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Facing the Challenges

5.1. Introduction

In this report, we explore the role of government in water allocation, quality, and infrastructure. We show that there are a variety of structural, societal, and political challenges to addressing U.S. water issues. The government's influence and control (actual and potential) over water resources are undeniable and have been a reality in the United States for well over a century. We also surveyed the ubiquitous impact that the electric and agricultural sectors exact on water resources in terms of use and degradation of quality. Another area of increasing concern is water infrastructure—not only its generally crumbling state, but also its contribution to human exposure to toxins.

Findings lead the authors of this report to conclude that the U.S. is currently in a water crisis, brought on, in general, by overuse and increasing stresses, with the structure of our energy and agriculture sectors contributing heavily to the crisis. With respect to the electric generation sector, our historic reliance on thermoelectric generation tied to fossil and nuclear fuel cycles continues to stress water supplies both in availability and quality. With respect to the agricultural sector, high chemical usage and practices provide direct conduits for fertilizer and pesticide pollution to surface and groundwater.

The research used in the reports demonstrates an acknowledgment of significant energy and agricultural water impacts. It also demonstrates that we have the means to greatly ameliorate or eliminate current trends in terms of usage and pollution. But coordinated national action is slow in coming, more so in the agricultural sector than in the energy sector. There is also significant awareness of the need to upgrade and modernize our water infrastructure. Again, however, the retreat of federal government funding over the last 30 years and the recent recession make it increasingly difficult for communities to make capital investments without severely impacting water service affordability. Privatization of water utilities has not improved the situation, but instead made it worse with respect to cost and planning.

Our immediate challenges, as described in previous reports, include:

- Forging a rational nationally coordinated water allocation policy;
- Moving the energy and agriculture sectors to be less impactful on water;
- Updating our water infrastructure;
- Addressing water and energy affordability; and,
- Planning for adequate clean supplies of water (water system resilience) in response to overuse, population growth, and climate change (drought and severe storms).

We also face more structural challenges in terms of governance. For these we draw on Peter Shuck's (Simeon E. Baldwin Professor of Law Emeritus at Yale University) work "Why Governments Fail So Often: And How It Can be Done Better."¹²²⁴ We also reviewed various perspectives on federalism—the tension between states' rights and federal jurisdiction.

The following more strategic challenges derived from Shuck's analysis can be readily applied to the water challenges highlighted in this report. These include:

- Overcoming difficulty in forming consensus (as in prioritizing water as national policy);
- Overcoming difficulty in properly assigning risks of current policies/actions—referred to by Shuck as moral hazard;
- Overcoming difficulty in a sustained commitment to policies over the long term including funding;
- Overcoming difficulty in systematic, up-to-date information and properly assessing the implications of proposed policies;
- Overcoming tendency to address symptoms and not causes of our water challenges;
- Overcoming entrenched economic interests to foster change.

Despite these challenges embedded in our own system and history, there are opportunities to overcome them. The public maintains a strong concern for water quality and consensus is emerging in support of renewables. The recent market is shifting to renewables and energy efficiency and away from thermoelectric power. Farmers are moving steadily (although slowly) to practices that reduce the agricultural impact on water. Success stories in water infrastructure and regional coordination of water resources exist and can serve as models.

In this chapter, we explore these challenges. The ultimate question is: Once we are aware and adequately informed of the problems and probable, most effective means of addressing them, can we decisively act as a nation on a sustained basis to address them and continually assess and alter policy choices to achieve the best possible outcomes with respect to water supply, quality, conveyance, and service affordability?

¹²²⁴ Schuck, P. 2014. "Why Government Fails so Often: And How It Can be Done Better." Princeton University Press.

5.2. Requirements for a Sustained Policy Effort

An effective response to U.S. water challenges will require a level of state-federal and executive-congressional cooperation we have not experienced in some time. This will be discussed in more detail in the following sections.

In 2014, the Civil Society Institute (a former Boston-based, nonpartisan nonprofit) published a short review about the German Energiewende (energy transition). The German situation was reviewed because of the typically negative press that was generated by utility and other interests opposed to rooftop solar, the phaseout of nuclear power, and the implication that a coal-fired phaseout would take place once nuclear power was removed from the German electric grid. Policy changes have occurred since then but the goal remains: Germany aims to eventually move to an electric grid powered exclusively by renewable energy and systematically reduce natural gas for heating purposes. Arguably the country's energy transition began in 1991, with the passage of the feed-in-tariff (promoting customer-owned distributed solar PV) that also prioritized renewable energy over conventional power sources.¹²²⁵

That this ambitious program has sustained over decades, despite periodic challenges and political sparring, is truly unique and impressive. In analyzing this program, Civil Society Institute arrived at the following concepts are critical to implementing policies over time. We in the U.S. must strive for the following to properly address the enormous water challenges facing the country:

- Consensus
- Cooperation
- Coordination
- Commitment
- Continuity

These requisites for systematically addressing our water issues may appear out of reach under current circumstances but are necessary for our own well-being and economic stability.

The following sections explore barriers and opportunities for maintaining adequate supplies of water and enhancing water quality.

5.3. Effectively Addressing the Ag and Power Sectors

5.3.1. Properly Assessing Risks of Government Policies

¹²²⁵ “Timeline Energiewende.” Energy Transition: The German Energiewende
<http://energytransition.de/2012/09/timeline-energiewende/>

Moral hazard is the “propensity to take on more risk when one knows that others will bear much of the expected costs of that risk.”¹²²⁶ Typically, this involves shifting financial risk from an economic sector or individual project to the public, allowing industry actors to adopt a course of action knowing “others will bear much of the expected costs of that risk.”¹²²⁷

One form of moral hazard is present in the environmental and public health (externality) costs inherent in conventional electric generation and high-chemical usage in agriculture.

The current discussion on nuclear power serves as an example. Supporters point to nuclear as a low-carbon resource. However, they do not take into account the risks of potential catastrophic accidents, the stress on water resources from withdrawals and consumption, the generation of high- and low-level nuclear wastes, and routine tritium leaks. Similarly in the agriculture sector, government and industry emphasis on increasing yields while ignoring the impacts of nutrient and pesticide loading into surface and groundwater threatens public health and ecosystems. Nutrient loading has also increased the costs of treating water at municipal treatment plants, reduced property values, threatened fisheries, and impacted tourism in various regions of the country.

Single-minded incentives can have similar negative results. As an example, four nuclear units located in the Southeast received either federal government loan guarantees and/or construction work in progress (CWIP) at the state level to reduce the risks of construction (shifting them to the public) in a region where the operation of a substantial number of coal-fired power plants were deemed vulnerable to drought—too little water for cooling or water that is too warm. The federal government’s ethanol incentive increased the acreage of corn, a highly water and nutrient intensive crop, in areas that are water stressed. Arguably, the incentive has led to more nutrient loading into water resources.

Congress’ deregulation of fracking—not subjecting the practice to the Safe Drinking Water Act—could be considered an example of a perverse incentive. It shielded the industry from potential enforcement actions while increasing risks to public health.

On a higher-level policy basis, the adoption of an “all of the above” energy approach and the perception of natural gas as a bridge fuel had similar flaws. Again, the “all of the above” policy did not account for environmental externalities of the natural gas, nuclear, and coal fuel cycles. Focusing on lower power plant emissions from natural gas-fired units misses the methane emissions from well sites that are driving climate change as well as the enormous impact the fracking industry has on water resources from failed wells, spills, and fracking itself.

5.3.2. Addressing Symptoms Rather than Causes

Historic emphasis on treating symptoms rather than causes is prevalent in the U.S. environmental regulatory system. We have developed an elaborate legal framework for controlling pollution

¹²²⁶ Shuck, 2014.

¹²²⁷ Shuck, 2014.

rather than preventing its generation in the first place. The prevalence of pollution control is readily recognizable in the energy sector but also, arguably, applies to the agriculture sector.

In 1986, the Congressional Office of Technology Assessment published a report titled “Serious Reduction of Hazardous Waste,”¹²²⁸ arguing the EPA should prioritize pollution prevention rather than pollution control for the industrial sector. In its report, OTA described the dominant pollution control culture at the EPA and outlined approaches manufacturers could take to avoid, eliminate, or reduce the generation of emissions, discharges, and waste generation.

The pollution control approach has dominated the electric sector, particularly for coal-fired and gas-fired generation. With respect to the nuclear industry, low-level radioactive waste disposal and high-level nuclear waste storage is also regulated. Any high-level radioactive waste depository (final disposal site) would also be regulated under EPA rules and regulation.

Various air pollution control technologies reduce sulfur dioxide, mercury, and nitrogen oxide air emissions. The EPA has finally promulgated regulations to regulate toxic coal ash—with previous non-regulation arguably being a huge subsidy to the industry. Also, the EPA just updated water discharges for coal-fired power plants. By and large, fracking regulations are left to the states. Barring state action and fracking on federal lands, exempting fracking from the Safe Drinking Water Act allows the industry to keep its toxic chemical mix confidential, even from regulators.

A reason that preventive principles were more readily applied to manufacturing was the fact that until recently, few options were available in the electric sector. Now, however, it is clear that energy efficiency and renewables—together with storage technology and demand response options—can replace conventional power over time. It’s already happening in the coal and nuclear industries. Solar PV and storage can soon replace simple combustion natural gas turbines.

The epitome of the pollution control mentality in the electric sector has been the constant push, although now waning, for carbon capture and sequestration, despite billions in costs to ratepayers and taxpayers, substantially increased water usage (at least with early designs), and unknown risks to water resources from sequestering hundreds of millions of tons of carbon.

Similarly, in the agriculture sector, the approach (although not consistently maintained) has been to create buffers between fields and water bodies to absorb as much of the nutrients and pesticides applied to crops. The use of cover crops is regaining popularity as a cost-efficient and effective strategy. However, a strategic paradigm shift to integrated pest management and organic farming that avoids, eliminates, or reduces nutrient and pesticide usage (and, with those, soil erosion) does not appear to be contemplated at this time.

5.3.3. Overcoming Entrenched Economic Interests

¹²²⁸ “Serious Reduction of Hazardous Waste.” Office of Technology Assessment (U.S. Congress), September 1986. http://govinfo.library.unt.edu/ota/Ota_3/DATA/1986/8625.PDF

Of course, these policies are not developed in a vacuum. There are economic interests (among other forces) moving government.

Shuck argues that the U.S. is more dominated by entrenched market interests than any other nation on earth. His conclusion is based on the American value system, which includes, he says, distrust of the federal government and support of the private sector. Shuck asserts that in no other country is there this “default” to the market, which results in the private sector being involved in what would otherwise be government-run programs including the concept of public/private partnerships.¹²²⁹

Shuck also says that market interests shape government policy from beginning (the legislative process) to end (implementation) and often subvert laws they don’t like through language, interpretation, funding, or close relationships with the agencies charged with overseeing them.¹²³⁰ These observations seem perhaps obvious to most Americans, but we cite Shuck because his approach is one of academic analysis.

The market influence on public policy described by Shuck obviously has implications for protecting our water resources. This report reveals these implications.

The utility industry is pushing hard across the country to eliminate ratepayer incentives for rooftop solar and energy efficiency, with some success. Utilities may be warming up to utility-scale solar PV and community solar when they own the facilities, but utility ownership also necessarily increases costs due to high profit margins. In Ohio and Illinois, utilities seek regulatory bailouts for coal-fired and nuclear power plants. New York is willing to implement a nuclear bailout. Without a concerted federal policy to prioritize alternatives, this rearguard action to save thermoelectric plants may slow the transition to a less water intense and polluting electric sector, at least in states not fully committed to renewables and comprehensive energy efficiency programs.

In the agriculture sector, the federal government has not prioritized integrated pest management (IPM), a practice that would reduce fertilizer and pesticide use nationwide. Programs to reduce runoff have essentially been derailed, although such approaches are now being re-emphasized to combat nutrient loading in Lake Erie and the Gulf of Mexico. The government has also taken a much more laissez-faire approach, waiting on the chemical/seed industry to develop solutions to the emergence of superweeds, for instance, which will invariably result in heavier herbicide use and increased toxic loading into waterways.

Unlike in the energy sector, there is no current rival paradigm (IPM or organic farming sectors for instance) large enough in the agricultural sector to challenge the chemical/seed industry. The organic sector is fairly concentrated in relatively few states, and organically grown food, being somewhat more expensive than conventionally grown food, is not accessible to all income brackets. Logistical factors, such as farm size and labor costs, contribute as well to the difficulty

¹²²⁹ Shuck, 2014.

¹²³⁰ Shuck, 2014.

of organic practices finding a stronger foothold in the sector. These issues seem to translate into a political weakness that makes it difficult for the industry to grow.

Beyond these factors, there is no consistent national discourse occurring with respect to agriculture and water. There are numerous advocacy organizations and growing public knowledge in terms of renewables. Battles over rooftop solar are raging across the country and are discussed in the local and national media. Similarly, agriculture was not a focus of debate or discussion this past primary season, nor was it broached during the presidential campaign. GMO labeling was mentioned but was not widely discussed.¹²³¹

5.3.4. Keeping Information Current and Assessing Policy

Information is expensive to collect, analyze, and publish on an ongoing basis in terms of defining, assessing, and addressing problems. Also, the U.S. government has not consistently assessed the implications of the policies it chooses.¹²³²

Oftentimes, policies are adopted based on hunches and perceptions rather than a full understanding of their implications.¹²³³ This is true when not fully understanding or ignoring the externality costs of subsidizing thermoelectric power and ethanol policies, as described above.

Another example is water infrastructure. There is movement on auditing water infrastructure, however it remains disjointed with no uniform collection of data. We have also noted in this series of reports that information is at times outdated, such as EPA information on water usage data at coal mines dating back to 2006.

Another issue is the lack of public education and engagement on these important issues. Often, NGOs and think tanks, rather than the government agencies themselves, compile agency information and publish it in a digestible format. Jumpstarting a true public discourse on water (and other issues) will require a more concerted effort on behalf of the government, NGOs and the media. Emergency situations unfortunately help. The disaster in Flint has brought focus back to lead in water supplies and the reality that this is a widespread problem in the U.S. But what will the ultimate response be?

Another challenge for government is the influence of regulated sectors on regulatory agencies.¹²³⁴ For instance, the Nuclear Regulatory Commission is steadily weakening safety standards to keep plants running. The EPA did not follow through when it determined that fracking was contaminating homeowners' water wells. By and large, state governments (with the exceptions of New York and Maryland) have allowed fracking to expand unabated while complaints from the public and instances of water contamination from various aspects of these operations continue to go unaddressed.

¹²³¹ “Sanders Takes Stand Against Senate Bill that Would Undermine Vermont’s GMO Labeling Law.” Altnet, June 28, 2016. <http://www.altnet.org/food/sanders-takes-stand-against-senate-bill-would-undermine-vermonts-new-gmo-labeling-law-video>

¹²³² Shuck, 2014.

¹²³³ Shuck, 2014.

¹²³⁴ Shuck, 2014.

5.3.5. Reaching Consensus

Currently in the U.S., some would argue that we are facing unprecedented gridlock as to policy directions for the country. Despite indisputable scientific evidence, there is no political consensus on climate change. We have a renewable energy industry locked in disputes over rate design and subsidies with entrenched, conventional energy interests. Flint displayed tension between federal initiative and state prerogative. Despite recognition that water infrastructure needs to be addressed, the new Congress does not appear to have prioritized this and other infrastructure needs.¹²³⁵ The President's current infrastructure plan would only provide incentives to infrastructure that is already privatized, and thus would fall far short of the nation's needs.¹²³⁶

Shuck argues that we've always been in this situation, and that Americans have always disagreed on the policy directions the country should take. However, he also notes that politicians (primarily those on the right of the political spectrum) have evolved from criticizing policy to criticizing government itself, which has contributed to undermining its credibility.¹²³⁷ Joel Rogers, in an article written for the *Harvard Law & Policy Review*, offers another insight.¹²³⁸ He proposes that there are good and bad kinds of federalism. On the good side, states act as incubators of ideas and policies that the federal government can then assess and propose on a nationwide basis. Here the notion is state government as a laboratory for change. On the bad side of the equation, state-level elites work with national elites to undermine democratic processes and government policies they find offensive—regardless of whether they have proven successful. He suggests that federalism is but a way to “organize political conflict” where the best and worst of policies can emerge.¹²³⁹

In a society with opposing philosophies and economic interests, can we develop policies to sustain our water resources for future generations? Can we fundamentally change the way electric power and food are produced to protect water? Can we initiate a national effort to make our water infrastructure more resilient in the face of aging water mains, rising costs, and changing weather patterns? Will we be able to make water a national priority and sustain the effort?

5.4. Advantages for Effectively Addressing U.S. Water Challenges

¹²³⁵ “Trump’s Infrastructure Plan Wouldn’t Actually Fix America’s Infrastructure Problems.” Vox, November 17, 2016. <http://www.vox.com/policy-and-politics/2016/11/16/13628382/donald-trump-infrastructure-plan>

¹²³⁶ Vox, November 17, 2016.

¹²³⁷ Shuck, 2014.

¹²³⁸ Sewell-Bascom Professor of Law, Political Science, Public Affairs, and Sociology at the University of Wisconsin-Madison

¹²³⁹ “Forward: Federalism Bound.” *Harvard Law and Policy Review*, June 2016. http://harvardlpr.com/wp-content/uploads/2016/06/10.2_1_Rogers.pdf

As we discussed, the private sector has significant influence over policies. In the energy arena, the national and global growth of the wind and solar PV sectors in the last eight years has been nothing short of phenomenal. Indeed, economically and, arguably, politically they have begun to rival entrenched fossil and nuclear interests. Utilities are investing more heavily in utility-scale solar. As the *Atlantic Monthly* recently reported, even traditionally conservative states are embracing renewables more readily due to their economic benefits.¹²⁴⁰ Moreover, due to increasing support, Congress extended the production tax credit for wind and the investment tax credit for solar PV at current levels for another three years. The evidence clearly shows that the U.S. is in an energy transition itself—despite that fact that an electric grid dominated by renewables, storage, and energy efficiency investments is not the stated national policy of the country. In 2016, over 300 corporations in 35 states wrote to the President-elect and urged him to continue to support the Paris carbon reduction accords and continue investment in “low-carbon infrastructure”¹²⁴¹ (which includes renewables).

Continuing the discussion on values in the context of American’s generally market-friendly attitude, the fact that the electric and water sectors have historically been regulated by government may create more acceptance of government policies and government intervention in these sectors. Municipal electric and water utilities are regulated or operated locally. Investor-owned electric and water utilities are regulated by state public utility commissions. The wholesale electric market is overseen by the Federal Energy Regulatory Commission (FERC). Quasi-governmental agencies, known as regional transmission organizations, plan and establish markets (under FERC supervision) for interstate transmission systems. States have created net metering regulations that are supported by the public in the face of utility opposition. Many states have mandated utilities to invest in renewables by enacting renewable energy standards. There has been a backlash against private management of local water utilities, here and abroad. A few states have also driven energy efficiency investment with energy efficiency standards that utilities must meet and created third party administrators (energy efficiency utilities) to implement energy efficiency programs as entities distinct from electric utilities.

Moreover, government has historically been and continues to be heavily involved in all aspects of water resource allocation and water quality. There are examples among the regional coordinating bodies approved by Congress that we can draw on nationally—the “good federalism” described by Rogers.

On the agricultural end of the water issue, farmers are beginning to adopt practices designed to protect water from contamination of agriculture chemicals. The U.S. and Canadian governments are coordinating efforts to reduce agricultural runoff into Lake Erie. States, such as Ohio, are moving to slow nutrient loading into the Mississippi River Basin. There is, at least, recognition that agricultural runoff is a problem of serious concern. The advent of superweeds from GMO corn and soybeans due to excessive use of glyphosate has been acknowledged by certain analysts, and there are efforts to curb their use outside the U.S.

¹²⁴⁰ “The Winds Are Changing for Renewable Energy.” *The Atlantic*, July 7, 2015.

<http://www.theatlantic.com/politics/archive/2016/07/are-the-winds-changing-for-renewable-energy/490250/>

¹²⁴¹ “Trump Must Continue Low Carbon Investment, say U.S. Business Leaders.” *PV-Tech*, November 17, 2016.

<http://www.pv-tech.org/news/trump-must-continue-low-carbon-investment-says-us-business-leaders>

In addition, in terms of information gathering, we possess the proof and understanding of climate change and its implications, understand the impacts that the electric sector and agricultural sector have on water resources, and understand the implications of increasing variable wind and solar penetration on electric grid operation. This information is available from a variety of government, academic, NGO, and media sources.

Finally, we also possess the knowledge and technology to systematically decouple the electric grid from water resources and substantially ameliorate the agriculture sector impacts on water usage and quality.

5.5. Establishing a Systematic Process for Policy Development

Shuck argues that much of government failure lies in lack of information or “hunches” made by policymakers—pointing the finger mainly at Congress.¹²⁴² The executive branch has the ability at the very least to assess what information gaps exist and to ascertain the best course of action with respect to water availability and quality. The President has access to a vast array of agency resources and expertise to galvanize research and thinking toward water resources as well as the influence to muster stakeholder expertise and resources for this purpose. The President also has the ear of the media and the public.

As demonstrated in this series, we do have experience with successful energy and agriculture policies that protect water resources. The same can be said for water infrastructure and allocation programs, driven by local policies and state cooperation at the regional level.

State-level renewable and energy efficiency policies have been operating for some time. Federal government analysts recognize and acknowledge the water/energy nexus as a critical issue for the country to tackle. Moreover, there are efforts, such as those in New York, Hawaii, and California, to further drive renewable and energy efficiency programs. Various stakeholders and analysts are tackling the issue of rate designs that balance the interests of ratepayers and electric utilities in an effort to capture the full economic, public health, and environmental (including water resource) benefits of our current energy transition away from conventional generation. There is an enormous amount of activity in the form of R&D, analysis, investment, practical experience, and policy development aimed at the electric sector.

Although there is not a comparable collection of resources focused on the agriculture sector (at least not in such a high-profile national discussion), we do have experience with programs that worked in the past to substantially slow farm runoff. States and various analysts are looking for the most effective mix of cover crops for their regions to achieve the best production and environmental benefits. Ethanol incentives and production provide an opportunity to study more comprehensively the impacts of federal policy on water quality. Experience with irrigation techniques and various crops that are less water intensive afford the U.S. the opportunity to find the best practices to reduce water burdens in water stressed regions.

¹²⁴² Shuck, 2014.

Moreover, there are examples of sound practices that have been developed or implemented at the local and state level in terms of planning, water main replacement, and enhanced maintenance practices to avoid substantial leaks and “boil water” notices. We will need such information to drill down to the financial needs and affordability issues facing municipalities of all sizes and situations.

We also have the means (with experience and growing knowledge of regional water stresses) to properly assess best practices in coordinating water allocation across the country. The federal government is already engaged in regional coordinating bodies and with respect to authority over disbursement of water resources from federal dams. A more highly coordinated effort with states and between states, with continuous federal/state assessment of water resource availability and potential future impacts, could better prepare the U.S. and reduce legal conflict among states.

The question remains whether we have the political will to act.

Conclusion

The main barrier to addressing the various stresses on our water systems posed by the energy and agricultural sectors and to fixing our water infrastructure and allocation challenges is political will. We, as a nation, are very aware of and acknowledge these impacts and challenges. We have experience with successfully addressing them. We understand the policies and programs that are or would likely be successful. We understand that we need to fill information gaps for planning and financing purposes with respect to water infrastructure. We have the necessary federal and state legal framework to facilitate change.

However, the current political climate makes it extremely difficult to systematically and effectively tackle these challenges. At the federal level, we now have a political configuration that does not appear to view infrastructure in general as a national priority. Indeed, we have a Congress that has already blocked holistic management of water resources under federal control. The dominant party in Congress is dismissive of human-caused climate change and supportive of more fossil fuel development. Neither political party seems particularly focused on agricultural impacts on water. Another issue is how the current administration will respond to these issues.

In terms of federal policy at this stage, there is likely to be continued disparity among state and local governments with respect to energy and agricultural policies and prioritizing and financing improvements in water infrastructure. Moreover, coordinated federal efforts to drive more efficient and effective allocation of water resources on a nationwide scale will likely be hampered. Federal funding levels for state and local assistance to upgrade water systems will remain inadequate as will the effort to create a uniform reporting regime for auditing water infrastructure. Progress is likely to come from water managers and their trade associations, with varying local and state support. The current infrastructure-funding blueprint proposed by the President is geared toward incentivizing the private sector, which does not indicate a well-coordinated national effort that addresses public needs.

However, the U.S. energy transition (as uncoordinated and uneven as it is) is likely to continue. It may be slowed without the current executive branch commitment to addressing climate change and R&D support for solar, wind, storage, and energy efficiency in buildings. The solar and wind sectors are firmly entrenched and are now rivaling conventional power politically and financially while battery storage costs continue to plummet. Trends in cost reductions and increasing efficiency for solar PV and wind technology are expected to continue. Committed state governments will also continue to drive wind, solar PV, and battery storage deployment through established and developing policies and programs. There is also growing corporate interest (either as purchasers, investors, manufacturers, or installers) in maintaining the current momentum, including the prospects for climate change impacts if we do not.

Although state governments are beginning to pay attention to nutrient loading into our watersheds from current agricultural practices, there has not been much of a federal effort to alter these practices nor will there likely be at this stage. The agriculture sector's impacts on water will be left primarily to state and regional approaches, while the chemical-seed industry continues to promote high-chemical usage strategies that will tend to lock in place the current

regime. The organic market will likely continue to grow successfully but not with the robust expansion experienced in the solar PV and wind markets.

The battle over renewable energy and energy efficiency is raging in the media and across the country, with the public pushing back against utility attacks on rooftop solar, as in Nevada and Florida.

The agricultural sector is a completely different proposition. Alternatives to high-chemical agriculture (IPM and organic agriculture) enjoy public support but the sector is politically weak and access limited to those who can afford them. Here, again, the public may ultimately be the deciding factor in how and where produce is grown and livestock managed. However, it appears change will come slowly.

There does not seem to be any effort nationally or otherwise to properly assess the water impacts of policy proposals. This leaves the U.S. open to speculative economic development with unintended consequences on our water resources and public health.

The chief opportunity for change is, of course, public pressure. The issue of lead contamination may be the linchpin to creating more willingness in Washington to address water infrastructure issues. Lead in water service lines is a ubiquitous national problem, and the public is aware and rightfully concerned. The media and NGOs will be necessary to keep the issue in the public eye in order to ensure that the public demands and receives proper government action.