ENERGY CENTER

The Center for Global Energy, International Arbitration and Environmental Law

A Sibling Rivalry: Energy Efficiency and Water Conservation

Jeremy Brown April 14, 2014 1 Comment

In the mid-1970s, the United States adopted its first significant policies aimed at meeting energy needs by reducing demand rather than increasing supply. So began the energy efficiency movement.

Despite the many similarities between the energy and water sectors, a decade passed before the country started to manage the demand side of water. And so began the water conservation movement.

Ever since, water conservation – and I use "conservation" and "efficiency" interchangeably, in keeping with their popular definitions, despite important technical distinctions – has played the part of the younger sibling, learning from energy efficiency, piggybacking off of energy sector efforts, but never quite achieving the same level of size or sophistication.

In this admittedly theoretical and semi-formal post, I'd like to present a quick theory on why it has not.

The post breaks down into three parts. The first part makes the case that energy efficiency does in fact have the lead. The second part looks briefly at the factors that have driven energy efficiency and water conservation. The third part considers another set of factors: those that differentiate water and energy and explain the divergent trajectories.

The photo – taken at greasy spoon diner, in April 2014 – hints at the extent to which water conservation is still considered novel in some quarters.

Energy Efficiency Has the Lead

ENERGY EFFICIENCY

The Energy Information Administration (EIA) projects total energy use will increase from about 95 quadrillion Btu, in 2012, to 106 quadrillion, in 2040, a rate of about 0.3 percent per year. To keep the rate of energy use from increasing as quickly as the rates of population and the economy (0.9 and 2.5 percent per year, respectively), the EIA projects that the United States will have to reduce per capita energy use, from about 312 million Btu in 2011 to less than 270 million Btu per person in 2034.

This projection is somewhat remarkable in that the reduction will be numerically much greater than the reductions that have occurred in the forty years that energy efficiency policies have been in effect.

The EIA explains: "From 1970 through 2008, energy use dipped below 320 million Btu per person for only a few years in the early 1980s." Put differently, per capita usage held relatively steady during the same time that large-scale deindustrialization was occurring and appliance and vehicle efficiency standards were being implemented.

During that same time, of course, new energy demands emerged: the digital economy is energy-intensive and changing lifestyles (the United States currently has about 3.4 times more as many highway vehicles as it did in 1963, for instance, despite having only about 1.7 times as many people) have further stoked energy consumption.

In some ways, then, energy efficiency is yet another arena that follows a Whac-A-Mole dynamic. Efficiency policies have had a significant impact; whether they have had an adequate impact is a separate question.

WATER CONSERVATION

In the last forty years, as energy use has increased, water use has declined – gradually at a national level and dramatically at a per capita level.

The United States does not have a national water program similar to its national energy program; nor does it integrate its water functions into a single department in the executive branch as it does energy functions in the Department of Energy. As a result, the federal government does not track water usage as meticulously as it does energy usage. (The data gaps for water are particularly striking when compared to energy; in many jurisdictions, for instance, groundwater pumping is not even measured.)

The best national usage figures come from the USGS. It last updated its numbers in 2005, and things may well have changed in the last nine years. But as of 2005, national usage was down about 5 percent from its peak in 1980, when the country had 30 percent fewer people.

What will happen in the future is difficult to predict – and climate change complicates forecasting – but credible arguments have been made that we can continue to hold steady or even ratchet down our usage. If you take the trajectory of long-term national usage as your metric of success, we as a country seem better at conserving water than energy.

COMPARISON OF POLICY AREAS

And yet, at this moment, in April 2014, I would argue– and I suspect most people would agree – that between water conservation and energy efficiency, energy is winning the race.

This is an observation. It's somewhat subjective, and somewhat impressionistic. There isn't a hard formula for doing a side-by-side comparison of these two policy areas. But according to any number of gauges, energy efficiency would come out on top.

Foundations and nonprofits as a group, for instance, devote substantially more resources to energy efficiency than to water conservation, in pursuit of agendas that reflect such factors as salience, political viability, and donor interest.

Similarly, governments at all levels have generally considered and adopted more laws and goals for energy efficiency than for water conservation. A few examples:

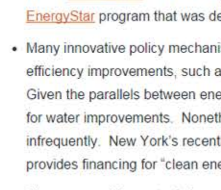
- EPA's WaterSense certification program for water-efficient products simply emulates the EnergyStar program that was developed years before.
- Many innovative policy mechanisms have been developed to provide financing for energy efficiency improvements, such as contractual assessments and on-bill financing/repayment. Given the parallels between energy and water, these mechanisms would often work equally well for water improvements. Nonetheless, they have been extended to water relatively infrequently. New York's recently launched and much-heralded NY Green Bank, for instance, provides financing for "clean energy" but not for water.
- The energy utility sector is leagues ahead of the water sector in developing rate structures that encourage conservation. (The Pacific Institute has put out two excellent reports on this subject.)
- Even in the business community, energy efficiency has generally been viewed as presenting more economic opportunities than water conservation and as a result has drawn more interest.

Drivers of Conservation and Efficiency

That energy efficiency is so much further ahead of water conservation on so many fronts is surprising. That is in part because water conservation has had a full generation to catch up and overcome energy efficiency's initial head start. And it is in part because water conservation and energy efficiency are being driven by many of the same general factors.

I have identified four such factors, which are all interrelated and, like many classifications of factors, are far from surgical in their precision: they could be sliced and diced into more factors, or fewer ones, with the same names, or different ones.

- Pollution Control: In the 1960s and 1970s, the federal government enacted significant pollution control laws that indirectly encouraged conservation and efficiency. Generally, inputs (such as water) correlate with outputs (such as wastewater) and reducing outputs requires to some degree reducing inputs.
- Social Values: Social values have shifted over the last forty years in a way that has led to laws and political pressures that favor the environment (or at least aspects of it) over competing policy concerns. Energy and water use affect and are affected by these environmental concerns. To take one example, Texas' first state water plan – released in 1961 – lamented that "water so urgently needed for the economy of the State *wastes* to the Gulf." Not even the most ardent opponent of environmental regulations would say that sort of thing today (since even opponents of regulation still tend to favor environmental protection).
- Economic Change: Heavy industry – which is both energy- and water-intensive – accounts for a smaller percentage of the American economy than it once did. A shifting industrial base combined with new technologies has helped to contain water and energy usage.
- Resource Scarcity: Concerns about the finite supplies of water and energy sources (or at least cost-effective and environmentally acceptable supplies) have motivated both water conservation and energy efficiency. In 2010, for instance, the Pacific Institute coined the term "peak water." The New York Times anointed it a word-of-the-year. And it is the water-world equivalent of peak oil.



This picture captures the regulation/preservation disjuncture. It is of a bumper sticker affixed to the back of an angler's car parked at a county park in the Blue Ridge Mountains.

What's So Special about Water

Despite these shared factors, there are other factors that help to explain the reasons that water conservation has fallen behind energy efficiency. In my mind, there are four primary factors: (1) water is cheap; (2) water is local; (3) water is public; and (4) climate change ties more directly into energy.

WATER IS CHEAP

In 2012, the American Water Works Association estimated the average American household spent $335 a year on water, though the exact amount would vary considerably from one market to the next.

For that same year, the EIA estimated an average household spent $1287 on electricity – about 3.8 times as much as on water – and that isn't even counting other forms of energy like natural gas or gasoline, which came to about $2,912, or nearly four percent of the average household's pretax income.

Of course, the costs that consumers pay don't necessarily reflect the full costs – the full economic costs, that is, let alone the social costs – of the goods that they're paying for. But the comparatively cheap cost of water has discouraged conservation in two ways.

First, contracting over something, quantifying something, litigating over something, and regulating something are only worthwhile if we think the stakes are high enough. Otherwise, we don't bother. And in water conservation you see that – an element of not bothering.

Second, price influences demand.

Admittedly, over the last thirty years, water costs have risen – as we have tapped out hydrologic systems, as federal support for new water infrastructure has dwindled, as projects costs – legal costs, engineering costs, and construction costs – have shot upward. As a result, the water sector has embraced conservation in a way that would have once been unthinkable.

Still, compared to energy, water remains relatively cheap. It eats up less of our budgets, at both a collective fiscal level and at an individual consumer level, and so we worry about it less unless some external force – such as the current worst-on-record drought in California, or the recent worst-on-record drought in Texas – makes us.

WATER IS LOCAL

In the 1970s, oceanographers had grand ideas about taking icebergs to the hot and dry parts of the world. In 1978, the California legislature even endorsed a resolution to park an iceberg off the coast of SoCal or Baja.

From an engineering perspective, the idea isn't that out there. In the nineteenth century, ships tugged small icebergs from southern Chile up to Valparaiso, so breweries could use them. And these days, ships in the artic, as a matter of routine, move icebergs away from oil rigs.

Still, even if moving an iceberg is doable from an engineering perspective, to a lot of us it seems outlandish. That's partly because of how icebergs look. It's like moving a mountain. But it's also because we're not used to moving water that far.

Transporting energy resources across the world is routine. The U.S. is talking about sending more LNG to Ukraine. You couldn't get much further away than that and still be on the same planet.

But water, compared to energy, is a regional game. The primary reason is that even in the most arid places, there are ways to obtain water that are more cost-effective than importing it from the other side of the world.

What will be the largest seawater desalination plant in the Western Hemisphere is currently being built in a San Diego suburb. The plant has a budget of about $1 billion and is expected to sell water for around $2,000 an acre foot.

That is expensive. (By comparison, the Texas Water Development Board estimates the cost of desalinating brackish groundwater – a relatively expensive supply source in a relatively water-scarce state – at only $357 to $782 per acre foot; the agency puts the cost of desalinating seawater at $800 to $1,400 an acre foot.) Still, the cost is not as great as importing from water-rich nations like Canada, Russia, or Brazil.

Compare this to energy. According to EIA, the United States currently imports about 16 percent of the energy it consumes, down from about 30 percent in 2005. The breakdown varies by fuel source, but the figure does convey the extent to which energy – unlike water – is vulnerable to geopolitical shocks.

Even when water issues have an international dimension, they remain fundamentally regional. If Mexico disregarded its treaty obligations and diverted all the flows in the Rio Grande, for instance, South Texas would suffer enormously. But the move would not affect water prices in Montana or Massachusetts or even in other parts of Texas.

This is important because it was the 1973 OPEC embargo that propelled energy efficiency in the first place. And in many ways, water conservation has been piggybacking off of energy efficiency ever since.

The phrase "water independence" has recently come into circulation. It's patterned after "energy independence," of course, but has a meaning that is both more modest and more ambitious.

Rather than becoming independent of international sources, it means becoming independent of extra-jurisdictional sources. Santa Monica – doing the sort of thing Santa Monica is famous for doing — has set a goal of relying entirely on water from within city limits by 2020. That means no more water from the Colorado River (a regional source) or the Bay-Delta (and even more regional and in-state source).

That "water independence" has the meaning that it does – and that a city like Santa Monica could become completely water independent – conveys the degree to which water is a regional issue compared to energy and thus insulated from the sort of international concerns that have fueled energy efficiency.

WATER IS PUBLIC

Water can be privately owned and privately stored. It can be put to private uses. But it has an unshakable public character that threads its way through water law and policy.

This character animates state ownership claims and no injury rules and the public trust doctrine and infrastructure financing. This public character, I would argue, gives governments at all levels more oversight of water and more opportunity to promote conservation.

But on the other hand, it creates entitlements and expectations and political pressures that have historically worked against conservation. As in so many other areas of life, we convince ourselves that we deserve what we have come to expect.

That is not to imply that there is no sense of entitlement in the energy sector. Every time gas prices materially increase, drivers complain and politicians grandstand. But that's where the public character comes into play. Gas prices are set by a global market. American politicians can subsidize those prices and can increase or decrease gas taxes (and thus the prices that consumers ultimately pay), but they cannot control the prices.

Similarly, consider electricity. In this country, with some notable exceptions such as in Austin and San Antonio, most Americans purchase their electricity from investor-owned utilities that are accountable to regulators but that above all answer to shareholders.

Conversely, most customers receive their water from publicly owned utilities – utilities that are typically parts of local governments. The local governments are accountable to voters, who also happen to be ratepayers. The local governments may have to abide by certain constitutional or statutory constraints; but they do not have to account to PUCs or equity owners who could temper ratepayer expectations.

Because water is so regional, politicians can exert significant influence over water prices by doing such things as having taxpayers subsidize new infrastructure to keep down rates. And they must determine how best to manage this influence while faced with political pressures to maintain low water prices and/or meet all water demands – in other words, to procure more water supplies rather than conserve existing supplies.

CLIMATE CHANGE

Concerns about climate change have inspired many environmental policies, which can generally be divided into two categories, those aimed at mitigation and those aimed at adaptation.

The goal of adaptation policies is to prepare for the consequences of climate change. In the future, for instance, the climate in the American West will likely be hotter, drier, and more volatile. Such conditions will make water scarcer, less reliable, and more essential than it is already. Adapting has thus led to and will continue to lead to greater water conservation.

For mitigation, however, the connection to water is less direct. The goal of mitigation policies is to reduce carbon emissions. It requires increased energy efficiency and a move toward lower-carbon energy sources. An increased commitment to mitigation must thus lead to an increased commitment to energy efficiency.

Supplying water can consume significant amounts of water. The water must be obtained (whether by diverting, pumping, desalinating, or some other means) and conveyed and treated and used and then treated once again to reusable or dischargeable standards. Each step in that process requires energy, which frequently means more carbon.

As a result, the environmental community has increasingly looked toward water conservation as a means of reducing energy usage and therefore carbon emissions. But water on its own – apart from the energy-water nexus – does not create emissions. The water sector has a less direct connection to climate change than the energy sector does and so has not been targeted as aggressively by mitigation policies.

Conclusion

Going forward, energy efficiency may not hold its lead, or at least not the full lead that it has now. Interest in water and concerns about water are increasing. So are water prices. Lessons from energy are being applied, and the energy-water nexus – which has become an increasingly trendy topic – will likely lead to further collaboration and cross-pollination between the sectors.

energy efficiency water conservation

One comment

CZ Heating
June 24, 2014 2:51 pm

Water use policy is going to be the main topic of environmentalism in the 21st century.

REPLY

Leave a Reply

Your email address will not be published. Required fields are marked *

Name *

Email *

Website

Comment

POST COMMENT

The Energy Center blog is a forum for faculty at the University of Texas, leading practitioners, lawmakers and other experts to contribute to the discussion of vital law and policy debates in the areas of energy, environmental law, and international arbitration. Blog posts reflect the opinions of the authors and not of the University of Texas or the Center for Global Energy, International Arbitration and Environmental Law.

Popular Tags

- Texas
- water
- drought
- energy
- fracking
- endangered species
- natural gas
- groundwater
- court cases
- conservation
- pollution
- TCEQ
- LNG
- climate change
- cases