



Metropolitan Water Reclamation District of Greater Chicago

Press Release

Allison Fore

Public and Intergovernmental Affairs Officer

312.751.6633

allison.fore@mwrdd.org

100 East Erie Street, Chicago, Illinois 60611

For immediate release

November 22, 2016

Perspectives at the Water-Energy-Climate Nexus: Anticipating changes to come

Dating back to 1950, it was believed that economic growth was inextricably linked to the nation's carbon dioxide emissions. The more the U.S. produced, manufactured, provided and even polluted the more wealth there was to go around. Then courses were altered. In the last few years, carbon emissions stayed flat and are now predicted to decline over the next decade as new environmental regulations take hold and more conscientious minds begin to consider the effects on the planet. At the same time, however, the nation's gross domestic product has continued to rise. Breaking up this union gives hope for simultaneous prosperity and environmental stewardship in the face of climate change. "We used to think we needed both to succeed," said Jessica Hellmann, PhD., director of the Institute on the Environment at the University of Minnesota. "That decoupling changes everything."

Despite that promise, serious challenges await, and many of those topics were brought to the forefront at Northwestern University's 2016 Climate Change Symposium: Perspectives at the Water-Energy-Climate Nexus. As Hellmann pointed out, water flows right to the center of the discussion. When polled about their greatest concerns over the next 10 years, global leaders responded that water crises attracted their biggest concern at 39.8 percent, followed by failure of climate change mitigation and adaption (36.7 percent), extreme weather events (26.5 percent), food crises (25.2 percent) and profound social instability (23.3 percent).

Before leading-edge scientists, researchers, government officials and other experts could weigh in on the topic, there was the startling admission that there was still a faction of Americans slowing these advancements. Not everyone believes in the existence of climate change, U.S. Rep. Mike Quigley said in his opening keynote address. Quigley said it will continue to be an uphill battle to



U.S. Rep. Mike Quigley (5th) spoke of climate action in the face of climate denial.

change these ideologies, "until there is a better political solution." He suggested that you can push the pendulum only so far without strong support in the middle of a polarized world. Legitimate debate has turned to "reality TV" in Washington, D.C., and strong leadership will be needed in the middle to confront climate change.

"Everything else in a noisy world is noise," said Quigley. Hellman said that the effects of climate change are devastating, and the resulting changing weather patterns could trigger massive migration of people as temperatures and ocean levels both rise. Hellmann said greenhouse gases are not projected to decrease for a decade, but once they do the question then becomes how aggressive should the world be in reaching the goals laid out for 2050 in the Paris Agreement that strives to hold the increase in the global average temperature to well below 2°C above pre-industrial levels. Also in that agreement, developed countries like the U.S. are jointly expected to provide \$100 billion by 2020 for mitigation and adaption.

(continued)

Recovering Resources, Transforming Water

Established in 1889, the MWRD (www.mwrdd.org) is an award-winning, special purpose government agency responsible for wastewater treatment and stormwater management in Cook County, Illinois.

Perspectives at the Water-Energy-Climate Nexus (continued)



Joseph Ryan, PhD., director of the Air-Water-Gas Sustainability Research Network at the University of Colorado, Boulder, talked about how unconventional oil and gas extractions through developments like fracking have also paid a toll on water usage.

In addition, a considerable amount of dollars must be spent domestically to ensure the U.S. is doing its part to reduce emissions. Hellmann argues that the nation should protect its natural assets. She said that projects that work to promote less reliability on freshwater for agriculture and restore wetlands to recharge groundwater are two examples of how water plays a role. Governmental, social and economic readiness will play key roles in protecting the vulnerable resources like water when faced with the growing impacts of climate change, Hellmann said. Congressman Quigley recently helped pass legislation to expedite the completion of the construction on the Metropolitan Water Reclamation District of Greater Chicago's (MWRD's) McCook Reservoir to prevent pollution in local waterways and mitigate flooding in Chicago and 36 other communities that are experiencing an increasing frequency of intense rain events soaking the Midwest. Water continues to be a central point of interest in the Great Lakes, home to 20 percent of the world's freshwater, said Drew Gronewold, PhD., physical scientist for the National

Oceanic and Atmospheric Administration, Great Lakes Environmental Research Laboratory. What most fail to recognize is that the Great Lakes are so massive that there are 4,530 miles of Great Lakes coastline, more than double the Atlantic coastline (2,170 miles) and triple that of the Pacific (1,300 miles). The surface areas of Michigan-Huron and Superior are also greater than any other freshwater area in the world, but the Great Lakes are "often overlooked" in the climate change discussion, Gronewold said. Across the world, there is a finite amount of freshwater. Of the world's water, 97.5 percent is saltwater from the oceans, and of that remaining 2.5 percent, it almost all comes in the form of ice caps and glaciers (79 percent) and groundwater (20 percent). Of that remaining 1 percent, a little more than half is freshwater found in lakes, Gronewold said. That's why scientists are paying particularly close attention to the dramatic fluctuations in lake levels over the history of the Great Lakes that are not experienced on other bodies of water and rivers and oceans around the world. The far more dramatic fluctuating water levels, which

(continued)

Recovering Resources, Transforming Water

Established in 1889, the MWRD (www.mwrdd.org) is an award-winning, special purpose government agency responsible for wastewater treatment and stormwater management in Cook County, Illinois.

Perspectives at the Water-Energy-Climate Nexus (continued)



A field of experts gathered to discuss climate change in the context of water and energy innovation and issues at Northwestern University's 2016 Climate Change Symposium. The event was coordinated by the Northwestern Center for Water Research, the Department of Earth & Planetary Sciences, the Institute for Sustainability and Energy at Northwestern (ISEN) and the Northwestern-Argonne Institute of Science and Engineering.

have been recorded back as far as 150 years, stem from changes in the magnitude of precipitation, ice melting in the region and suppressed evaporation. After the frigid temperatures experienced in the famed “Polar Vortex” winter of 2014, the lake levels surged.

“Very cold water loses energy and doesn’t evaporate,” said Gronewold showing aerial images of portions of the frozen Great Lakes in 2014 and pictures of a snow storm that forced a state of emergency in Buffalo, N.Y. in 2014. “If a previous winter is colder and there is more precipitation, there will be less evaporation.”

But while a few winters may lead to surges in lake levels, under higher emissions scenarios predicted, the lake levels will instead decrease on the order of 0.5 to nearly 2.0 feet toward the end of this century. For now, scientists can gather data and determine whether projects and simulations can predict or offer any insight. “How do we take lessons learned on a global scale and translate to a regional scale and how do we take regional lessons learned to other parts of the world where relevant,” Gronewold said.

This unpredictable precipitation has led to a new battle waged against urban flooding. Harriet Festing, director of CNT’s Water Program, discussed the nature of urban flooding and various forms it takes while impacting more and more people. Slides of her presentation showed images of flooding impacting even State Farm Insurance and Perma-Seal buildings, proving that even companies that provide insurance and basement waterproofing can inevitably fall prey to flooding. Further, it also speaks to the inability to be prepared. She said flooding claims

have been filed in 99 percent of Illinois counties, but over 90 percent of these claims were filed outside of mapped floodplains.

“The highest damage payouts are in places where FEMA does not recognize the risk,” Festing said.

CNT’s work motivated elected officials to enact legislation requiring FEMA to conduct a national study on urban flooding. Based on its many partnerships, CNT, also known as the Center for Neighborhood Technology, has been able to deliver more sustainable practices that come to the aid of homeowners and communities to mitigate flooding. Through CNT’s popular RainReady initiative, homeowners and municipalities save money by installing green infrastructure solutions like rain gardens and bioswales for stormwater management. The pain can be better managed, she said.

“Engineers can learn from doctors to identify and interpret risk, and then design and finance solutions,” Festing said.

One of those alliances was formed with the MWRD to implement and assess the value of green infrastructure to mitigate flooding, said Thomas Kunetz, PhD., assistant director of Engineering at the MWRD. The Illinois General Assembly in 2004 delegated the MWRD as the stormwater management authority for Cook County, as conditions became more unpredictable and more outside-the-box thinking was required to assess the situation going forward. The MWRD quickly recognized that simply digging a hole in the ground to contain more water only created more holes into

(continued)

Recovering Resources, Transforming Water

Established in 1889, the MWRD (www.mwr.org) is an award-winning, special purpose government agency responsible for wastewater treatment and stormwater management in Cook County, Illinois.

Perspectives at the Water-Energy-Climate Nexus (continued)

building a reputable plan.

“We’re all part of the problem, so maybe we can be part of the solution,” said Kunez. “But we can’t just put holes in the ground. That’s Swiss cheese.”

The MWRD has taken steps closer to completing its massive Tunnel and Reservoir Plan to build 109 miles of Deep Tunnels and the two largest combined sewer reservoirs in the world, while distributing more than 100,000 free rain barrels, and currently investing in nearly 100 different stormwater projects across the county that include green alleys, streambank stabilizations and a schoolyard redesign and construction partnership that works to accommodate more stormwater retention. In 2014, the MWRD introduced the Watershed Management Ordinance, which provides uniform stormwater management regulations to prevent future commercial, municipal, and residential development and redevelopment projects from exacerbating flooding and protects environmentally sensitive areas.

In its role as wastewater treatment operator, the MWRD has found that there is very little waste to go around during the process. The agency is incorporating renewable energy production through its anaerobic digesters and hydroelectric power generated at its Lockport Powerhouse, just to name a few sources on its way to reaching energy neutrality by 2023. In addition to energy, the MWRD is also recovering phosphorus, biosolids, algae and water, which is being reused through the industrial sector. Even breweries are experimenting with the idea of brewing beer through reclaimed water, Kunez said.

“Don’t judge water on its history. Let’s judge it on its quality,” Kunez said.

Mark Johnson, PhD., director of the Advanced Manufacturing Office for the U.S. Department of Energy (DOE), said there is a growing focus on energy efficient manufacturing. Officials are attempting to develop a robust U.S. clean energy economy where products are developed and manufactured through a competitive manufacturing sector that is more energy productive. They aim to meet these goals by doubling the amount of clean energy research and development. The challenge is that manufacturing accounts for roughly 25 percent of energy consumed in the U.S. Johnson said production efficiencies will come with improved information technology that comes in the form of computing abilities and big data analytics to create

advanced sensors, controls, modeling and platforms. He said that will require infusions of research and private sector participation.

“As a globe we are betting on innovation,” Johnson said. “We can double research and development investment and mobilize private sector development to leverage it. We have the best universities and best labs in the world. The question becomes how do we turn it loose and break down the silos?”

The U.S. investment of \$500 million in research and development has catalyzed over \$1.2 billion from a consortia of DOE-supported institutes from the National Network for Manufacturing Innovation, Johnson said. These institutes have attracted hundreds of companies and universities as active partners from across the country to find ways to save on energy costs and spark innovation in projects that include desalination and freshwater transport. It’s these types of public-private partnerships that will reap positive yields for energy and water usage in the face of climate change. Investment in this research leverages innovation for future needs facing the environment, economy and community, he said.

“Investing in research opens new avenues,” Johnson said. He was not alone in this perspective. Scientists at the symposium repeatedly reflected on this research that aided in the understanding of this nexus between water and energy. Water and energy are symbiotically relying on each other to be produced and delivered, and in the face of climate change they are inherently impacted together, and it becomes imperative that one cannot be addressed without the other. The speakers also repeatedly referenced the students in the room as future leaders to quell these seemingly insurmountable issues.

Aaron Packman, director of the Northwestern Center for Water Research, told the crowd that they can take many actions to respond to the growing crisis. He said addressing climate change starts at home and at the polling booths. Through events like the symposium, he said he hopes to see connections made on the local level through partnerships between Northwestern and CNT, the MWRD and the DOE’s Argonne National Laboratory and others to work together and develop solutions to climate change.

“Our students are interested in climate change,” Packman said. “We are trying to make a difference and we’re all part of that here at Northwestern.”

###

Recovering Resources, Transforming Water

Established in 1889, the MWRD (www.mwr.org) is an award-winning, special purpose government agency responsible for wastewater treatment and stormwater management in Cook County, Illinois.