Testimony of
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Committee on Natural Resources
"Modernizing Western Water & Power Infrastructure in the 21st Century"
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Greetings Subcommittee Members:

I'm Jonathan Kaledin, the EVP/GC of Natural Systems Utilities, or NSU. NSU is headquartered in NJ and has regional offices in MA, MN, and CA. We are a distributed (i.e., non-centralized) water and wastewater system company, and our current focus is on water reuse systems.

I've worked on water infrastructure issues for 30 years now—for the government, for NGOs, and in the private sector. As a result of my work in these three sectors, I've got a multi-dimensional perspective on our water infrastructure needs. Attached to my testimony is a 12 slide power point presentation; I'd like to highlight some of the slides during my oral testimony today.

Let me start by saying that I've been working on and writing about our national water infrastructure since the 1990s. Some of my first work in the field was on our clean water (both water supply and wastewater) financing needs—my "status of U.S. infrastructure" slide is not telling us anything new; we've had perennial problems with our water infrastructure—the funding of it and its quality—for decades now. Note in this slide, however, that two of the states with the largest 20 year needs are western states (west of the Mississippi River): Texas and California.

I want to focus in on two things from the title to today's hearing: "modernizing" and "21st Century." While related they don't mean the same thing: just because we are in the 21st Century doesn't mean that we necessarily have to choose approaches to water infrastructure that I would characterize as "modernizing." Doing so, however, is absolutely critical to ensuring that we accomplish and maximize our economic, social, and environmental goals when it comes to water.

"Modernizing" our Western Water Infrastructure

There are four principles that need emphasis in regard to modernizing our western water infrastructure in the 21st century:

1. Don't "build your own, or another, dinosaur."
2. Determine and make available the "right water for the right use."
3. When it comes to water, "use it more than once."
4. Recognize that "green water infrastructure" is critical to our future.

I am convinced that the successful application of these four principles will allow us to modernize our water infrastructure this century in economically efficient, effective ways, and in ways that not only create many so-called "infrastructure" jobs, but will allow state and local economies to thrive by keeping water and wastewater costs down while establishing the stability needed in communities to have their businesses succeed. In addition to the economic benefits associated with these principles, their adoption also allows us to accomplish our social (water for all) and environmental (water outside of an anthropomorphic context) goals. Finally, they will allow us to build more resilient systems than our water systems of the past, and as the 21st century brings climate change with it, such resiliency is an imperative.

Don't Build Your Own Dinosaur

The concept of not "building your own, or another, dinosaur" challenges the notion that the answer to all of our water infrastructure needs lies in the huge, centralized, and by and large linear water supply and wastewater systems of last century. Much of the country's prosperity and growth can be attributed to the development of large water supply and wastewater systems, but these systems—our dams, our major city systems, our large scale irrigation projects—are not "modern" in any sense of the word nor need to be thought of and relied upon as the central focus of our 21st century water infrastructure.

Although the focus of today's hearing is on western water infrastructure, let me "pick on" a city in the East—Boston—for a minute. Slide 6 in the accompanying power point presentation depicts Boston's "dinosaur" of a water infrastructure system: a huge, hugely expensive, and almost completely linear system that brings water into the metropolis from close to 100 miles away, and then once it is used discharges it almost 10 miles out into Massachusetts Bay.

Once these enormous water infrastructure systems are built, it takes decades to pay for them, almost always through increases in water and sewer rates. In Boston, water use has dropped, so the system finds itself looking for ways to increase revenue through additional water sales to communities and retail customers. When I worked for the federal government in the late 1980s I was part of the federal team overseeing the "Boston Harbor cleanup," the multi-billion dollar modernization of the metropolitan area's wastewater system. During the design stage of the project, the Director of the Charles River Watershed Association came to see some of us, and proposed that we build a series of smaller wastewater facilities around the region, rather than one enormous (one of the world's largest) facility located on Boston Harbor. I remember thinking at the time "what a strange and silly idea."

Now I know that the idea was a prescient one—insight into how not "building your own dinosaur"—huge and expensive water infrastructure projects such as dams or enormous, centralized wastewater or water supply facilities--allows for future adaptability and much greater flexibility in regard to meeting future water needs. If Boston had built a series of small facilities rather than a single large system, arguably it would not have a situation on its hands where declining or flat revenue was a real concern for its water infrastructure.

This same exact story could be told about the great, centralized water infrastructure systems that serve Phoenix, or San Diego, or Los Angeles, or Seattle, or numerous other western municipalities, large and small. The issue is one of careful planning as to what are the most economically efficient ways of meeting our future water needs. "Modernizing" our western water infrastructure in the 21st century unquestionably means first taking a long hard look at determining what our true needs are, and second, analyzing if there are better—cheaper, more adaptable, quicker, more multi-dimensional--alternatives to the large centralized water projects that defined the last century.

Right Water for the Right Use

The "right water for the right use." What does this mean, and how should this principle underlie the "modernization" of our "21st century" water infrastructure?

As our water systems in the 20th century were developed, we adopted a "one size fits all" approach to how we used our water. As a result, we now treat and deliver, and at significant cost, potable water for use where potable water is not needed. Slide 7 of the accompanying power point presentation gives a glimpse of this: why are we watering are lawns, and our crops, with drinkable water? Why are we using potable water in our toilets—we all know dogs or cats that lap from the toilet—if the ceramic or plastic is clean enough, so could we, since the water in our toilets is almost always drinkable.

Modernizing our water infrastructure in the 21st century simply has to include building water infrastructure that allows us to be much much more discriminating in regard to matching the quality of water we use to the need itself. In the west, where water supply—quantity--is often the predominant issue as opposed to the quality of water, it is almost insane to treat water to drinkable standards and then use it for purposes for which less high quality water would do.

Unless our investment in modernizing our western water infrastructure takes this issue fully into account, planning for and then implementing a whole new paradigm regarding the "right water for the right use," we will have failed to bring western water infrastructure into the 21st century. Strong words, but unquestionably so; and there is a true leadership role for the federal government to play on the issue of the "right water for the right use." Our federal regulatory apparatus needs to be tweaked (not dismantled or otherwise harmed) so as to allow for the development of water infrastructure aimed at making available the "right water for the right use," and federal funding needs to be made available for such systems just as much as it is made available for more conventional water infrastructure.

Use It More Than Once

The cyclical principle—"use it more than once"—also needs to be adopted fully into modernizing our western water infrastructure in the 21st century. To a certain extent, it is already in effect—naturally so. The Colorado River (including its tributaries—see Slide 5) is used many times as it wends its way from Wyoming down to the Gulf of California. Water is taken out for water supply purposes and treated wastewater put back into it many times during its voyage to the sea, so it is indeed "used more than once." This is the case with virtually all of our rivers of any substance.

But "use it more than once" in regard to modernizing our western water infrastructure really has a different meaning to it--a meaning that incorporates both the concept of "not building your own dinosaur" and the concept of "the right water for the right use." Part of our modernized water infrastructure has got to involve breaking the linear approach to water management—look at the linear quality to the Boston system (slide 6)—and using water cyclically. For example, treating wastewater to non-potable but safe standards, from a health perspective, and then using it to water lawns and crops, is an example of the "use it more than once" principle that needs full adoption this century.

Western communities are already well on their way to putting the "use it more than once" principle into full effect. Orange County's (CA) replenishment of its aquifers with treated wastewater is one of the best known examples; the County pumps treated wastewater into discharge wells for two purposes—to prevent saltwater from intruding into its drinking water aquifer, and also to allow treated wastewater to be treated further naturally and recharge the drinking water aquifer. This is known as indirect potable reuse of water. Another example of it is in San Diego, where treated wastewater is being added to the City's reservoirs. There is already direct potable reuse of water—the treatment of wastewater to a standard that allows it to be used directly for drinking water and other potable purposes occurring in the West, in Texas, in the communities of Big Springs and Wichita Falls.

What is important to note regarding the "use it more than once" principle is that it can be championed at many levels and within many different contexts as part of the modernization of our western water infrastructure. Two of the examples above show communities and counties—Big Springs, TX and Orange County, CA—embracing "use it more than once." It is a principle, however, that can be brought down to the in-building and district size level, however, which is the space that NSU operates within. We design, build, and operate water reuse systems at a much smaller level than the previous examples. Slides 10-12 give an example of one of our in-building water reuse systems; these systems result in non-potable water being available for landscaping, toilets, laundry, and cooling tower purposes, which in turn results in 50-60% less water being used by a building—coming in and being discharged.

Rather than establishing expensive "traditional" new water supply infrastructure such as well fields, dams, and desalinization plants, one can argue that one of the smart and truly cost-effective ways of bringing our water infrastructure into the 21st century is to adopt fully and aggressively the "use it more than once" principle to developing water infrastructure.

Green Infrastructure

Finally, the last principle that needs to be adopted in regard to modernizing our western water infrastructure is the principle that "green infrastructure" needs to be a critical component of it—"green" is the color of the 21st century.

Our knowledge about what is efficient and effective in meeting our water supply and wastewater needs has grown exponentially through the decades, and will continue to do so. While in generations past, we thought that hard structured, highly engineered approaches to all of our water supply and wastewater needs was the right way to go, over the past 20 years or so there has been a growing recognition and acceptance of the fact that approaches that adopt natural means have much to offer.

Slide 9 shows what a City that fully adopts a number of different "green infrastructure" approaches into its overall water infrastructure might look like. Athletic fields that double as storm water retention facilities; green roofs; storm water swales that also have solar energy components to them, and much more. Wetlands are now being used as "green infrastructure" for both wastewater treatment purposes and stormwater control, and preserving land in its natural state that surrounds or is on top of our water supplies—watershed land—is now an active and integral part of water infrastructure planning and development.

What is critical to note about using "green infrastructure" approaches to modernizing our water infrastructure in the 21st century is that such approaches are not just out-of-the-mainstream desires of the environmental community anymore. The economics of "green infrastructure" approaches have been analyzed and developed in sophisticated, reliable ways in recent years, and the health and environmental benefits of such approaches compared and analyzed carefully against highly engineered, technical water infrastructure approaches. We now know that "green infrastructure" often can work as effectively and efficiently as traditional infrastructure, and that there can be compelling reasons for adopting its use.

In closing, let me address briefly the modernization of our western water infrastructure and the issues of climate change and resiliency. While there may be climate change skeptics--whose views need to be acknowledged—it is pretty clear that 21st century water infrastructure development must take into account increased climate variability and the fact that modernizing our water infrastructure must account for increased resiliency within these systems. Increased climate variability, and the need for increased resiliency within our modernized water infrastructure, truly require that we rethink our approaches to such infrastructure.

One of the keys to the future, I believe, lies in adopting a smaller approach to sizing our water infrastructure overall, and adopting as cyclical an approach to water infrastructure as is possible. Both are at the root of the four principles set forth above.

Thank you. It has been a real pleasure presenting to you.