

Trade Show Support

Are you planning a trade show presence at a U.S. or German trade fair to attract new business partners and customers? We can support you in the preparation, execution, and follow-up activities involved in exhibiting at a trade show.

Site Selection

The complexity of a site selection process in the U.S. market requires a trusted partner on site. Thanks to our broad network of members, contacts, and clients we help you independently and objectively to find the ideal location for your company.

Collection Services

As one of the most important trade partners for German companies, regrettably, it is sometimes the case that a U.S. client pays its invoices belatedly or not at all. We support German companies and private persons claim outstanding debts from defaulting partners in the U.S.

If you want to learn more about our market entry and business development services, please contact Virginia Attaway Rounds at rounds@gaccmidwest.org or +1 (312) 494-2163

HR Services

With our HR services, we offer full-cycle recruitment support for open positions at your company. We also coach your U.S. and/or German employees to learn the most important intercultural differences in a work environment and prepare them for business meetings, presentations as well as for all communication with clients and colleagues.

Career Services

We offer full-cycle recruitment support for open positions at your company. We specialize in matching job seekers from a wide range of fields and experience levels to positions at our client companies. Our focus is on identifying qualified bilingual talent as well as professionals with transatlantic and/or start-up business experience.

Coaching for Intercultural Teams & Managers

After founding a subsidiary and recruiting appropriate employees, there remains the complex task of integrating German or U.S. employees into an international work environment. To help facilitate the integration of your employees into the international environment, we offer coaching services for intercultural teams and managers in a wide variety of situations.

If you need support in filling an open position at your company, please contact Justin Flaxbart at flaxbart@gaccmidwest.org or +1 (312) 644-3369.

Event & Delegation Services

As event service provider, we support the preparation, organization, and realization of your business events in various formats. In addition to that, we organize delegation visits to the US and business trips to Germany.

Event Services

Do you need professional support to organize your company event? From smaller workshops to conferences and summits up to galas and receptions, we are capable of covering many event formats and catering to different industry focuses.

Delegation Services

We have found that delegations provide a useful tool for discovering new markets and business areas. We not only set up delegation programs, but provide support for companies to find new contacts and business partners based on an analysis of their technology and developments in the target market.

If you need support in organizing your event or a delegation visit, please contact Nadine Schieban at schieban@gaccmidwest.org or +1 (312) 494-2180.

New Concepts For Combined Stormwater And Wastewater Management

Andreas Matzinger & Bodo Weigert, Berlin Center for Applied Water Research,
Paul Uwe Thamsen & Raja-Louisa Mitchell, TU Berlin, Department of Fluid System Dynamics

Urban water infrastructure is increasingly facing challenges resulting from climate change and demographic developments. Using Berlin as an example, the project KURAS, which is supported by the Federal German Ministry for Education and Research, aims at demonstrating how future wastewater disposal, water quality, urban climate, and quality of life in the city can be improved through intelligently-combined stormwater and wastewater management. The project consists of a network of partners from research and industry as well as Berlin decision makers (eight research institutions, four industrial partners, two public authorities, and one public utility responsible for drinking water supply and wastewater disposal).

Urban rainwater and wastewater management concepts have to guarantee a safe disposal of water, while also mitigating associated environmental issues, such as the pollution of ground and surface water. Since these current challenges may be exacerbated in the future due to climate change and demographic trends, it is evident that there is a need for sustainable precautionary actions.

The urban water infrastructure can be improved in several ways. On the one hand, stormwater management can combine many small-scale, decentralized, building- and/or plot-related measures, such as green roofs, infiltration troughs, and ponds with traditional stormwater storage tanks. Such solutions help to minimize combined sewer overflows and improve urban residential and open spaces. Moreover, they provide cooling and create new green and water areas. On the other hand, there is major development potential in the implementation of operational and constructional actions in the urban sewer system. Such measures include the activation of storage reservoirs, new sewer flushing concepts, and real-time controlling of the wastewater system. In addition, the operation of wastewater pumping stations can be further improved through intelligent control and optimized pump engineering.

So far, there has been a lack of detailed studies on the real efficacy of these measures. A complete implementation of the concepts mentioned above requires conceptual planning, the development of customized software, and new approaches to landscape planning. Furthermore, binding practices and procedures in urban development, the creation of incentive systems and the removal of impediments to implementation can aid in the implementation of operational and constructional measures.

Objectives

The overall objective of KURAS is to develop and demonstrate integrated concepts for a sustainable management of wastewater and stormwater in urban areas. This is to be achieved through the following sub-goals:

- For operators of municipal sewer systems, options are elaborated in order to adapt the wastewater infrastructure to expected consequences resulting from climate change and to guarantee the continued, long-term operation and upgrade of these systems.
- In parallel, concepts of (decentralized) stormwater management have to be developed and compared on their impact on the population, the environment, and their economic efficiency. The already implemented Berlin-based model projects are being evaluated and the results can be documented as recommendations for city planning strategies.
- With forecast models, the effects of measures – e.g. to avoid deposits in the sewer system after long dry weather phases or to reduce combined sewer overflows to receiving rivers during major storms – have to be examined in real Berlin model areas. Based on the results, operators and city authorities have to be supported in view of viable stormwater and sewer system management while maintaining safe wastewater disposal.
- Hence, suggestions for viable financing models and regulatory measures to promote decentralized stormwater management have to be developed.

Focal Area Wastewater Systems

Based on selection criteria including size, population, need for rehabilitation,

preexisting issues, and sewer system type (combined or separate), an urban zone in Berlin has been selected as the model area for the "wastewater systems" focal area. Furthermore, expected changes in demography, consumer behavior, and climate were defined for the model area. Changes to these criteria can result in an increased capacity underload or overload of the wastewater system, which in turn can lead to a series of undesirable effects, such as corrosion, odor nuisance, clogging of pumping stations or flooding events. To reduce these adverse effects in extreme situations, constructional and operational measures are being identified at all levels of the wastewater system. The impact of improvements will be analyzed through experimental investigations and simulation. Finally, the identified options will be optimized through a risk and SWOT analysis. Any concrete results from the model area in Berlin will be used as recommendations for the operators of the wastewater infrastructure. They will be integrated into GIS-based management tools which will directly support the extension, conversion, new construction, rehabilitation planning, and also the operation of wastewater systems.

Wastewater pumping Station, Berlin Fischerstraße © BWB/ Donath

Focal Area Stormwater Management

In the "stormwater management" focal area, all partners, including the environmental authorities and the wastewater disposal company, have been involved in selecting existing stormwater management measures available in Berlin for an in-depth investigation. To enable a comparative assessment of the different measures, the partners define quantitative indicators for their impacts on inhabitants and environmental goods as well as their respective costs. Based on these indicators, the measures will be evaluated by the respective experts through existing studies, new investigations, and model-based evaluations, resulting in a measures-indicator-matrix. Furthermore, methods of extrapolation for city quarters will be developed. Based on these methods, and together with Berlin decision makers and public interest groups, suitable combinations of measures will be developed for two concrete model areas in Berlin. Eventually, the results from the applications of the measures-indicator-matrix will be used as recommendations for urban stormwater management.

Stormwater management at Potsdamer Platz, Berlin © Atelier Dreiseitl

First Steps

During the first months of the project, measures, indicators, model approach and concrete areas in Berlin were defined for further analysis. For the wastewater systems focal area, the catchment area of a large wastewater pumping station stretching over approximately 31 km2 was chosen. For the stormwater management focal area, two urban areas with a size of approximately 1 km2 each were preselected; one is drained by a combined sewer system and the other by a separated sewer system. To examine the synergies between urban wastewater and stormwater management (the two focal areas), the stormwater model area with the combined sewer system is located within the larger wastewater management focal area (the pumping station catchment). Evaluation of the effects these measures have had on stormwater management is presently ongoing, along with the continued development of simulation tools and the preparation of stakeholder workshops. Moreover, current disturbances in the wastewater system are being analyzed and implementation concepts are being developed.

News on the project and detailed contact information for the partners involved are available on the project website www.kuras-projekt (currently in German only).

Green roof, headquarter Berlin water company © BWB/Donath

Acknowledgements

The KURAS project is mainly funded by the German Ministry of Education and Research (BMBF) in the framework of the FONA (Research for Sustainable Development) initiative. The projects are co-financed by contributions of the participating SMEs and large-scale enterprises. KWB receives co-financing from Veolia Water and Berliner Wasserbetriebe.

Not Only A Drop In The Ocean – Spurring Innovation In Water

GACC Midwest

Innovation is the main driver of growth, and GACC Midwest is always working to foster innovation – be it through our services, or leveraging synergies throughout our network.

Another powerful tool to support innovation within our network is our renowned MERLIN Award, honoring an Outstanding Innovator each year. The award recognizes excellence in German-American business in various categories, including service, innovation, and skilled workforce.

GACC Midwest honors innovation in sedimentation with MERLIN Award

In May 2014, the MERLIN Award for Outstanding Innovator was given to a company involved in the water industry – a sector that is facing tremendous challenges and opportunities. Technical challenges due to an increasing environmental awareness, stricter laws and regulations, and the lack of public funding make innovation and more sustainable and resource-efficient solutions in the water sector imperative. As a previous partner within GACC Midwest's German American Water Technology Initiative, DB Sediments GmbH received the 2014 MERLIN Award for Outstanding Innovator for their excellence in vision, creative prowess, and innovation. DB Sediments is an environmental technology firm focused on water and innovation, especially with regard to the crucial role of water in the water-energy-nexus.

Innovative ConSed Trans-Method

With their ConSed Trans-Method, DB Sediment enables sustainable hydro power and water use development, keeping the ecosystem in balance at the same time. With this method, reservoirs are kept free of sediments, which improves performance and maximizes storage capacity. This innovative approach that could prove profitable for every single hydro installation has attracted global attention, such as from the World Bank, given its potential for global development in the critically important water sector. With their patented, ecologically-sound solution for sediment management in rivers and reservoirs, DB Sediments is a truly deserving winner of the 2014 MERLIN Award for Outstanding Innovator.

Going forward, GACC Midwest will keep fostering innovation, among our network and beyond – to remain a strong catalyst for a strong German-American business community.

Introducing The German Water Sector

Claudia Iberle, Advisor North America & Mexico, German Water Partnership

Germany has a long-standing tradition in water management. In over 150 years of water supply and wastewater disposal, its small-scale and, hence, highly specialized water sector has produced a large number of experts in management, science, technology, and politics for our most precious resource. Almost one hundred percent of the German population is connected to a network of over 500,000 kilometers of water and wastewater infrastructure each.

Water supply is provided 24/7 without unannounced interruptions. Compared to the rest of Europe, the efficiency of German water services reaches over 93 percent. The government annually invests 4.5 billion euros in the wastewater sector, and two billion euros in the drinking water sector. Legal requirements ensure a high quality of the drinking water, regulated by frequent analyses and inspections.

Germany's awareness of the value of water is reflected in the relatively low average daily consumption. Since 1990, technical innovations to reduce water losses, adjustments in the tariff system, and awareness-raising campaigns have led to a decreased daily water use from 150 liters to 120 liters per person today.

North and south: a rich diversity of conditions

With a size of around 357 square kilometers and a population of almost 81 million people, Germany has a population density of 226 inhabitants per square kilometer. However, over half of the area is used for agriculture (52.5 percent), and another 30.1 percent is covered with woodland. Settlement areas and traffic account for only 13.2 percent of the land, while surface water accounts for 2.4 percent.

The country is located in a moderately-humid zone, with a coastal, mild climate in the north, a continental and dryer climate especially in the east, and a climate which is influenced by the Alps in the south. From the northern plains to the hilly middle part and the alpine mountainous south, Germany has a diverse geography with highly-variable supply and demand when it comes to its water resources and their management.

The country's yearly precipitation average is 790 millimeters, and its annual available water is 188 million cubic meters per person. Less than 20 percent is actually used for water supply. This water is mainly consumed by the industry (87 percent, 66 percent of it for energy supply). Domestic water consumption is only twelve percent, with an average daily water use of 120 liters per person. Agricultural needs for water are as low as one percent. Except for some areas in Germany relying on bank filtration and reservoirs, groundwater is the most important source for drinking water supply (over seventy percent).

A long history of protecting water and securing supply

Groundwater protection zones, covering almost 14 percent of Germany's land area, ensure both the secure supply and the high quality of German drinking water.

The fundamental directives are set by the European Union, and they must be transposed into the laws and regulations set by the German federal and state governments. The Federal Water Act was amended in 2010 and has to be implemented by the Länder (states), who are able to supplement the legislation where needed. Usually, local municipalities are in charge of water supply and wastewater disposal. The operators are either the municipalities themselves or public corporations, acting as democratically-legitimized bodies. Public authorities are in place to control fees, water quality, environmental requirements, as well as water extraction and discharge rights. A very important feature in the tariff setting is that cost recovery of water services is a legal obligation.

Groundwater protection zones are a vital component of safe drinking water supply. (photo credits: Manfred Schimmel/ pixelio.de)

The local authorities have the power to adopt bylaws in order to regulate the connection, discharges, and the levying of cost-covering fees. The German water sector is technically self-administered, with norms and standards being set by two large associations for water and wastewater works: the DVGW (German Technical and Scientific Association for Gas and Water) and the DWA (German Association for Water, Wastewater and Waste).

The activities of these technical and scientific associations date back to the 19th century and underline the long history in German water management. Their standardization processes are transparent and comprehensive; hence, their norms and standards are acknowledged by all branches of the German water sector. The extraordinary position of those associations originates from the small-scale and locally-embedded organization of the sector: more than 6,500 water works and over 7,000 wastewater disposal enterprises are providing the public water services.

The corporate structure reflects the settlement structure

While the drinking water sector is dominated by private and mixed public-private companies, the wastewater operators are mainly run by public entities. In relation to the water output, 64 percent of drinking water in Germany is supplied by private organizations.

The corporate structure, however, reflects the German settlement structure: while mostly small utilities provide water to a relatively small number of inhabitants in the rural areas, over half of the water output is supplied by less than two percent of the utilities. The wastewater services show the same distribution with three percent of the facilities providing sewage services to more than half of the German population.

Sewage treatment plants and water works are largely run by municipalities. (photo credits: Dieter Schütz/pixelio.de)

Today's challenges: micro-pollutants and nutrients

Related to the organizational structure of the water sector, a current and future challenge is the ongoing urbanization, which confronts cities with the growing demand for water supply and sewage services in densely-populated areas. This migration results in major challenges for the rural water supply and sewage infrastructure. Moreover, a generally negative population growth rate in Germany adds to these challenges.

With regards to water quality, micro-pollutants and nutrients are the main issues that need to be addressed in Germany. In particular, pollution in the water from pharmaceutical residues are increasingly becoming the focus of the German and European water sectors – be it in scientific research, policy or management.

Last, but not least, the effects of climate change naturally influence the German water cycle and, ultimately, its management. The increase in the number of extreme weather events – which are likewise becoming stronger and longer-lasting – is a particularly major issue which will require an adapted and flexible reaction in measures and management.

In Germany, about 20 percent of the drinking water comes from reservoirs. (photo credits: Rosel Eckstein/pixelio.de)

Transformation Into A Surplus Energy Process – Wastewater Treatment In Hamburg

Lueder Garleff & Christian Guenner, HAMBURG WASSER

Since 2011, the wastewater treatment plant of HAMBURG WASSER has shown a balance of energy consumption and renewable energy production. An energy surplus has already been achieved, which is expected to increase over the next years. The combination of standard solutions and unconventional ideas has resulted in a win-win solution for both ecological and economic challenges.

HAMBURG WASSER operates Germany's largest wastewater treatment plant. The WWTP "Köhlbrandhöft / Dradenau" processes the wastewater of almost two million people, the city's industries, as well as Europe's second biggest seaport. With an electricity demand of 80 MWh p.a., this plant remains one of the biggest public energy consumers in the city.

Before 1995, the energy world was comparatively simple. Energy demand was covered by electricity and natural gas from local suppliers, a monopoly of grid operators had been established, and price negotiations for energy in Germany remained within a very small range. Climate change and renewable energy were still new topics to the public.

With the liberalization of the electricity market in 1998, energy management was finally given a chance to combine both technical and economic aspects and gain considerable benefits. This prospect motivated HAMBURG WASSER to install an energy management system aimed at reducing energy costs within a legal, economic, and technical framework. Since 2004, these aspects have become more and more important due to the extreme increase in energy prices.

In the wake of challenges to counter the consequences of climate change, HAMBURG WASSER redoubled its efforts and set the official goal of creating an energy-self-sufficient WWTP by 2011. In doing so, this publicly-owned company added immense support to the political targets established by the Free and Hanseatic City of Hamburg, acting as the European Green Capital of 2011.

The first approach: Sewage sludge to energy

The first and most important technical change came about due to changing conditions for the disposal of sewage sludge in the early 1990s. Hamburg, a city with high population density, had always dumped its sewage sludge into landfills. Agricultural use was not an option due to the high volumes of sludge that would have required very long and expensive transport. Digester gas from the wastewater treatment process was used for heating the digesters, but not for effective electricity production. When this kind of sludge disposal was eventually prohibited, the City of Hamburg decided to invest in a high-tech solution to dry and incinerate the sewage sludge in a combined process which used digester gas for electricity generation. The incineration plant named VERA was put into operation in 1998 as a showcase project at the World Exhibition 2000 in Hannover, Germany. Today, it continues to serve as the backbone of the

VERA is a high tech solution for the combination of sewage sludge incineration and digester gas usage

treatment plant's energy supply.

Since then, sewage sludge is no longer simply a disposal problem, but also a source of renewable energy. After mechanical dewatering and thermal drying, the sludge is incinerated in fluidized bed incinerators, with the heat producing steam which drives turbines for electricity production. So far, the process is comparable to common power plant technology. The highlight, however, is the very close interconnection of both heat and digester gas systems.

VERA covers the high heat demand of the thermal sludge drying plant. The residual waste heat is subsequently used to supply the digesters, all buildings of the WWTP, and – since 2009 – even the neighboring container terminal of the Hamburg seaport. With this, the heat demand was covered by 109% in 2013.

HAMBURG WASSER provides the know-how and experience to implement and operate similar projects worldwide.

The backbone: High efficiency digester gas usage

Using digester gas for electricity

generation has become a standard solution for wastewater treatment plants. In Hamburg, this practice is also integrated in VERA. Digester gas is combusted in a gas turbine of 5 MW and a gas engine of 2 MW rated power. The waste heat is then used again for steam production, feeding the same steam turbine as the sludge incineration. This combination leads to a very high electrical efficiency of 42%.

The essential task: Reducing energy consumption

Energy self-sufficiency could not have been gained solely by extending the energy production. Reducing the energy consumption is just as important – and certainly more valuable from an ecological point of view. HAMBURG WASSER has implemented a number of projects as a result of a systematic data acquisition and analysis of the energy demand from every single sub-process. A modern aeration system reduced the plants electricity demand by almost 18%, several additional projects result in an overall saving of more than 20%.

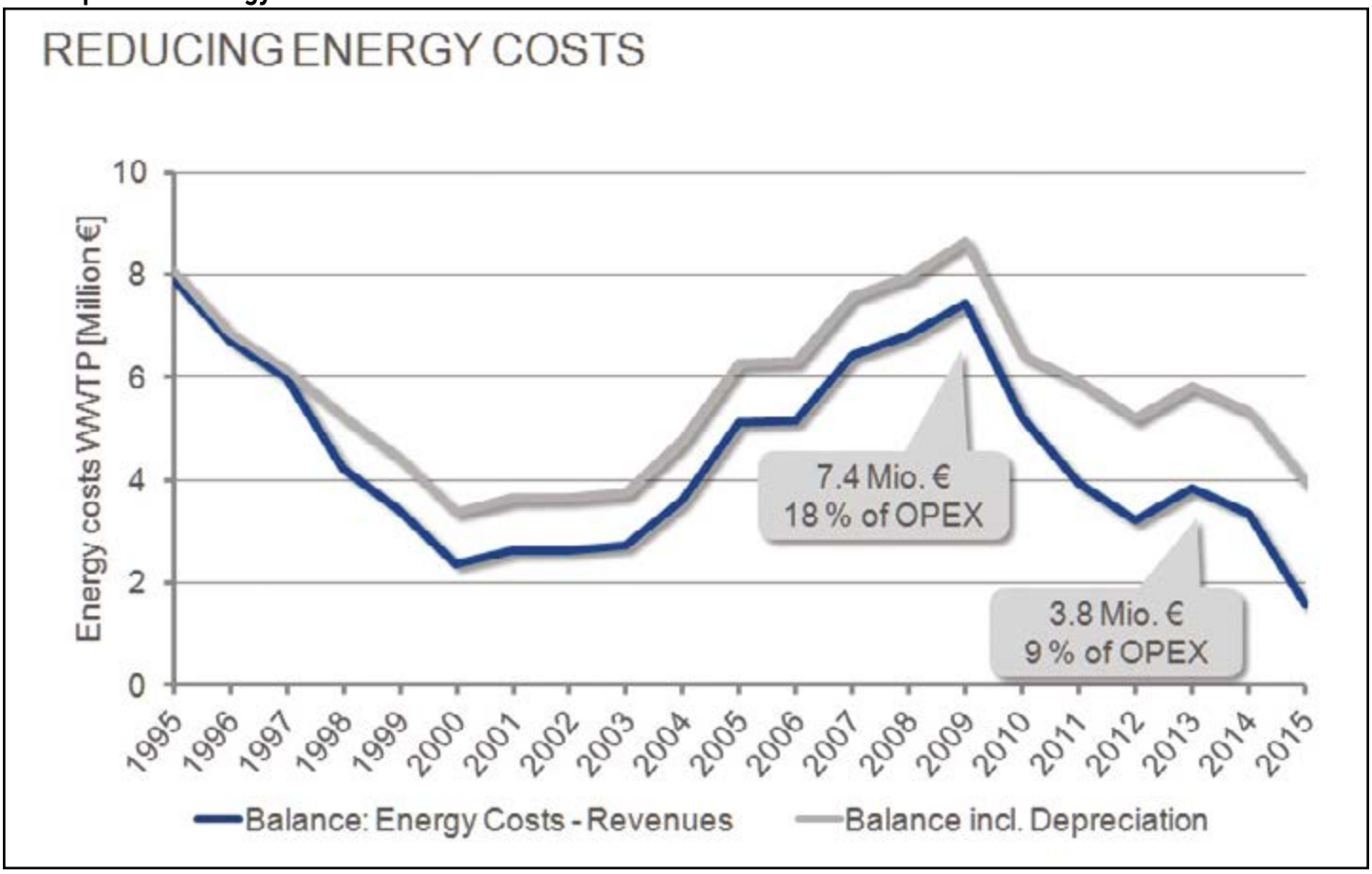
Filling the gap: Wind energy for industrial self-provision

Hamburg's geographic position, located not too far from the North Sea, provides considerable potential for wind energy, a technology that has become very common in Germany through the past several decades. However, the idea of using wind energy for the self-provision of an industrial plant was not that common and required new legal and contractual models for energy procurement and sale. Nevertheless, HAMBURG WASSER installed three wind turbines with an overall rated power of 8 MW. Even though wind power is obviously no reliable source, annual data on the balance of energy consumption and production today has revealed a remarkable energy surplus.

The surplus: Feeding digester gas into the natural gas grid

The amount of digester gas production was significantly increased by co-fermentation of various types of biological waste from industry and food scraps. Since it became apparent that the gas production would soon exceed its usage capacities, HAMBURG WASSER had to determine the right technology to extend these capacities. The simple way – increasing electricity generation – was clearly not the best, since there would be no use for the extra heat and the plant was already almost electricity self-sufficient. The solution was not to use natural gas grid. Due to the different contents and qualities of digester and natural gas, a plant for upgrading the digester gas was installed – one of the first plants of its kind to run on digester gas.

Development of energy costs for wastewater treatment



The flat WWTP Dradenau is today marked by two wind turbines of almost 200m in height.

The balance: Win-win in ecological and economic terms

Since 1995, the electricity consumption has been reduced from more than 100 GWh p.a. to less than 79 GWh p.a. At the same time, the renewable electricity generation increased to more than 80 GWh p.a. Both trends are expected to continue in the future as additional projects are under construction. At the final stage, the electricity production will exceed consumption by 15%. Heat supply has already had a continuous surplus of almost 10% every year.

Every single project of course has to pass a thorough payback analysis. If technical approaches are failing in this aspect, they are reassessed when changing frame conditions give reason to expect a positive result.

Thus the savings of energy costs far exceed the operation and capital expenditures of the implemented projects. The overall balance of energy procurement expenditures, revenues from energy sales, and operation and capital costs of energy production will decrease from 8.7 million Euros in 2009 to about 4.0 million Euros in 2015 – and that is almost entirely without any public subsidies.

Another economic aspect is almost as important: Energy costs have become predictable for HAMBURG WASSER and are now almost fully independent from volatile energy prices. Since 2007, the price of electricity has increased by 65% – almost 10% p.a! At the same time, energy costs of the WWTP – now dominated by capital costs – have decreased by 30%, returning to the level they were three years ago.

The ecological and economic successes of the energy concepts developed by HAMBURG WASSER for the wastewater treatment plant “Köhlbrandhöft / Dradenau” have already prompted other German cities to pursue similar strategies, and our efforts continue to attract worldwide attention.

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Enterprise Water!

Proposed partners: Argonne National Laboratory – University of Chicago – Northwestern University – University of Illinois – Michigan – MWRD – World Business Chicago – City of Chicago

Seth Snyder, ANL

A regional center to address critical issues in water stewardship

Enterprise Water focuses on freshwater systems, especially in population-dense, water-rich environments having a diverse economic basis. Enterprise Water is developing advanced data, modeling and analysis tools and near-commercial ready technology. The use of existing resources and the development of more efficient technologies for recovery and reuse of resources is one critical strategy.

Enterprise Water employs a systems approach that incorporates decision tools with technology development. A social decision framework will be developed which considers water as a shared regional resource. The decision framework will consider allocations to support quality of life, ecosystem services, and economic development. Enterprise Water will build and refine data, modeling and analysis tools to understand the balance between water supply, demand, and quality. The tools will consider regional climate change impacts, economic development, population dynamics, and state of technology. Modeling will be a primary source for evaluating risk in water systems and determining gaps between emerging demand and water supply. The decision tools will identify infrastructure and technology gaps. The experimental program will address critical gaps in technology performance of sensors and detectors, water treatment, nutrient recovery and best environmental practices, among others. It is expected that a tool will be developed for implementing gray and green infrastructure to maximize overall performance. Another expected outcome will be the reuse of water, energy, and nutrients to create value and enable reused water to economically compete with fresh, clean water.

The opportunity

Significant opportunities are emerging in the public and private sector. The U.S. Department of Energy identified the water-energy nexus as one of four emerging activities that require substantial R&D investment in the next year. There is a strong expectation that DOE will support several regional water centers to address critical issues in the water-energy nexus. Enterprise Water will compete to lead a regional DOE-funded water center focused on recovered and reclaimed water. DOE's Energy Water Nexus report has identified reclaimed water as a core opportunity for managing water.

The Senate Energy and Natural Resources committee identified sustainable water-energy as critical for the nation's sustainability and security. Senate Bill 1971 will create momentum for investing in water models and technologies.

State, regional, and local governments, as well as other federal agencies, have experienced significant stresses in water systems and have begun to focus on sustainable and resilient systems. There is a strong expectation that cross-cutting investments in water systems are poised for substantial growth.

Water is a critical factor in quality of life and transmission of communicable diseases. In the face of rapid urbanization and climate change, the risk of severe disruptions is growing rapidly. In response to these challenges, social foundations and international health organizations are taking a growing interest in modernizing water infrastructure in the developing world. There is an enormous opportunity to implement developed-world technologies in the developing world.

With increased stress on the water systems and increased discharges, environmental groups are increasingly cognizant of the role of water in a healthy environment. Environmental NGOs and associated foundations are a natural partner in developing water technologies.

Limited access to water is a potential society stress that could lead to conflict. Defense and security represents a critical opportunity to invest in long-term solutions to water systems.

Enterprise Water is a regional water center poised to address critical issues in water management. The center was founded by Argonne National Laboratory, The University of Chicago and Northwestern University, and includes the Metropolitan Water Reclamation District of Greater

Chicago, the City of Chicago and World Business Chicago, University of Illinois, and Michigan Department of Environmental Quality. The center also includes other major Great Lakes and Midwestern research universities and institutes. The Enterprise Water mission is directed by a corporate advisory board, which includes major industrial players in the supply chain as well as investors. A stakeholder board that includes representatives from the environment and human development communities guides Enterprise Water.

Partnerships

Enterprise Water is actively seeking partnerships with researchers, investors, sponsors, policy makers, customers, technology developers, and stakeholders across the water supply chain. Membership in Enterprise Water will enable members to access leading research, models, and technologies to advance water management and stewardship.

About Argonne National Laboratory

Argonne National Laboratory is a multidisciplinary science and engineering research center, where "dream teams" of world-class researchers work alongside experts from industry, academia, and other government laboratories to address vital national challenges in clean energy, environment, technology and national security. Argonne is managed by UChicago Argonne, LLC, for the U.S. Department of Energy's Office of Science.

The Transatlantic Climate Bridge – Tackling The Common Challenges Of Climate Change And Energy Security Together

Embassy of the Federal Republic of Germany

"By 2025, 1.8 billion people will live in regions that face 'absolute water scarcity'," reports the United Nations (Greenbiz.com, August 4, 2014). These numbers show that sustainable water and resource management is becoming ever more important. Not only is water essential for life, but its scarcity also threatens the allocation of almost anything we produce, sell, and consume.

In the U.S., 94 percent of all water withdrawals are used for energy production, water supply, and food production, with the energy sector being the largest consumer of water among all industry sectors. In addition, climate change increasingly results in more extreme weather situations such as floods and droughts, which challenges the secure supply of vital resources such as water and energy.

Cities, regions, and entire nations are developing climate action plans in an effort to increase their resiliency, conserve these scarce resources, and implement innovative solutions that can help reduce greenhouse gas emissions and thus also the impact of climate change.

Energy conservation and sustainable water management are the top priorities for most climate action activities and the respective goals set by policy makers. Water is needed for energy generation (cooling of power plants, hydro-power, etc.), and energy is needed for water treatment and distribution.

Developing nations and industrialized economies alike are pressured to find solutions to tackle these interdependencies and current trends. Collaboration and knowledge-sharing among nations are crucial to controlling climate change and reducing greenhouse gas emissions.

Germany and the U.S. are global leaders in the water sector, holding more than 40 percent of water technology patents worldwide. The German American Water Technology Initiative has brought together water technology experts from both sides of the Atlantic in order to discuss solutions and innovations they have to offer in this field.

The GAWT Initiative is part of The Transatlantic Climate Bridge, an initiative of the Government of the Federal Republic of Germany aimed at fostering greater cooperation and communication between Germany and the United States in the area of energy and climate policy.

German-American cooperation can be a powerful engine for progressive climate and energy policies, and we are committed to continuing the transatlantic dialogue on climate change and challenges in the water and energy sector. The Transatlantic Climate Bridge is the ideal platform to help Americans and Germans exchange know-how and pave the way for joint solutions for a sustainable and secure future.

For more information about the Transatlantic Climate Bridge and future events, please see www.germany.info/climatebridge

Transatlantic Climate Bridge
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All Problems Started Out As Solutions

Peter Mulvaney, Skidmore, Owings & Merrill LLP

Global big picture

Throughout time, species evolved within natural boundaries, constrained by their ability to move across mountains, oceans, or climate zones. But with the onset of human economy, we began to connect far reaching places in shorter and shorter amounts of time. With our global movement of goods came the unexpected consequence of species hitchhiking their way across natural barriers, enhancing the natural mobility of species. Further, if a non-native species finds itself without natural predators, or is adaptable to many ecological niches, it may become an "invasive species" that displaces native plants and animals resulting in the erosion of our ecologic integrity.

It is estimated that over 50,000 non-native species have been introduced to the United States (Pimentel 2002), some intentionally for anticipated benefits, such as brown trout for recreational sport fishing, or Asian carp as pond weed control. Other introductions were accidental, such as the round goby that entered the Great Lakes from the ballast water of international ships. Of the 50,000 introductions, roughly 10% have become self-sustaining populations and 10% of those have become invasive (Groves 1991).

The economic implications of invasive species are quantifiable, and are neither small nor hypothetical. The Federal costs associated with controlling invasive species exceeds $200 million per year, while the annual cost of damages resulting from invasive species entering the Great Lakes is estimated to be as high as $800 million.

Chicago River

So, how does the Chicago River and Asian carp fit into this story? For starters, Chicago is where the two largest fresh water basins in North America – the Mississippi River Basin and the Great Lakes Basin – were physically connected by the completion of the Ship and Sanitary Canal in 1900. As Joel Greenburg has noted in his Natural History of the Chicago Region, "The force of the glacier ordained that the Chicago region would straddle the eastern Continental Divide, separating the drainage area of the Atlantic Ocean from that of the Gulf of Mexico."

1860s and 70s Chicago was growing at unprecedented rates, with great population growth and economic gains. Like most cities, people dumped human and animal waste and all manner of garbage directly into the river, which flowed into Lake Michigan. While industry and the city grew, public health deteriorated. Water-borne illnesses like cholera, typhoid fever and dysentery caused many deaths.

At the same time, Chicago was building its water infrastructure. Sewers were built to collect sanitary waste from homes and businesses, and flush it to the river via a stormwater system fed by rain. Concurrently, the public water supply was being developed with near shore intakes and a pumping system to deliver water. When these systems were being built, they were solving problems, literally lifting Chicago out of the mud and providing potable water.

However, it has been said that all problems started out as solutions, and Chicago's water systems may be such an example. As we increasingly drained city waste into the Chicago River System, which flowed to Lake Michigan – the city's source of potable water — we exacerbated the public health risks for the whole city. In 1889 concerns mounted, and the Chicago Sanitary District (now known as the Metropolitan Water Reclamation District) was established to protect the drinking water supply for city residents.

The problem of Chicago's contaminated drinking water led to the construction of two major channels to direct the flow of the Chicago River into the Des Plaines River and divert waste away from Lake Michigan. The Sanitary District dug the 28-mile Sanitary and Ship Canal between 1889 and 1900. The canal connected the drainage area of the Chicago River system that drained to Lake Michigan, instead draining it into the Des Planes River, a part of the Mississippi River drainage basin.

Then in 1910, the completion of the 8-mile North Shore Channel connected Lake Michigan at Wilmette Harbor with the North Branch of the Chicago River and allowed us to use lake water to flush sewage from the northern suburbs downstream. Put another way, the solution to pollution was dilution.

In 1922, the 16-mile Cal-Sag Channel was constructed between Blue Island and Sag Bridge to link the Little Calumet River to the Sanitary and Ship Canal.

These massive engineering projects were essentially open sewage pipes built to convey human and animal waste and all manner of garbage downstream. They were manmade channels dug where no

waterways had existed previously and broke the natural barrier between the Great Lakes and the Mississippi River Basins.

Through human activity – our energy, capital, and invention – we reversed the Chicago River waterways. By the 1920s more modern processes of sewage treatment had been developed and the Sanitary District began to build sewage treatment plants in Cook County. As a result, Chicago no longer dumps raw sewage into the rivers. Now its wastewater is sent to seven wastewater treatment plants that have the capacity to treat a billion and a half gallons of residential and industrial wastewater a day and serve the equivalent of 10 million people. Today, 70 percent of the flow in Chicago's waterways is from the Lake, having passed through the potable water treatment plants, then used in our homes and industries, and finally discharged to the rivers after being treated in our sewer and reclamation plants.

Today, we are increasingly aware that nature has provided natural systems within which we must live. Environmentalist Roland Clement has said:

"Our whole society was built on the notion that we could and must control nature, that we must master our circumstances, technologically. But natural systems are the consequence of a long evolution, and ecology is teaching us that we must first understand these systems to see how far we may modify them for our benefit without disastrous consequences. This is a new point of view that arose with ecological science, that world systems have a functional reality of their own and that if we push them too far, the systems will either break down or backfire."

By reversing the Chicago River we created two new problems. First, we established a conduit between Lake Michigan and the Mississippi River that did not exist in nature. As a result, we now spend millions of dollars to try to prevent invasive species, especially the Asian carp, from traveling up the Mississippi and Illinois Rivers and entering the Great Lakes, where they would likely decimate the sport fishery industry.

Second, we have also interrupted the natural hydrologic cycle, changing the shape of the Lake Michigan watershed and creating what is known as the "Chicago diversion." Today we take close to a billion gallons of water a day from Lake Michigan for residential and industrial use and we return almost none of it. And all the rain that falls on the landscape east of the continental divide still flows into the Chicago River and its tributaries. But now that flow no longer replenishes the lake, ending up rather in the Gulf of Mexico.

Specific actions being taken

Roughly a third of the 180 aquatic invasive species introduced to the Great Lakes arrived through ballast water from international shipping. According to the U.S. Army Corp of Engineers, 39 species from other continents are at high risk for becoming established in the Great Lakes. The Sanitary and Ship Canal makes the entire Mississippi River basin – from the Appalachian to the Rocky Mountains – vulnerable to the invasive species spreading through the Great Lakes.

However, in response to the threat of the non-native invasive Asian carp, the Great Lakes Commission recently proposed new port infrastructure standards that meet both challenges.

The impact of aquatic invasive species on industries, businesses, and communities is estimated at over $5 billion by the New York Sea Grant. Species such as the zebra and quagga mussel and round goby have not only altered the Great Lakes, but also the Mississippi River basin, costing the USA hundreds of millions of dollars each year. By way of example, the budget of the Great Lakes Fishery commission includes almost $20 million to manage a single invasive species – the sea lamprey. The budget provides for control, not eradication, and does not reflect the economic losses to commercial, tribal or recreational fisheries, nor the millions of dollars spent each year to restore the ecology of the Great Lakes. Likewise, the Zebra Mussel has caused extensive problems in both the Great Lakes and the Mississippi Basin, blocking pipes that deliver drinking and process water to cities and factories and cooling water to power plants.

In the United States, congressional researchers estimate that mussels cost the power industry $3.1 billion between 1993 and1999. In 2010, the U.S. Federal government committed $78.5 million dollars to control another invasive species – the Asian carp. Asian carp have migrated up the Illinois River towards the Great Lakes via the Chicago River System. The most recent study of damages to the Great Lakes from invasive species estimates between $138 to over $800 million annually.

Fortunately, solutions exist. The Great Lakes and St. Lawrence Cities Initiative and the Great Lakes Commission have studied the idea of physical dams in the river systems that would prevent the movement of invasive species, while simultaneously reducing the risk of flooding. This report indicates that not only can it be done technically, but stopping invasive species from entering our inland waterways is good for economy, ecology, and society.

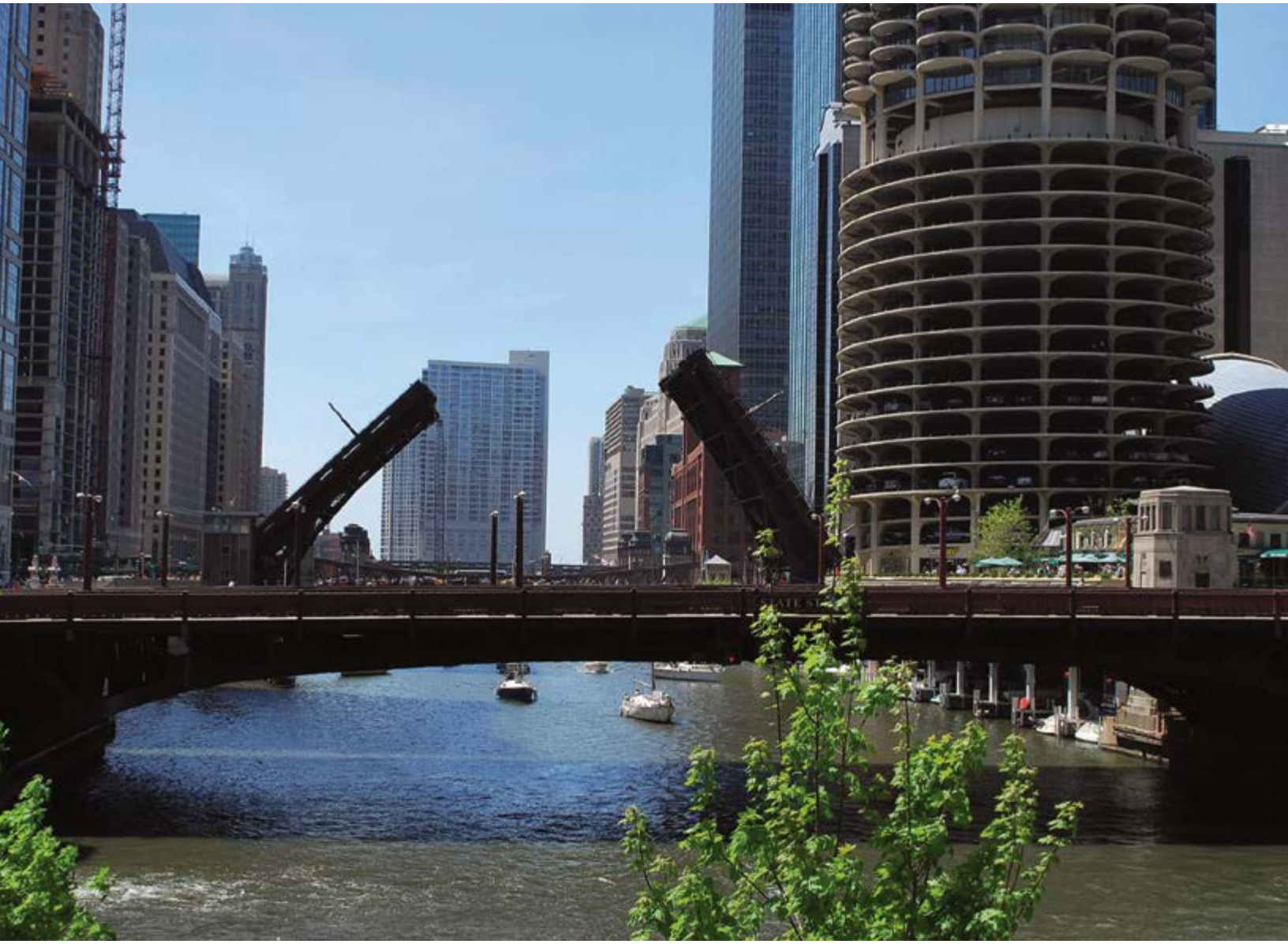
Furthermore, the U.S. Army Corps of Engineers (USACE) is currently engaged in the Great Lakes and Mississippi River Interbasin Study (GLMRIS), a feasibility study of the range of options and technologies available to prevent the spread of aquatic nuisance species between the Great Lakes and Mississippi River basins via aquatic connections.

The USACE has indicated that physical barriers are most effective at stopping invasive species. They are currently engaged in advancing the means and methods of placing protections at the Brandon lock and dam to stop the movement of Asian carp into the Great Lakes basin. These actions are necessary, as without a strong ecology we will face rising costs, uncertainty, loss of quality of life, and ultimately a loss of economy.

Therefore, we should protect the integrity of our basin boundaries with policies, infrastructure, and actions that prevent the movement of species into and out of our basin. Many policies involve simple solutions such as the ban on certain aquarium species, or the displacement of ballast water before entering new ecological zones. Other solutions require capital to build costly infrastructure, such as treatment systems for ballast water, or the creation of physical barriers such as port walls to separate the Great Lakes basin from other watersheds. Yet many risks can be reduced with simple acts of common sense, like not emptying bait buckets, and washing recreational boats before and after entering new waterways.

Everyone has a role to play in curtailing the adverse ecological and economic impacts of invasive species. Every corner of earth has a unique set of native species, and all are at risk of creating or receiving invaders. The world needs to act together if we are to preserve our planet's diversity.

The Great Lakes and the Mississippi River watersheds are fantastic places with tremendous endemic ecologies. Our lives, our economies, and our culture are embedded in the biology of this place. By protecting it, we are indeed protecting ourselves.



Combining Localization Techniques For Water Leak Detection

Hermann Sewerin GmbH

Abstract based on "Combining location techniques for water leak detection" by Dirk Becker (Dipl.-Ing.), Hermann Sewerin GmbH, first published 2013

The importance of drinking water as a vital commodity has been growing steadily for years, and both water suppliers and their customers are becoming increasingly aware of the need to conserve this exhaustible resource. Just as consumers should continually ask themselves how they can do more to reduce water usage on a day-to-day basis, water supply companies are constantly seeking out possible ways to save water. Their focus is primarily on the water distribution network which for various reasons is highly susceptible to leaks: by the time a leak is repaired, vast amounts of water may have been lost. For that reason, water companies are keen to minimize the number of leaks and to ensure that once a leak is detected, it can be repaired without delay.

In Germany, DVGW (Technical and Scientific Association for Gas and Water) Code of Practice W 392 underpins all measures aimed at reducing water losses. Chapter 6 recommends introducing a strategy for monitoring, reducing, and keeping down water losses and defines three key steps: measuring leak tightness, determining water losses by measuring flow, and using leak detection methods.

Leak tightness measurement and the quantitative determination of water losses can be combined into a single step. The information obtained can be sufficient to identify even minor leaks and small leakage volumes.

In order to detect leaks as accurately and reliably as possible, it is essential to divide the pipe network into monitoring zones. These zones have to be divided by valves that can isolate them completely from the rest of the pipe network and allow a defined infeed of a measurable volume. In addition, permanent meters can be installed at those valves.

The process of determining all inflows and outflows in the zone is defined as a continuous flow measurement by the Code of Practice W 392. The measured values should be transmitted and evaluated promptly. The measurements should take place overnight for a period of one to two hours within measuring sections of about 4 to 30km. The overnight minimum consumption determined over the measurement period includes a certain residual consumption volume. This residual consumption volume must be used as a reference value in the defined stationary zones. Overnight minimum consumption values do not change significantly in normal operating conditions. If a leak occurs in the measuring area, the overnight values will rise significantly and will remain high. Since the actual leakage amount can be measured directly by the continuous flow measurement, it is easy to respond to changes immediately. As a result the necessary actions to contain the problem, such as closing the valves to reduce the size of the measuring area, can be taken without delay.

This type of continuous flow measurement is very costly and requires detailed information on the pipe network hydraulics for the selection of suitable measuring points as well as a thorough pipe network capacity calculation.

Instantaneous flow measurement represents an alternative to continuous flow measurement with fixed measuring points. Depending on the water losses, network inspections take place at regular intervals with much smaller measurement sections of about one to 10 km. The designated section of the pipe network is shut off from the rest of the network for the inspection and supplied by means of a bridging hose via two hydrants, one inside and one outside the measuring area. A portable metering device (see Figure 1) connected to this bridging hose transmits pressure and flow data to a PC. The minimum flow is calculated from these measurements.

Figure 1: Instantaneous flow measurement – roadside setup

The residual consumption volume has to be estimated as accurately as possible. If only a few consumers are connected to the pipe network zone or if the diversity factor of water withdrawal is very low, a zero-consumption measurement may be recorded.

When a leak is detected during the leak tightness inspection, further steps are necessary to locate it as accurately as possible.

This is where mobile electro acoustic techniques come into play. A leak detection specialist systematically surveys the network with a test rod at each manhole and assesses the noise of all fittings, such as valves, stop taps, or hydrants (see Figure 2). For the localization process, sites where leak noise is audible are marked. This concludes the pre-locating process. As the effectiveness of all electroacoustic methods is very much dependent on ambient noise and on the experience of the operator, these inspections often take place at night. This is the quietest time, as traffic noise and water consumption are low. The biggest advantage of this pre-localization technique is that it is suitable for all network structures.

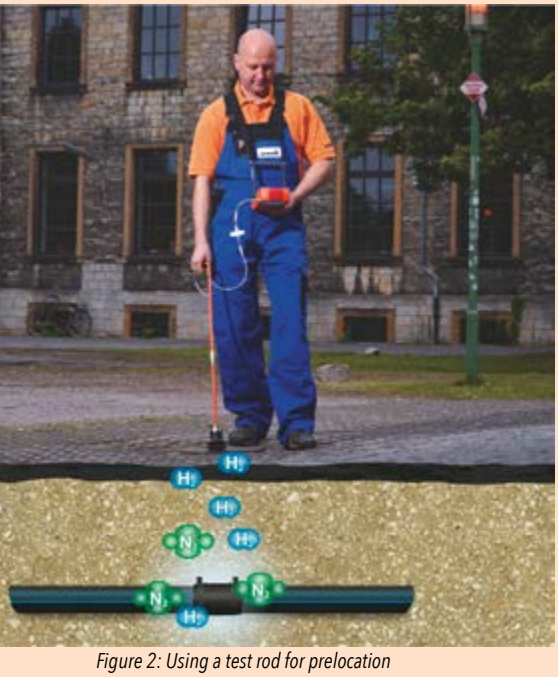


Figure 2: Using a test rod for prelocation

The noise differs depending on the pipe's material and diameter. A leak has a distinctive noise that cannot be mistaken for normal flow noises in the water pipe network though.

However, the exact location of a leak cannot be found by simply inspecting the fittings. The correlation method is a technique that has been used successfully for many years. This pinpointing method involves installing microphones at two measurement locations (fittings in the pipe network). The microphone signals are transmitted wirelessly to a receiver, where they are analyzed mathematically (see Figure 3). The correlator shows the position of the leak as the distance from one of the two measuring points. Correlation methods do not require an experienced operator, and the accuracy of the measurement is determined by two objective factors: the length of pipe between the two measuring points and the material and diameter of the correlation section.

In practice, the accuracy of leak detection depends on the quality of the available pipe data. It has proven beneficial to confirm the result and the location of the leak site using an electroacoustic method. This is done by connecting a receiver to a ground microphone, which should be suitable for the surface at the site in question. The inspection is then carried out directly over the pipe at the correlated position. The noise transmitted through the ground to the surface is analyzed by the leak detection specialist. If ambient noise such as rain, wind or traffic noise at the leak site makes it harder to pinpoint the leak or if the leak noise is not clearly audible, filter settings on the receiver can help to isolate the noise.

Once all the pinpointing steps have been completed and the result has been confirmed by acoustic methods, the position of the leak is marked on the ground surface and reparation can begin.

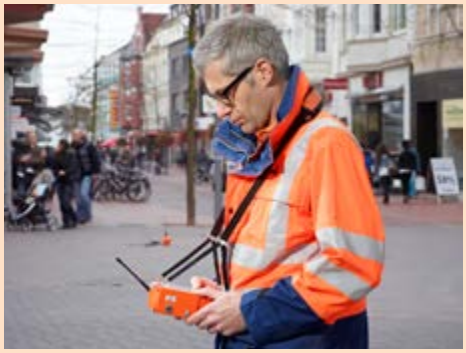


Figure 3: Pinpointing the leak with a correlator

All of the previously mentioned methods for pre-locating and pinpointing a water leak – use of noise loggers, pre-locating with a test rod, pinpointing with a correlator and electroacoustic confirmation of the leak with a ground microphone – depend on noise generation at the leak. However, the leakage amount determined during inspection of the pipe network section may not necessarily come from a leak that is large enough to create an audible noise. It may result of several small leaks, which on their own do not

Figure 4: Tracer gas to pinpoint leaks in water pipes

generate a measurable or audible noise.

In addition, the leak detection techniques mentioned so far can encounter difficulties because of the absence of contact points (valves, hydrants, etc.) or a long distance between them, etc. Instantaneous flow measurement is an effective way of checking for leaks in this type of section, however, using acoustic methods to pre-locate and pinpoint the damage is often unsuccessful.

An alternative approach is the gas inspection method where a volatile, odorless, tasteless, and non-combustible gas is introduced into the pipe Technical gases are easily available and mostly contain 5% hydrogen in nitrogen. These mixtures are known as tracer gas or forming gas.

In practice, the pipes have to be taken out of service and drained. The gas can then expand to fill the entire volume of the pipe. This ensures that the gas can escape from all possible leaks over the full extent of the pipe in the ground. The hydrogen, which is very light, then diffuses quickly to the surface, where it can be detected with a highly sensitive gas leak detector (see Figure 4).

DVGW Code of Practice W 392 recommends that the frequency of leak tightness inspections should be based on the level of water losses in the pipe network. It recommends annual inspections for high losses, three-yearly inspections for moderate losses, and at least six-yearly inspections for low water losses. The key elements of any strategy are dividing the pipe network into monitoring zones for inspection, the quantitative determination of the leakage amount in the pipe network, and the choice and combination of techniques to allow a leak to be located with sufficient accuracy. The exact combination of the methods used depends on local conditions and on the available measuring technology. However, the only way to achieve a long-term decrease of water losses in pipe networks is by combining several localization techniques for water leak detection.

Country Special: BRAZIL – The Brazilian Water Sector

Daniely Andrade, Director of the Department for Environment, Renewable Energies and Energy Efficiency of the German Brazilan Chamber of Commerce and Industry

In Brazil, there are significant economic disparities between the various regions in the country; disparities that can also be seen in the water supply sector. In the South and Southeast of the country, where the majority of the GDP is generated, the quality of water supply is much better. In some of the states, such as São Paulo, the proportion of residences with water supply is almost one hundred percent and even a large portion of their wastewater disposal is centralized.

However, according to the Brazilian Institute of Geography and Statistics (IBGE), in 2000, only 30.7% of all residences in regions such as the state of Rondônia were connected to the central water supply. In the state of Piauí, 42.9% of all households had neither access to a toilet nor sanitation. Less than half (44.3%) of the population in the Northeast had access to tap water, whereas in the Southeast 70.5% of the population had access to the central water supply system. Despite the large number of water sources in regions such as Amazonia, Tocantins-Araguaia, the western Northeast, and Parnaíba, less than 25% of the region is covered by the water supply system. The largest number of municipalities with a share of 90% of water supply is in the state of Paraná in southern Brazil.

This imbalance is also prevalent in the more rural parts of the country: less than 30% of the rural population has access to water supply. In total, 12 million urban Brazilians and 22 million rural Brazilians don't have access to water supply. Politicians are facing a major challenge especially with those inequalities on a local level.

An analysis on Brazil's water supply and wastewater treatment by the Ministério das Cidades including data from the Sistema Nacional de Informações sobre Saneamento (SNIS) points out the country's water loss problem. In 2004, utilities recorded average water losses of 40.4% in their systems. In the past 10 years, this number has hardly changed. Even in big cities, like São Paulo and Rio de Janeiro, approximately 35% of the drinking water gets lost in the pipeline system.

The public sector still provides about 92% of the water supply in the 5,570 municipalities. Since the 1980s, most public companies in the wastewater sector have had financial difficulties and therefore have inadequate capacity to make the necessary investments or to take additional loans. Therefore, in 1990, the government began to reform the sector and open it to private enterprises.

The economic liberalization and privatization of the various sectors in the 90s attracted many international companies to the Brazilian water supply and wastewater management sector. However, due to the lack of clear regulation, hardly any private companies entered the market. Since the opening of the water sector, only private investors from France, Portugal, and the U.S. have been active in the Brazilian water sector. Only one German company, Berliner Wasser, has established a representative office in Brazil.

The topic of the privatization of the state-owned companies in the wastewater industry such as the SABESP (the water and wastewater authority of São Paulo) has developed into a public discussion. In general, a majority was against the sale of state-owned enterprises, also including the telecommunications industry. The core of this long-standing debate is the interpretation of the legislation regarding the competencies of wastewater management. Even though according to the constitution, the municipalities are responsible for wastewater management, in the seventies, many licenses had been given to state-owned entities. Currently, most of these 25 to 30 year old licensing agreements are going to expire or have already expired (some of them have not even been completed).

In the last few years, this legal impasse has brought the development of the water sector, and especially the investments in the private sector, to a standstill. According to a study by the Associação Brasileira para o Desenvolvimento das Indústrias de Base (Abdib), with the rate of investments between 1996 and 2005, it would take more than 60 years to guarantee water supply to the whole population (without taking the population growth into account). This estimate takes

the investment of private actors and public administration – federal, state, and local governments into account. With the current average annual federal investment, it would take 296 years. The new trend towards public-private partnerships aims at increasing and supporting private investments in this sector and might result in a new era in the Brazilian water sector.

The problems that private companies faced in the collaboration with municipalities in the last years helped build experience and know-how in dealing with municipalities and drafting contracts that minimize unclear regulations and political risk. In this context, there are some opportunities for significant development in this sector in the upcoming years.

In order to profit from tax exemptions, the infrastructure sector has increased the pressure on the government. This could lead to international investments in Brazilian government bonds. The Ministry of Finance is currently analyzing the exemption package. The international investment funds could significantly increase the budget available for the infrastructure projects. According to calculations of the Associação Brasileira de Infraestrutura e Indústrias de Base (Abdib), within four years, tax exemption could lead to investments in the transportation, telecommunications, electricity, and water supply systems of approximately 75 billion BRL (approx. 33 billion USD). This represents about 10% of the already invested government bonds. Even without the tax exemption for investments in infrastructure, the profitability of the fixed interest bonds is unbeatable in comparison to the industry investments.

The Brazilian water and wastewater sector has significant economic development potential in the next years. Even though some states, for example São Paulo, already provide sufficient water supply and wastewater treatment, the water supply in the majority of states is insufficient. There is an obvious need for increased investments to improve the current infrastructure situation. After years of regulative problems in the water industry, current developments may result in better legislation and more planning security in the water sector.

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Markets Of The German Water And Wastewater Technology

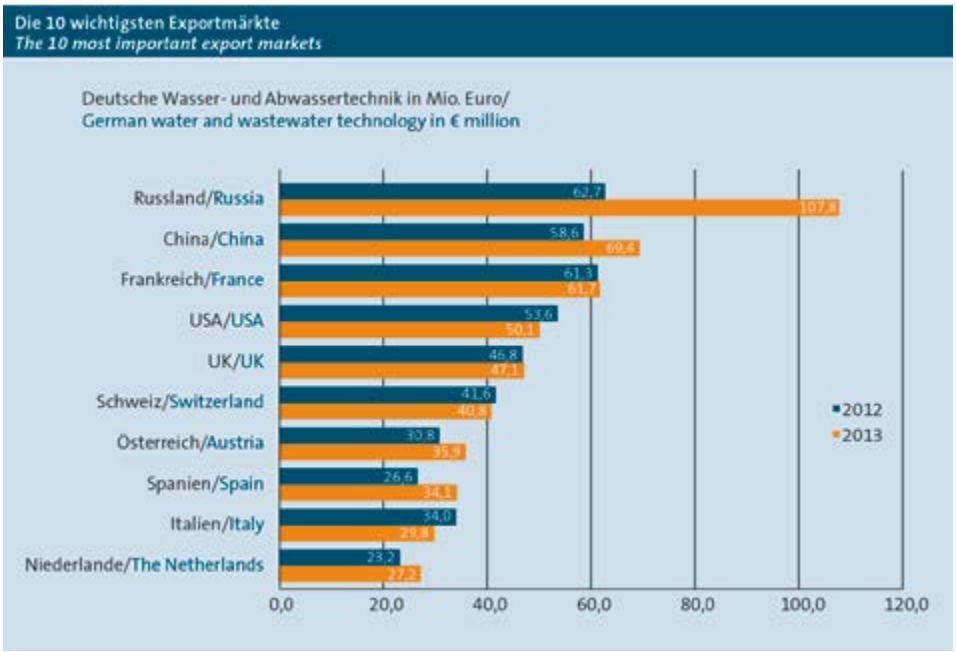
Peter Gebhart, VDMA

The global demand for components and systems for the treatment of water, wastewater, and sludge is already high and continues to rise. Since German providers offer their customers individualized system solutions adapted to the particular requirements on site, they are in great demand as global partners. The short decision-making lines found in the mainly medium-sized companies put the providers in a position where they can quickly react to changes even if it is as late as during the project design and implementation.

It is for the same reasons, among other things, that in 2013, German businesses were able to further strengthen their position as global leaders. In 2013, exports of components and systems for the treatment of water, wastewater, and sludge from Germany increased by 3.5% to 945 million euros.

The most important sales market used to be – and still is – the EU-28 (370.5 million). The growth in exports was largely driven by the demand from Russia and China. Russia was the world's strongest export market with 107.8 million euros, followed by China with 69.4 million. The strongest markets in the EU were France and the UK with 61.7 and 47.1 million euros. For 2013, the sector's turnover in the field of mechanical equipment for water technology is estimated to more than 1.8 billion euros.

In the future, expanding megacities and the continuing development of industrial locations all over the world will additionally generate a growing demand for components and systems for the treatment of water, wastewater, and sludge. As a result, German businesses – with their innovative concepts – will continue to be in demand as global partners.



New water and wastewater technology portal

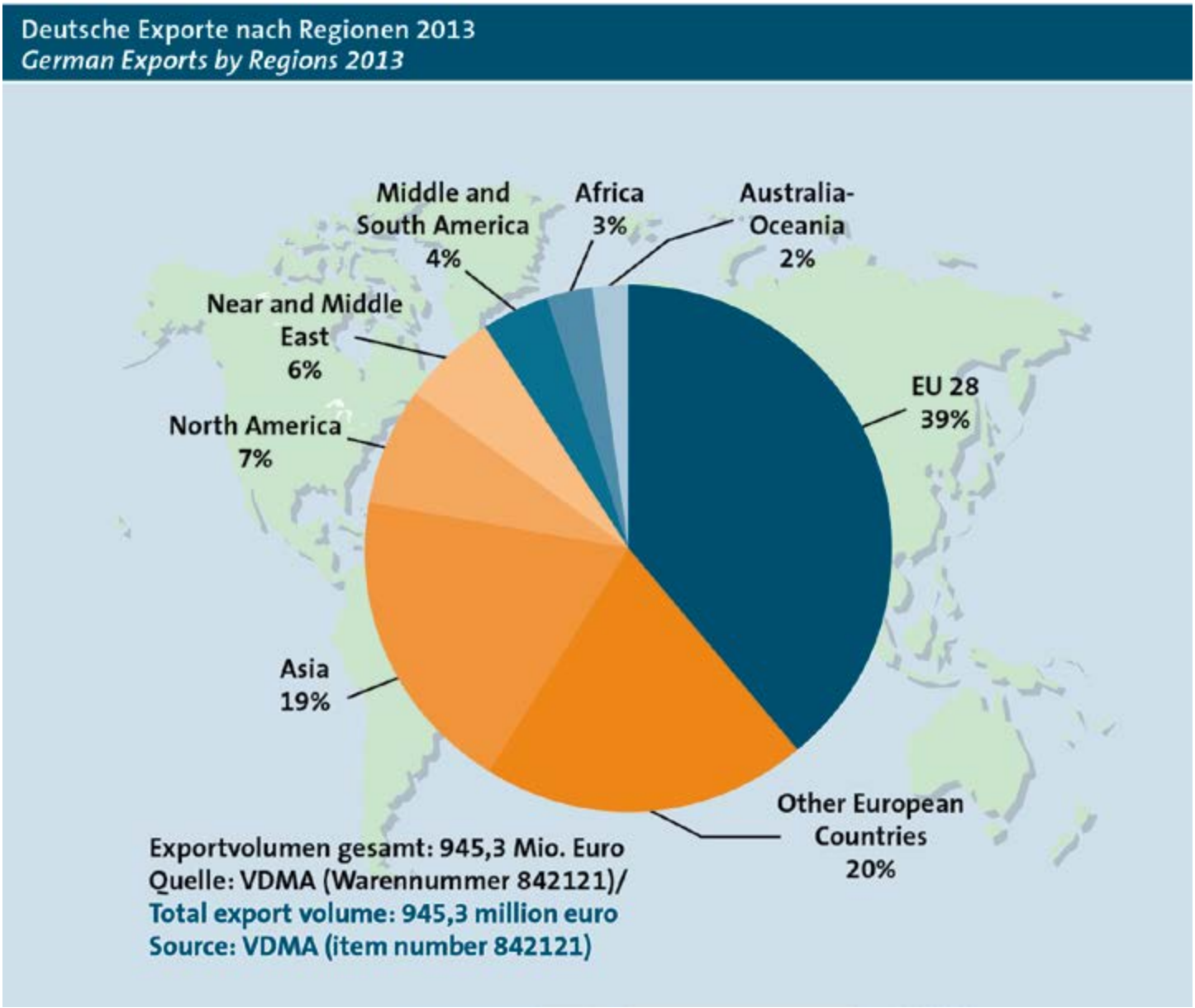
In 2014, the VDMA Process Plant and Equipment Association introduced a new Water and Wastewater Technology portal.

Water is the elixir of life for humans. It is the most important source of nutrition and its availability and quality is a basic prerequisite for hygiene, health, and wellbeing. At the same time, water is essential for the agricultural production of food and for many industrial processes used to produce consumer and investment goods.

The limited amount of fresh water available is faced with a rising world population with ever-growing requirements. There is one particular instrument that can be used to permanently align supply and demand as well as raise awareness about the careful use of finite resources: technology!

Technology that supplies people with clean drinking water; technology that provides water for agricultural and industrial processes; technology that treats municipal and industrial wastewater. German water and wastewater technology makes a major contribution towards ensuring a secure supply of water.

With the continuous improvement of technologies, innovative prowess, and a range of specific and needs-oriented solutions, German manufacturers of water and wastewater technology offer their services as global partners. Our companies



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UV Disinfection: Emergence In Water Treatment Applications

Ernest R. Blatchley III, Professor, School of Civil Engineering and Division of Environmental & Ecological Engineering, Purdue University

Disinfection processes are implemented as a means of reducing the risk of human exposure to microbial pathogens. The inclusion of disinfection processes as a component of water treatment has led to the virtual elimination of a number of waterborne, communicable diseases, including cholera and typhoid fever.

The most common method of disinfection involves the addition of chlorine to water. Chlorination is highly effective for control of bacteria and viruses in water. The long history of chlorination practices has allowed for a detailed understanding of chlorine chemistry, the effects of chlorine on microorganisms, and the development of well-defined principles of chlorine contact chamber design.

Although chlorination has the potential to yield clear benefits in disinfection applications, a number of drawbacks of chlorination have also been identified. For example, the protozoan parasites *Cryptosporidium parvum* and *Giardia lamblia*, which are common to surface waters and account for a large number of documented disease outbreaks, are extremely resistant to chlorine. The reactivity of chlorine, which is largely responsible for its effectiveness as a disinfectant, also allows for the formation of disinfection byproducts (DBPs), some of which are known to be harmful to human health. To date, more than 700 DBPs have been identified to result from chlorination, and this is generally thought to represent a minority of the total number of DBPs that result from chlorination.

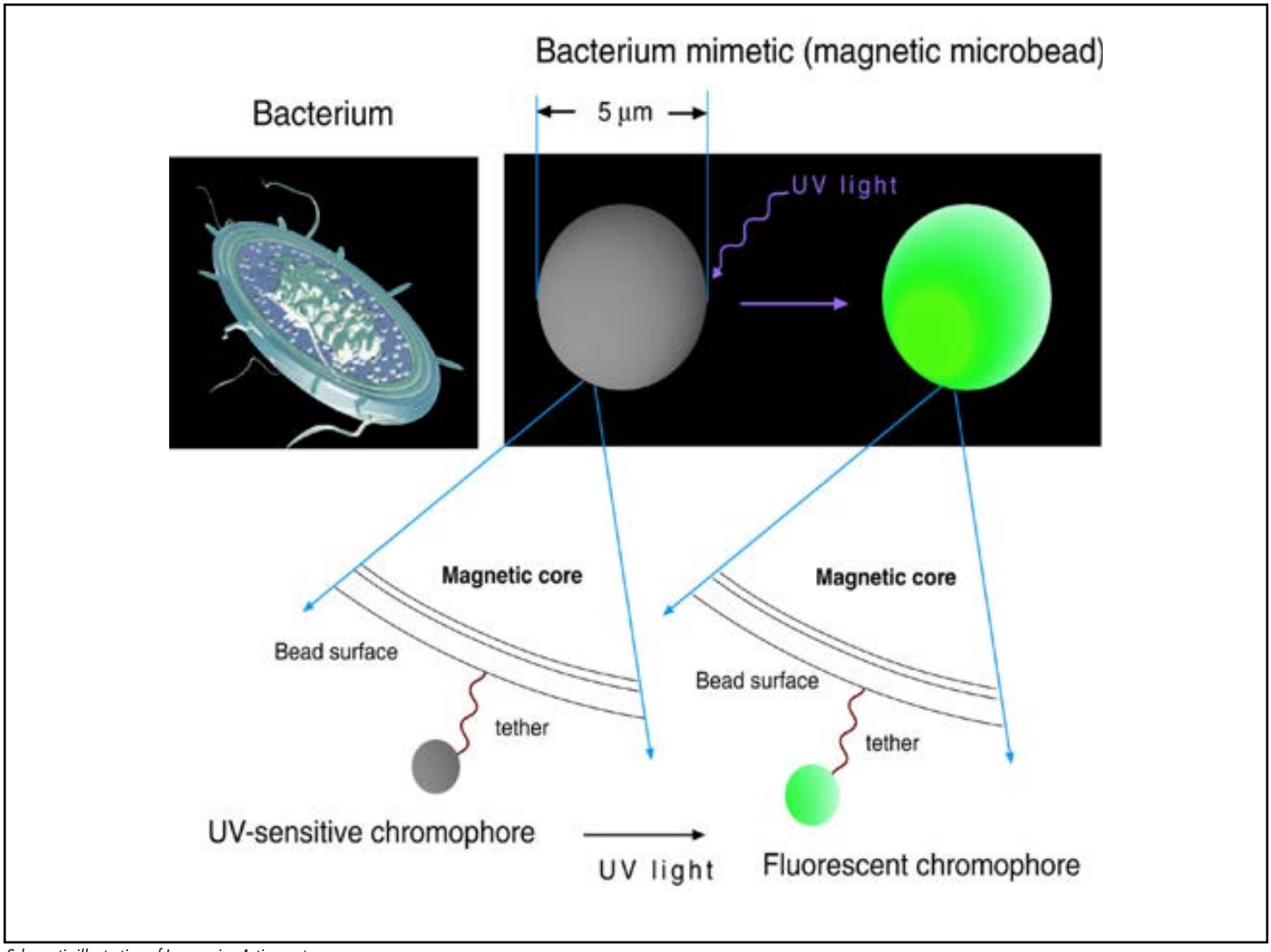
For these and other reasons, many water utilities have switched to other disinfection processes. In particular, ultraviolet (UV) irradiation has emerged as the most common alternative to conventional chlorine-based disinfection.

Exposure to UV radiation causes damage to nucleic acids (DNA and RNA) and proteins. Accumulation of sufficient damage diminishes the ability of microorganisms to reproduce and their ability to cause disease. Given that nucleic acids and proteins are common to all life forms, UV disinfection can be used to inactivate a broad array of microorganisms. UV disinfection is known to be highly effective for control of bacteria. It is now the disinfection of choice for inactivation of *Cryptosporidium parvum* and *Giardia lamblia*. UV can also be used to inactivate viruses, but it is generally less effective than chemical disinfectants (chlorine and ozone) for this purpose.

The reactions that lead to inactivation of microorganisms in UV systems tend to be extremely fast. Because of this, UV reactors generally have a much smaller footprint than those of comparable chemical disinfection processes. Contemporary reactor designs have also allowed UV systems to be cost-competitive with chemical disinfection processes. And at the doses of UV radiation that are needed to accomplish disinfection, DBP formation is greatly diminished in most applications, as compared to an analogous chemical disinfection process.

The emergence of UV disinfection as a viable alternative to chemical disinfection started with municipal wastewater applications. In these settings, where design and operating criteria are often based on control of indicator bacteria (e.g., E. coli), UV systems have been demonstrated to be reliable and economical. The ability of UV systems to control *Cryptosporidium parvum* and *Giardia lamblia* with little or no DBP formation were important factors in the inclusion of UV disinfection processes in drinking water production facilities.

These same characteristics have contributed to inclusion of UV disinfection in many other settings. In swimming pools and other recreational water settings, UV-based systems are used to augment disinfection by chlorination; these systems have also been observed to bring about improvements in water and air chemistry by breaking down chloramine compounds. UV-based systems are also being used for treatment of ballast water onboard commercial ships. Ballast water management is now mandated by the International Maritime Organization (IMO). The small size and broad-spectrum antimicrobial attributes of UV systems fit the needs of ballast water treatment processes quite well. UV disinfection processes are not limited to disinfection of water. Another common application of UV is for disinfection of air. This process is important in a number of critical settings, including hospitals.

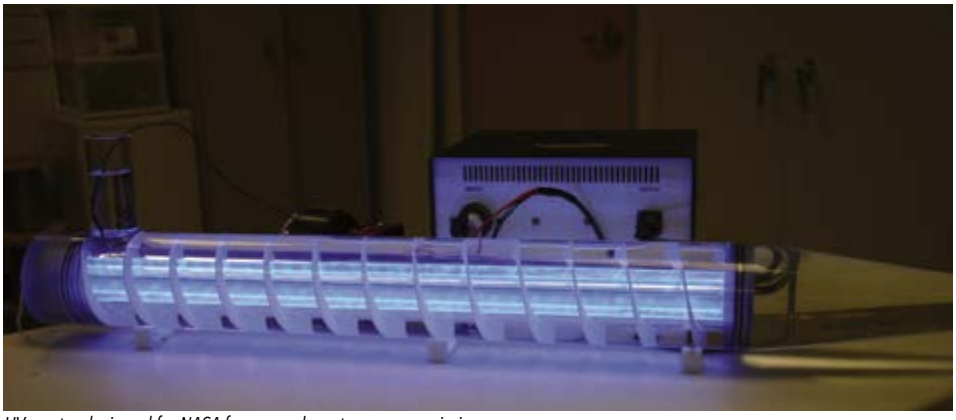


Schematic illustration of Lagrangian Actinometry

Microspheres are chosen with size and specific gravity that mimics those of aquatic microorganisms. As such, the microspheres follow trajectories through the reactor system that are similar to those of microorganisms. UV-sensitive molecules are bound to the surface of the microsphere; these molecules undergo a permanent photochemical change when exposed to germicidal UV radiation that yields a brightly-fluorescent product; the parent compound is non-fluorescent. Because a large number of these molecules are linked to the surface of each microsphere, the fluorescence response of an individual microsphere can be related to the UV dose delivered to that particle. By introducing a large population of these "dyed microspheres" to a reactor, collecting them downstream of the reactor, then measuring the fluorescence of each microsphere, it is possible to measure the UV dose distribution delivered by the reactor.

Blatchley III, E.R.; Shen, C.; Naunovic, Z.; Lin, L.; Lyn, D.A.; Robinson, J.P.; Ragheb, K.; Grégori, G.; Bergstrom, D.E.; Fang, S.; Guan, Y.; Jennings, K.; Gunaratna, N. (2006) "Dyed Microspheres for Quantification of UV Dose Distributions: Photochemical Reactor Characterization by Lagrangian Actinometry," Journal of Environmental Engineering, ASCE, 132, 11, 1390-1403.

An interdisciplinary group of researchers at Purdue University has been actively involved in research related to UV-based treatment processes. Purdue University, which is located between Chicago and Indianapolis in West Lafayette, Indiana, is home to academic programs that address virtually all areas of engineering and the physical sciences. Research activities at Purdue University have yielded important contributions to fundamental photochemical reactor theory. These principles have led to improvements in reactor design, analytical methods, and diagnostic measures for UV reactors. For example, Lagrangian actinometry (U.S. Patent Number 7,842,512) was developed by an interdisciplinary research team at Purdue. This method allows for more detailed characterization of UV reactor behavior than any other method, and because of this capability it has been used for validation of reactor performance as well as for validation of numerical models



UV reactor designed for NASA for use on long-term space missions

NASA requested the design and construction of a UV system that was highly efficient and avoided the use of mercury lamp technology. This reactor was designed using an approach called "numerical prototyping," in which reactor behavior is simulated on a computer. By examining the behavior of the simulated reactor, it is possible to identify weaknesses in a given reactor design. The model is then adjusted to improve reactor behavior, which allows for convergence on an efficient reactor design.

Naunovic, Z.; Pennell, K.; Blatchley III, E.R. (2008) "The Development and Performance of an Irradiance Field Model for a Cylindrical Excimer Lamp," Environmental Science & Technology, 42, 5, 1605-1614.
Naunovic, Z.; Lim, S.; Blatchley III, E.R. (2008) "Investigation of microbial inactivation efficiency of a UV disinfection system employing an excimer lamp," Water Research, 42, 19, 4838-4846.

that are used to predict performance and develop reactor designs. In general terms, the development of tools such as Lagrangian actinometry facilitates the design of highly efficient and highly reliable UV reactors.

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Between The North And The South Elbe - Water Management Projects Of The International Building Exhibition IBA Hamburg

Uli Hellweg, Managing Director, International Building Exhibition IBA Hamburg

The Hamburg suburb of Wilhelmsburg lies between the north and the south arms of the Elbe River. Here, approximately 62 miles upriver from the North Sea, a mix of port facilities, heavy industry, charming and rundown neighborhoods, as well as agricultural land alongside natural preservation areas has developed.

Hamburg's position on the river has always impacted its urban development. The port is known as the "gateway to the world" and attracts trade and generates vital economic activities. But the opportunities that come with being Europe's third largest port also bring challenges, both natural and economic. The risk of storm surges like the one experienced in 1962, for instance, when one fifth of the city of Hamburg was flooded, means that the management and raise of groundwater levels is a priority for politicians, architects, and urban planners in the conception of new projects.

If they had not realized it before, the fourth IPCC report presented in January 2007 must certainly have made it clear to every politician and town planner that climate change threatens the existence of our planet and that major cities and metropolises, apart from being the areas that stand to be most affected, are also the worst offenders in climate change. It was therefore only logical that "Cities and Climate Change" should be one of the key themes of the International Building Exhibition IBA Hamburg.

Project site within the metropolitan area of Hamburg - IBA Hamburg GmbH / Freie und Hansestadt Hamburg / Landesbetrieb für Geoinformation und Vermessung

At the end of 2006, the Free and Hanseatic City of Hamburg constituted IBA Hamburg as a municipal corporation. Its task was to prepare for the presentation of an international building exhibition on the river islands occupying an area of 13.5 square mile (35 square kilometers) in the heart of Hamburg in 2013. Germany has a long history of building exhibitions (the first was in 1901) and IBA Hamburg is the 8th in the series. IBA is much more than a showcase for architecture: building exhibitions also tend to drive urban development. Building exhibitions concentrate and coordinate private and public spending on construction in an area or region featuring specific problems as well as specific opportunities.

The morphological condition of Wilhelmsburg was researched and visualized in the Wasseratlas (Water Atlas). As the book indicates, large expanses of the land lie at sea level or even below; there is a complex system of drainage channels to dispel groundwater flows in case of heavy rain, and a dike line of 17 miles which makes it difficult to experience the esthetic quality of water. Today, seven years after the IBA launch, several projects have been implemented to improve flood protection as well as the quality of the urban environment along the dike line.

The IBA Project Kreetsand, a pilot project within the framework of the Hamburg Port Authority's (HPA) Elbe tidal concept, will create additional space for the Elbe river on the east side of the Elbe island of Wilhelmsburg. The tidal volume will be expanded and the tidal hub reduced as a result of these river engineering measures. At the same time, it will also deal with new possibilities for integrative planning and implementation of a variety of interests and concerns relating to flood protection, use of the port, water management, nature conservation, and recreation areas. Thus, the Kreetsand project will be presented as part of the IBA project "Elbinsel dike park."

Creation of the Kreetsand Tidepark will enlarge the flood plain of the Elbe and consequently reduce the tidal hub. At the same time, the Port of Hamburg will benefit from a reduction of sedimentation which will also diminish the risk of flooding. In the course of the pilot project, the now de-embanked former flushing basin Spandenlander Busch / Kreetsand will be deepened. In the 30 hectare shallow water area, the tide will be able to flow freely in and out – resulting in an additional tidal flow of around one million cubic meters. However, the pilot project is not planned as a purely hydraulic measure; it also takes into consideration aspects of quality of design and landscaping, as well as of nature conservation and recreational value.

The WaterHouses were built on 110 piles in a water retention basin with a surface area of about 4,000 square meters that has been integrated into the existing waterways network. They show that water does not always act as a barrier but can add new qualities to residential developments. The artificial basin (0.745 meters deep) is fed with rainwater and is located in an area of Wilhelmsburg Central that is at risk from groundwater.

The WaterHouses, designed by Schenk + Waiblinger Architekten of Hamburg were completed in March 2013. The complex consists of four TriPlex Houses, each containing three separate triplex apartments, and the nine-floor WaterTower, with 22 apartments. Each apartment has a balcony or terrace overlooking the water. Each apartment in the TriPlex Houses has its own "natural" or water terrace with large glazed panels, while the residents of the WaterTowers have access to a spacious shared water terrace area. The connection to water is palpable throughout the complex: there are boat jetties, floating terraces, underwater gardens, and waterfall walls as privacy shields, all of which emphasize the special quality of life on the water.

The buildings are constructed to passive house standard, which means they require a minimum of heating and that all of their

Areal picture Spadenlander Busch before renaturalization – HPA / Studio Urbane Landschaften

energy needs can be met using renewables. A geothermal heat pump uses water to heat the houses, while solar thermal elements in the façade ensure the provision of a basic hot water supply. The WaterHouses are also linked up to the Wilhelmsburg Central Energy Network. Smart building technologies control ventilation and energy supply, providing residents with feedback on their energy consumption. The German Sustainable Building Council (DGNB) granted their Gold Award to the WaterHouses in recognition of their outstanding building standards.

In addition to the key IBA theme "Cities and Climate Change," IBA Hamburg is also concerned with social issues. The objective was to make the island livable once again for people from all walks of life. To achieve this goal, the emphasis has been placed on better education, in particular improving schools; on refurbishing and modernizing housing; on constructing innovative new buildings; and on affirmative action for an intercultural urban community.

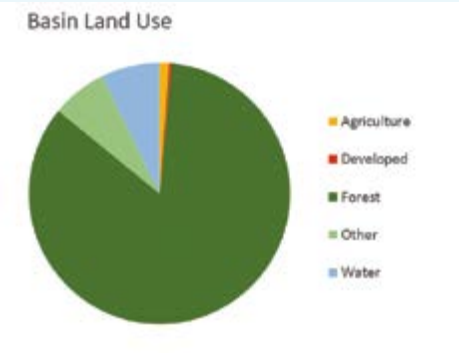
To demonstrate what is possible when an entire city district is remodeled along social and environmental lines, the IBA has initiated 70 building projects and some 14 social and cultural projects. Achieving modern standards of energy efficiency plays a key role, acting as catalyst and driver of the myriad aspects and tasks making up a holistic planning approach. These projects are designed partly to show the future of modern environment-friendly urban planning and how cities could be remodeled to become climate-friendly or even climate-neutral. Another benefit is that Wilhelmsburg, a hitherto somewhat neglected district of Hamburg saddled with a negative image, has had the chance to reinvent itself as a pioneer of energy-efficiency in the city.

Water Houses – IBA Hamburg GmbH / Bernadette Grimmenstein

Great Lakes Series: Lake Superior

When French explorers first set sights on Lake Superior they christened it "le lac superieur"— or Upper Lake, originally referencing its position above Lake Huron, not its impressive size as is sometimes believed. The Ojibwe people, however, had indeed long since considered the lake's superlative size its defining characteristic and called it thus "Gichigama" — or "great sea". No doubt, it is both.

Indeed, Lake Superior reigns as the largest freshwater lake in the world by surface area — 31,700 square miles. And at a total volume of 2,900 cubic miles, it is more than twice the size of Lake Michigan and is the world's third most voluminous freshwater lake. Averaging 483 feet in depth, it descends to 1,332 feet at its deepest point. Indeed, so massive is Lake Superior in relation to its Great Lakes brethren that it could contain the volume of all the other Great Lakes combined and still have room for another three Lake Eries.



Basin

Sparsely populated, with poor soil for agriculture and much of its land area remote, the region that comprises the Lake Superior watershed remains predominantly forested. Yet just as with the other Great Lakes, the basin nevertheless remains subject to climate impacts, human settlement and industry pressures, and invasive species. A binational agreement between the U.S. and Canada helps to balance these interests and to protect this lake containing fully 10% of the world's non-glacier or ice freshwater.

The full Lake Superior basin covers an area of 49,300 square miles encompassing portions of the U.S. states of Michigan, Minnesota and Wisconsin and the Canadian province of Ontario. Fed by over 200 rivers, Lake Superior eventually flows into Lake Huron via St. Mary's River. However, at a lurching turn-over rate of 200 years, a theoretical drop of water that began to cycle through the lake during the War of 1812 would only just be leaving today. It is, in short, a lake with a long memory.

Major Industries Cities and Industries of Lake Superior

Compared to neighboring Great Lakes, cities along Lake Superior are few and modestly sized. The largest — Thunder Bay, Ontario — is home to 108,000 people. Initially established and subsequently abandoned as a French fur trading post in 1683 and 1717, it wasn't until 1803 that Montreal-based North West Trading Company helped to establish a more permanent settlement there as part of its mid-continent depot. Following a process of municipal amalgamation in 1970, the name Thunder Bay was adopted, though barely edged out competing "Lakehead". Today Thunder Bay serves primarily as a governmental regional services center for Northwestern Ontario. It is also home to Lakehead University and to Confederation College.

The second largest city on Lake Superior is Duluth, Minnesota, with a population of 86,000. Perhaps most notably Duluth is home to the world's only all-freshwater aquarium, the Great Lakes Aquarium. Forming a metropolitan area with neighboring Superior called "Twin Ports," the cities share the Great Lakes' largest port transporting coal, iron ore and grain. These Twin Ports, the "Great Lakes Bulk Cargo Capital," is also one of the busiest inland ports in the U.S. Each year some 1,000 ships pass through the port, carrying some 42 million tons valued at $1.9B. While most ships passing through are classified as "lakers," or ships that will never sail the oceans, some 10% of total ships are classed as seagoing "salties" and carry anything from grain to heavy machinery used in renewable energy installations throughout the continent's interior.

Indiana Sees Economic Opportunities In Water Innovation

Erik Hromadka, Global Water Technologies

Indiana may be known as the Crossroads of America, but the Midwestern state is recognizing the role that water plays in its regional economic strength.

Indiana leads the nation in terms of the percentage of its total employment in water-related industries, according to Innovating for the Blue Economy, a new report commissioned by the University Research Corridor in Michigan.

The study found that 23.3 percent of Indiana's total private sector employment in 2012 was in industries most intensively affected by water supply and quality. The Great Lakes region was well represented in the findings, with Wisconsin ranking second and Michigan placing fourth. The six-state region had a concentration of 3.8 million total workers in water-related industries.

Water-related industries include both the companies delivering core water technology products and services as well as those that use water as a key input to their operations, and/or have significant water discharge that must be processed properly. As a result, issues of water supply, infrastructure, and innovation are key to these regional economies.

This message was reinforced by the Indiana Chamber of Commerce, which completed a comprehensive analysis of the state's water resources in 2014. While it noted that the Midwest has not faced the severe drought that dominates headlines in California and other western states, the impact of water availability is just as important and requires careful planning for the future.

"This is definitely a jobs and economic development issue," said Indiana Chamber President and CEO Kevin Brinegar, who noted much of the state's water demand is driven by manufacturing and agriculture. "Our state's economy is growing more diverse, but we always will make things. And it often takes large, reliable supplies of water to do so."

For example, the report noted an increase in agricultural irrigation in northern and central Indiana, which produces large crops of corn and soybeans. A growing population in Central Indiana is projected to require an additional 50 million gallons per day by 2050 and limited natural water supplies in the southern part of the state are expected to be insufficient for anticipated business development in the region.

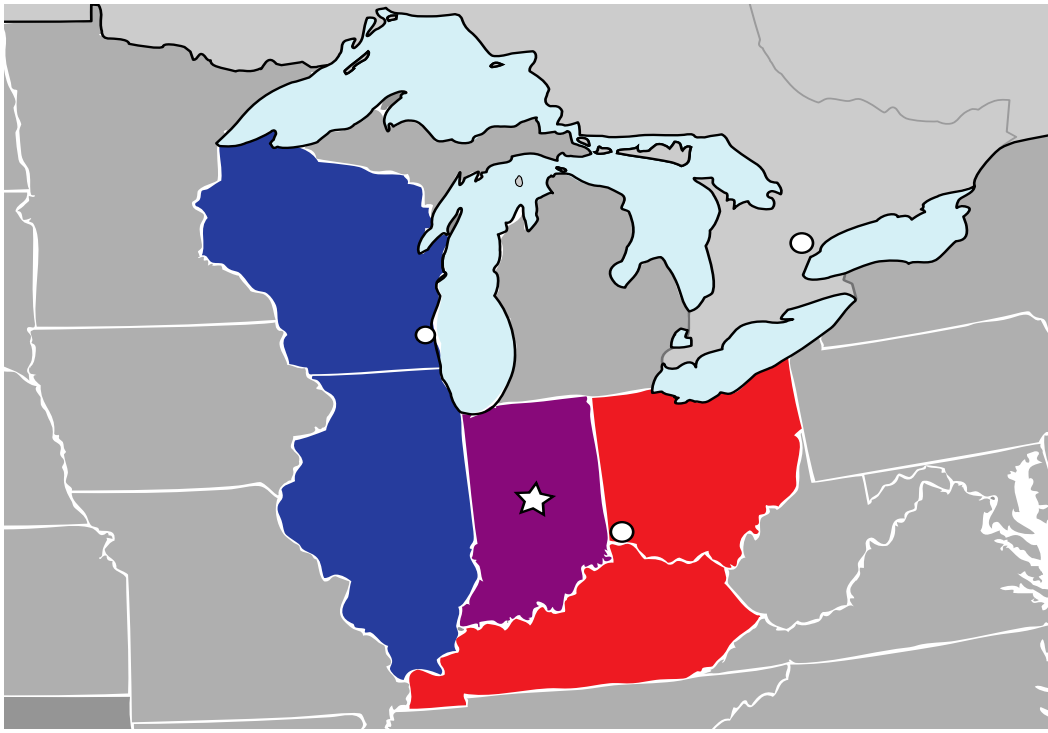
"What this study does is set the stage for creation of a long-needed, long-range water plan for the state," explained Vince Griffin, the state chamber's vice president of energy and environmental policy. "While a credible plan may take three to five years, legislators – from the Senate and House, as well as both parties – understand the importance of this issue and are prepared to lead on the next steps."

Such collaboration on water issues is already beginning to take place in Indiana. The state overlaps two of the leading water technology clusters in the nation. Confluence is an Indiana-Ohio-Kentucky initiative that was launched with support from the U.S. Environmental Protection Agency and Small Business Administration to leverage federal resources, such as the national water laboratories in Cincinnati. To the north, the Tri-State Alliance is an Indiana-Illinois-Wisconsin effort that promotes water research and includes Milwaukee as a United Nations Global Compact City for freshwater expertise.

In the state's capital, Indianapolis Mayor Greg Ballard cited progress in water infrastructure as one of his most significant accomplishments during a spring meeting organized by the German

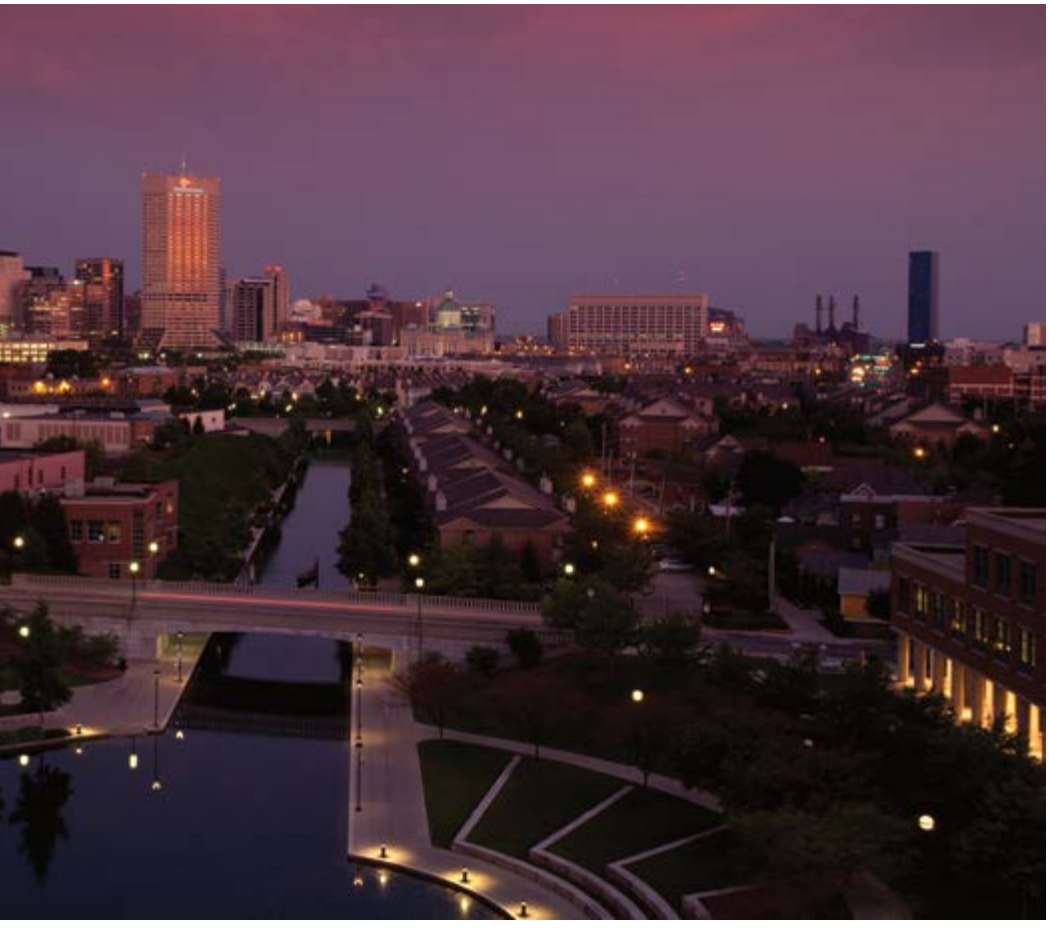
American Chamber of Commerce of the Midwest. Ballard, who serves as co-chair of the U.S. Conference of Mayors Water Council, noted the transfer of the city's water and wastewater utilities to a public charitable trust and significant investments being made to upgrade the infrastructure, including a massive seven-mile underground tunnel system to prevent 54 million gallons of untreated sewage from overflowing into the White River.

This effort is creating a new awareness of water issues in the city, such as Reconnecting Our Waterways, a grassroots effort that has drawn dozens of organizations to use a collective impact model to improve neighborhoods by better appreciating water resources.



Another effort to deploy new water technologies through a "living laboratory" is being organized by Global Water Technologies, in partnership with Indiana University - Purdue University at Indianapolis, the urban campus of the state's leading research institutions.

The living laboratory concept is designed to introduce new innovations and technologies in a real-world setting, so they can be demonstrated and benefits can be shared with other utilities in the state. Initial efforts include better water usage data tools, advanced leak detection and pipeline rehabilitation methods developed in Europe and the United States.



Having recognized growing opportunities in the water technology sector, Indiana will be a state to watch in the coming years.

Erik Hromadka is the CEO of Global Water Technologies, a company based in Indiana that is developing solutions to improve water efficiency. More information about the company is available at: gwtr.com

School Initiative "Aqua-Agents" From Hamburg Enters Chicago

Kristina Raab, Aqua-Agent-Office Hamburg

The sister cities Hamburg and Chicago share a lot of similarities; one of them is the overall presence of water. The citizens of Hamburg love to take a walk along the Elbe River or go rowing on the Alster, the Chicagoans appreciate the Riverwalk along the Chicago River or cycle along Lake Michigan. In both cities waterways are not only used for pleasure, but they are also vital for business. For example, Hamburg's harbor is the largest in Germany and therefore a major business hub and Lake Michigan is Chicago's main drinking water resource. But, in the end, what really unites these two great cites is their commitment to protect their nature and waterfronts.

All these perspectives come together in the educational initiative "Aqua-Agents" for school kids from the age of 8 to 11. The project started in 2009 in Hamburg. Its main goal is to show students not only how important water is for humans, for nature, and for the economy, but also how they can treat this special element in a sustainable way in everyday life. To achieve this goal, we developed classroom materials, organized field trips to places such as the wastewater treatment plant in Hamburg, and developed surveys where students asked and informed pedestrians about different issues related to water. Several institutions such as the Michael Otto Foundation for Environmental Protection and Hamburg Wasser (responsible for water supply and wastewater management in Hamburg) help us make the initiative possible.

The Aqua-Agents in Chicago

With the sister city partnership between Hamburg and Chicago, we were able to bring part of the initiative to Chicago. Our partner in Chicago is the Goethe-Institut. It only took Kristina Raab, who is responsible for the initiative in Hamburg, and Anja Schmitt, German Language Consultant at the Goethe-Institut, from June until September 2014 to incorporate the idea in Chicago.The first phase includes two schools , one class from the German International School Chicago and six classes from Stephen K. Hayt Elementary School. Together with Aqua-Agents, they complete their tasks that are broken down into four thematic blocks which include water supply, wastewater management, water habitat, and economic area water. Students have to find answers to different "water-missions" such as

- How do people living elsewhere get their water?
- How much water do I need daily?
- Does every toilet use a flush or are there other solutions?
- What is the cause of water pollution?

- How does the transport of containers work?
- Why do rivers look different?

Additional tasks focus on the sister city partnership where students are asked to find out differences and similarities between Hamburg and Chicago or Germany and the USA (like daily water use; rivers, lakes, waterfront; protection of water etc). Later on in the school year, they will get in touch with their partner school in Hamburg and compare their results.

During a small event at Riverside Plaza in Chicago, 12 students from both schools were able to conduct a small survey and ask pedestrians about their knowledge of water, e.g. water that is needed for the production of goods. Grouped in small teams, they informed over 90 people about water issues and asked them if they would help protect water at the end of the survey. And, as you can imagine, nobody said “no” to those courageous and smart kids. Not only do these kids know a lot about water, but they also had the courage to speak about it to adults. At the end of the event, we had 12 happy and excited kids, eating pizza and excitedly sharing their experience with the passers by. It was great to see how confident these students were in campaigning for our special element, water.

Future thoughts

We are very interested in the feedback of teachers and students to help us to improve our new initiative in the U.S. During her stay in Chicago, Kristina Raab, Project Manager, Aqua-Agents had many successful meetings with institutions such as the Chicago Public School System and the Sister Cities Committee. Every single stakeholder encouraged us to continue the initiative in Chicago. Our next steps will

be the optimization of the materials and the development of a German glossary giving us another opportunity to foster German language and culture in the U.S. We are excited about the opportunity to teach more kids to become Aqua-Agents in Chicago in the future.

The Chicago debut of Aqua-Agents would not have been possible without the support from Goethe-Institut and Michael Otto Foundation.

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Mission: Wasser

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WANGEN Pumpen Conveying Solutions: Economical And Extremely Reliable

Eduard Weiss, WANGEN AMERICA Inc.

The construction of wastewater treatment plants poses challenges to plant manufacturers worldwide. WANGEN Pumpen is a competent partner to improve performance as well as reliability on the international stage. The high quality of WANGEN pumps helps prevent time consuming cleaning, high wear and tear, frequent repairs or downtimes. A wide variety of progressing cavity pumps is available to convey sludge and solids from wastewater treatment plants.

The proven quality of WANGEN products and technologies together with the innovative ideas from other industries make WANGEN Pumpen an economically beneficial choice guaranteeing

- sound engineering technology in the area of bearing bracket design,
- freedom from leakage, and
- reliable joints.

Since 1969, displacement pumps have been developed and built for a variety of applications in Wangen. With WANGEN pumps highly viscous or abrasive substances, multi-phase mixtures, or 'sticky' media can be conveyed as easily as dewatered sludge. WANGEN Pumpen products – engineered, planned, manufactured and distributed from the city of Wangen, Germany – can be found in sewage treatment and biogas plants as well as in the agricultural sectors throughout the world.

In February 2014, WANGEN Pumpen opened its first U.S. subsidiary in Wood Dale, Illinois. From this location, WANGEN Pumpen supplies its customers through a national distribution network.

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CNT Initiative Helps America Become "Rain Ready"

Ryan Kilpatrick, The Center for Neighborhood Technology (CNT)

CHICAGO – The Center for Neighborhood Technology (CNT), a Chicago-based nonprofit with expertise in water management and urban flooding, just launched a new resource to help individuals, businesses, and communities find solutions to the problem of too much or too little water. CNT's Rain Ready initiative offers a suite of policies and practices to help residents, communities, and states plan for weather events associated with global climate change.

Anchored around the website *www.rainready.org*, Rain Ready helps Americans, and their municipal and state leaders, approach the challenges of flooding, water shortage, and/or water pollution in customized and cost-effective ways.

"Through our years of research and advocacy on water management issues, we realized that there was something of a disconnect between information and action," said Harriet Festing, Water Program Director at CNT. "Rain Ready seeks to close that gap by making it easier for homeowners, businesses, and government leaders to create Rain Ready plans."

Rain Ready was developed by CNT with the support of the City of Chicago, a partner with CNT on the Chicago Sustainable Backyards Program, which ended in 2013.

"There are many actions that residents can take to address the challenges of stormwater," said City of Chicago Chief Sustainability Officer Karen Weigert. "Rain Ready, building off of the Chicago Sustainable Backyards program, will be a one-stop-shop of solutions that will strengthen homes and neighborhoods."

The Rain Ready website features videos and how-to factsheets that show rain readiness in action.

"Rain Ready provides much needed training and information to help families and businesses prepare for the unexpected," said Ed Woods, Director of Community Development for State Farm Insurance Companies. "Damage from surface water can cause severe economic loss for everyone involved. I applaud the Center for Neighborhood Technology for their hard work in helping families, towns and cities better understand water mitigation strategies."

"The user-friendly tools and resources Rain Ready is bringing to individuals and government at all levels to improve our communities is an important addition to the discussion of effective water management policies," said Kirk Parker, Head of the Great Lakes Territory for Farmers Insurance. "The helpful insights offered by Rain Ready can greatly improve efforts to mitigate destructive urban flooding and aid in the more effective use of our valuable water resources."

"America is getting warmer and wetter, and cities are beginning to recognize the need to prepare for unpredictable weather," said Scott Bernstein, President of CNT. "And they need to do it in a way that doesn't break the bank, for themselves or their residents. Our Rain Ready initiative builds on our integrated approach to water management and can help municipalities and property owners alike find cost-effective, scalable solutions."

Communities are also looking to states for help. Although each differs in weather, geography, urban development, and population, states can draw from a broad set of actions to help communities protect themselves now and reduce risks in the future.

"Illinois has suffered severe flooding over the past several years and people across the state have lost possessions, property and peace of mind due to flooding. As extreme weather events become more common due to climate change, we need to focus on protecting Illinois residents from natural disasters such as flooding," said Governor Pat Quinn, who is a member of President Barack Obama's Task Force on Climate Preparedness and Resilience. "We've worked hard to add green infrastructure projects to the Illinois Clean Water Initiative so that Illinois communities can better manage and prepare for stormwater issues while also protecting the environment. The Center for Neighborhood Technology's 'Rain Ready' initiative continues this trend of building a more resilient Illinois by curbing flooding while providing support for residents and business-owners."

The research and preparatory work for Rain Ready was generously funded by the Surdna Foundation, Prince Charitable Trusts, Grand Victoria Foundation, the Joyce Foundation, the City of Chicago and State Farm.

Water Resources and Economic Development: The Unlikely Couple

Indy Chamber

The connection between a community's water infrastructure and its economic development efforts may not be obvious to many; however there is a direct correlation between the two and the impact is immense.

As the leading economic development organization for the Indianapolis region, the Indy Chamber is committed to boosting our economy and helping provide solutions to major issues that impede our ability to attract and retain business – not least among these is protecting our natural resources and advocating for investment in quality infrastructure.

Many factors are at play when companies look to launch, relocate or expand their business, from available workforce, low tax climate, proximity to interstate systems and even availability of natural water resources. In an effort to maintain our long-term economic competitiveness, the Indy Chamber led a study of the region's water supply in 2010. Recognizing that population growth, variable weather conditions, and water-quality degradation in central Indiana require skilled management of our regional resources, the Indy Chamber continues to closely monitor this issue today.

The Indy Chamber and leaders throughout the region understand that central Indiana needs to systematically plan for what is certain to occur – an increase in water demand when there is a short or long-term decrease in supplies. The greatest demand after energy production is public supply. This category is comprised of water utilities that provide water for domestic, commercial, and some industrial needs.

In 2011, the City of Indianapolis took a major step forward in this mission to preserve our resources through proper management and service to citizens and businesses alike by transferring the then publically managed water and wastewater utilities to Citizen's Energy Group, a public charitable trust that operates like a not-for-profit.

This $1.9 billion transfer of the community's water and wastewater utilities not only provided better customer service to water users throughout the state's largest city and economic driver, but also laid out long-term measures to make Indianapolis's rivers and streams cleaner, bringing more consistency to these vital utilities, and saving utility

customers money through rates that will be lower than they otherwise would have been.

The issue of maintaining quality water infrastructure cannot and has not been solved by this single brushstroke. Only long-term planning based on efficient use and a regional approach to managing finite water supplies will improve the Indianapolis region's economic opportunities, promote continued regional growth, and help secure central Indiana's future.

Today, companies considering locating and/or growing in central Indiana can see that business and city leaders are invested in plans to strengthen and maintain a sustainable water supply. Recognition of this mission is a major attractor for investment in our region and will continue to catch the attention of business and talent looking to plant their roots here.

For years, the Indy Chamber's member base has lead the charge in advocating for legislation and programs focused on protecting our natural resources and maintaining a culture of community investment in our regional environment. We will continue this effort through partnerships with both our civic and corporate leaders to ensure we are both thoughtfully and strategically laying the groundwork for a plan that serves our current needs and provides for future generations of resident and corporate citizens of our region.

Upcoming GACC Midwest Programs 2014/2015

We look forward to presenting our upcoming events, which provide the German-American business community with unique opportunities to grow, network, and to meet high-ranking representatives of transatlantic relations in business and politics.

November 2014

- **Annual Executive Wine Dinner**, Chicago, IL, Nov. 7
- **Auto Supplier Business Delegation & Conference**, MI and GA, Nov. 10-14
- **MI Chapter: Fall Dinner**, Detroit, MI, Nov. 12
- **Knowledge Exchange**, Chicago, IL, Nov. 13
- **HR Circle**, IL, Nov. 13
- **International Business Networking**, Chicago, IL, Nov. 19
- **Denver Christkindl Market**, Denver, CO, Nov. 21 - Dec. 20
- **Christkindlmarket Chicago**, Chicago, IL, Nov. 25 - Dec. 24
- **Christkindlmarket Oakbrook**, Oakbrook, IL, Nov. 28 - Dec. 24

December 2014

- **German American Business Outlook**, New York City, NY, Dec. 8
- **Children's Lantern Parade** at the Christkindlmarket, Chicago, IL
- **Knowledge Exchange**, Chicago, IL, Dec. 11
- **Jingle Mingle Reception**, Chicago, IL

Our Signature Events in 2015

Annual Economic Forum, January 29

At the beginning of each year, around 200 executives get together for the German American Chambers of Commerce's Annual Economic Forum. Top speakers from both sides of the Atlantic identify current economic developments in the international and, in particular, the German-American business world. Attendees from a variety of industries, companies, and backgrounds listen to high-ranking speakers from the U.S. and Europe and discuss synergies and business opportunities. Previous speakers included Mesirow Financial Economists Diane and Adolfo Laurenti, and panelists from companies such as Baxter International, Ipsen, Rittal, Volkswagen Group of America, Wittenstein, and the Representative of German Industry and Trade.

Speakers at the Annual Economic Forum 2014 (from the left: Peter Riehle, President & CEO, Wittenstein, Inc., Geoffrey Somary, CEO Ipsen USA and COO Ipsen Group, Adolfo Laurenti, Deputy Chief Economist, Mesirow Financial, Simone Pohl, President & CEO, GACC Midwest, W. David Braun, Partner, Quarles & Brady LLP and Chairman, AHK USA & GACC Midwest, Dr.Thomas Zielke, President and CEO, Representative of German Industry and Trade)

MERLIN Awards Gala, May 1

A true tradition and a highlight not to miss is our Annual MERLIN Awards Gala. Named after one of the founders of the German American Chamber of Commerce of the Midwest, Peter H. Merlin, this elegant gala takes place annually in an exclusive location in downtown Chicago. 300 top executives from the German-American Business community and their guests attend this prestigious event. The highlight of the evening is the MERLIN Awards ceremony, which honors companies exemplifying outstanding achievements in German-American business. A silent auction, networking opportunities, and an exquisite culinary

MERLIN Awards Gala 2014

& entertainment program round off this unique evening of celebration.

Innovation Forum, Fall 2015

Introduced in 2014, this new event invited innovators to the breathtaking and truly inspiring atmosphere of the Abbey Resort at Lake Geneva. We created this forum to provide a business platform for engagement and dialogue for innovation within our German-American business community. Howard Tullman, CEO of 1871 was our keynote speaker, followed by two interactive panels on Growth Through Innovation, ending on a high note with an evening of Bavarian "Gemütlichkeit" at our authentic Oktoberfest!

German American Business Outlook 2013

Wine Dinner 2013: Anniversary Members

Executive Wine Dinner, November 2015

The Annual Executive Wine Dinner is one of GACC Midwest's finest events, featuring unique wines from Germany and other European Countries paired with an exquisite seven-course meal. A refreshing networking cocktail reception is followed by a gourmet sit-down dinner in an exclusive ambiance in downtown Chicago. At the Wine Dinner, GACC Midwest takes the opportunity to festively honor our loyal anniversary members. The Annual Executive Wine Dinner is truly a perfect event to entertain your clients, co-workers, and friends alike.

German American Business Outlook, December 2015

The German American Chambers of Commerce in cooperation with the Representative of German Industry and Trade, and Roland Berger Strategy Consultants survey over 1,900 German subsidiaries in the United States each year to assess their economic outlook. The German American Business Outlook measures the satisfaction of German companies with the United States as an investment location and takes on a different topical angle each year. Last year's study found that German-American business relations are stronger than ever with highly attractive investment conditions in the United States. Headlines celebrated strong German-American business ties and continuous progress when it came to skilled workforce initiatives.

In addition to our signature events, the German American Chambers of Commerce present the following event highlight in 2015: the **German American Business Forum** in Munich (June 24, 2015). Again, high-level executives of German subsidiaries in the U.S. will present their success stories and talk about how to get involved in the U.S. market.

Get involved! We look forward to welcoming you at our events.

For more information, please visit our website and feel free to contact us with any questions.

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The German Amercian Chambers Of Commerce Network

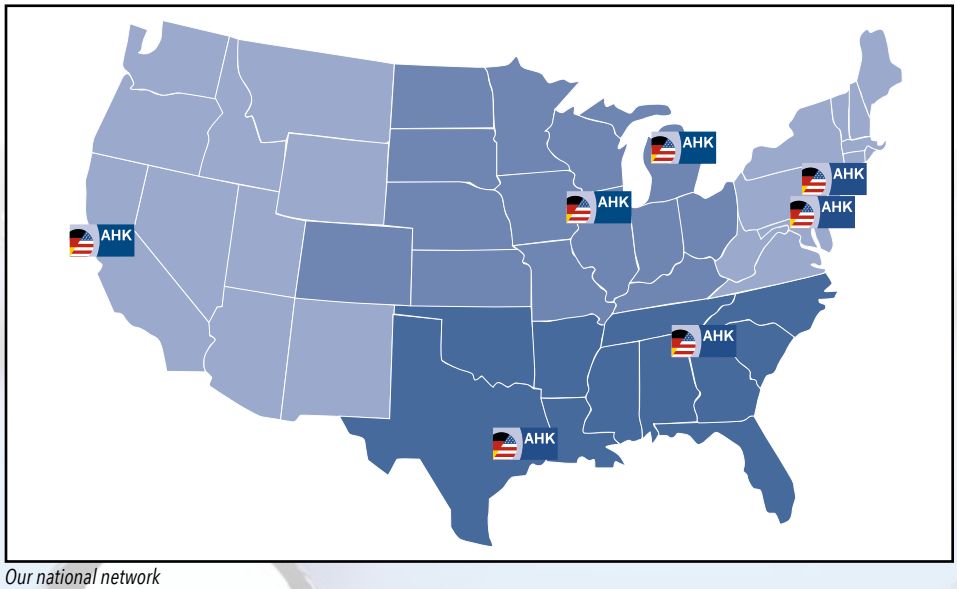
The German American Chambers of Commerce (GACCs) are one of the largest bilateral trade organizations worldwide. With 2,500 member companies and office locations in Atlanta, Chicago, and New York as well as branch offices in Detroit, Houston, Philadelphia, and San Francisco, the members and clients of GACCs benefit from a nation-wide service network. In several states, the GACCs are also represented by local chapters.

The GACCs are an integral part of the network of German Chambers of Commerce Abroad (AHKs). At 130 locations in 90 countries around the world, the members of the German Chamber Network offer their experience, connections, and services to German and foreign companies. The service portfolio of the AHKs is unified worldwide under the brand name DEinternational.

In the U.S., our liaison office in Washington, DC, the Representative of German Industry and Trade, represents the interests of the German business community vis-à-vis both the US administration and other international organizations based in Washington, DC.

The AHKs cooperate closely with the foreign trade and inward investment agency of the Federal Republic of Germany – Germany Trade & Invest.

The German American Chamber of Commerce of the Midwest (GACC Midwest), headquartered in Chicago, and with a branch office in Detroit, was founded in 1963. Our continuing mission is to further, promote, and assist in the expansion of bilateral trade and investment between Germany and the United States, especially the Midwest.



Our national network

GACC Midwest's territory covers 14 U.S. states: the 13 states of the Midwest (Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin) and Colorado, comprising together approximately one quarter of the nation's geographical area, its population, and its GDP.

With over 800 members, GACC Midwest enables its members to socialize and build important business relationships throughout its network.

Our organization combines elements of a trade commission, a membership association, and a professional consultancy - quite a unique concept in international trade promotion. More specifically, the Chamber's three pillars consist of:

1. Public Function

Being the official representatives of German companies, AHKs are key players of German foreign business development on behalf of the Federal Republic of Germany. The GACCs represent German business interests in the USA.

2. Member Organization

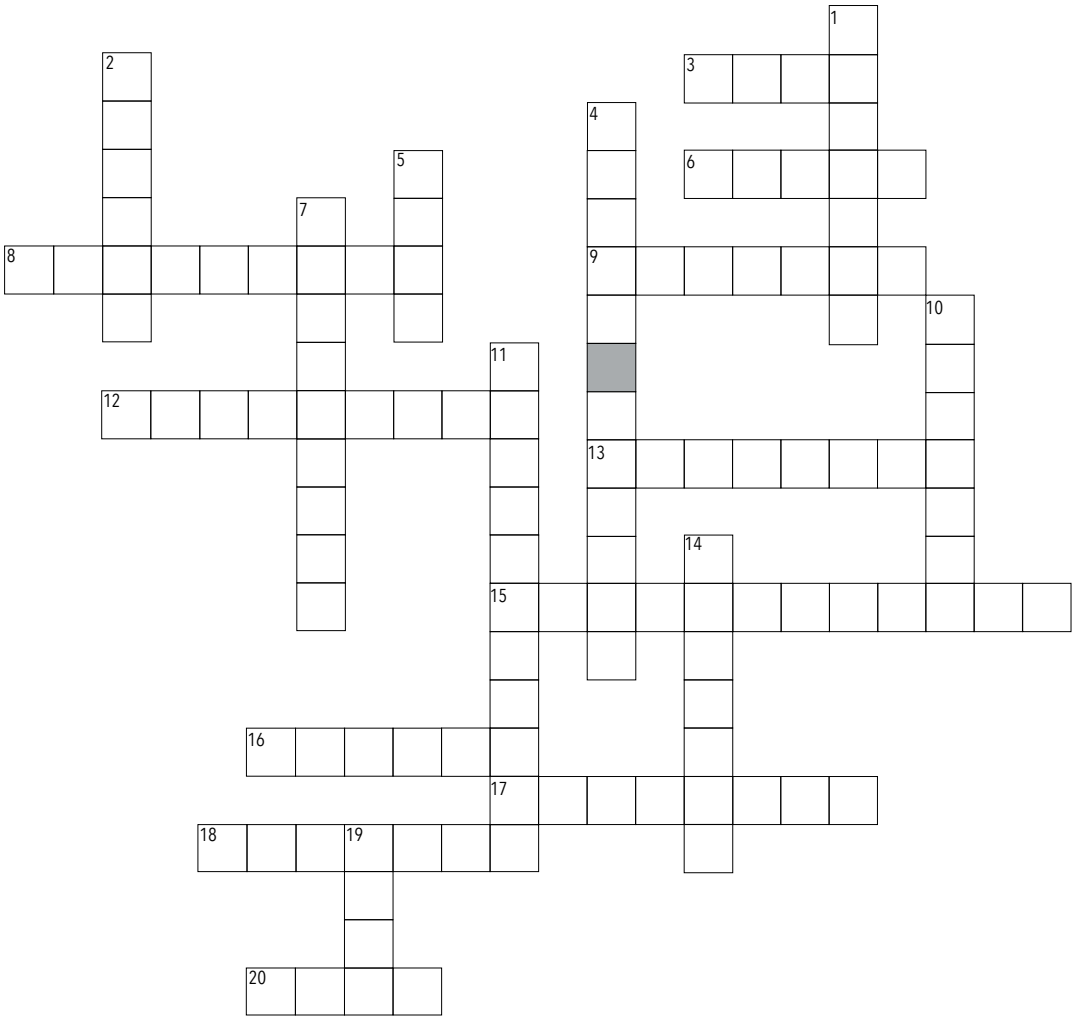
The GACCs are a member organization for companies actively involved in bilateral business relations. As a reliable partner for both U.S. and German companies, we offer excellent services to our members. The GACCs interact with political organizations and businesses in terms of promoting the bilateral business relations and facilitate trade and investment.

3. Professional Consultancy and Service Provider

The GACCs' service portfolio brand "DEinternational" provides consulting services to companies both from Germany and in the U.S. in order to support their foreign business activities.

GAWT Crossword Puzzle – Win A One-Page Advertisement In The Next GAWT Magazine!

Complete the GAWT Crossword Puzzle below, send it to GACC Midwest, and take part in the competition for a 1-page advertisement in the next GAWT Magazine!



Across

3. Number of the orange subway line in Berlin.
6. Name of street in Chicago where GACC Midwest's headquarters are located.
8. Last name of the German soccer coach who brought Team USA to the World Cup in 2014.
9. A southern neighbor of Germany.
12. Which country played against Germany in the FIFA World Cup Final in 2014?
13. A type of road network with unlimited speed in Germany.
15. A city in Indiana where GACC Midwest hosted a GAWT Roundtable in 2014.
16. Which river originates in Germany's Black Forest and empties into the Black Sea in Southeastern Europe?
17. Largest Lake of the Great Lakes.
18. The Great Lakes and the Mississippi, Ohio, and Missouri rivers are located in this U.S. region.
20. Beverage that needs a lot of water for its production and is very popular in Germany and the U.S.

Down

1. Where in Michigan does GACC Midwest operate a branch office?
2. Last name of the current Ambassador of the Federal Republic of Germany to the U.S.
4. Where did the first GAWT Expert Roundtable take place in 2012?
5. How many U.S. states has the GAWT initiative visited from 2012 – 2014?
7. Europe's largest urban re-development project in a downtown area.
10. Last name of a Chicago Mayor who announced $50 million in funding for green infrastructure improvements.
11. What is the acronym of the German American Chamber of Commerce of the Midwest?
14. In 2014, Chicago is celebrating its 20th anniversary sister city partnership with which German city?
19. The theme of GACC Midwest's November signature event.

Thank You For Supporting The GAWT Initiative!