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Before the:
Subcommittee on Water and Power
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, D.C. 20515

Legislative Hearing on the *Reauthorization of Water Desalination Act of 2011*

Tuesday, April 17, 2012
2:00 PM
1324 Longworth House Office Building

The Competitive Enterprise Institute (CEI) is a non-profit public policy research organization dedicated to advancing individual liberty and free enterprise with an emphasis on regulatory policy. We appreciate the opportunity to discuss issues surrounding innovation and research in water policy as an element of broader science and manufacturing policy.

CEI maintains that competitive approaches to infrastructure and the technologies underlying it will be more effective than political interventions at boosting innovation, enhancing consumer well-being, facilitating commerce and trade, and contributing to prosperity for the United States.

Separation of State and Water

Water availability is a core infrastructure concern; today, that specific legislative concern is over what a federal role in water desalination should be. CEI's view is that policymakers should strive to increasingly subject water policy decisions and investment to the pressures of the marketplace.

Unneeded Spending

The bill at issue, H.R. 2664, to reauthorize the Water Desalination Act of 1996,¹ would reauthorize \$2 million annually through 2016 for water desalination projects at the Department of the Interior. Specifically:

The Secretary of the Interior shall operate, manage and maintain facilities to carry out research, development, and demonstration activities to develop technologies and methods that promote brackish groundwater desalination as a viable method to increase water supply in a cost-effective manner.

Granted, it's not a lot of money. But America's economy is faced not with just scarcity of water, but scarcity of funds. Perhaps even more importantly, federal spending's effects reverberate beyond the dollars.

Redundant Research

Opponents see the bill as financially redundant because private sector research dollars far outstrip the proposed outlays. Moreover, government research has been underway since the World War II era (on what is actually an ancient method of treating water), on membrane improvement, energy reduction, treatment of desalination's waste brine and more. In markets, research is itself competitive, driven by reaction to consumer needs and to what rivals do. In H.R. 2664, competition and rivalry isn't part of the vision, making both the goal of and methods to achieve desalination suspect.

Redundant Education

Also redundant with readily available resources and ongoing operations would be H.R. 2664's proposed "outreach program to educate the public." Policymakers need not and ought not advocate for specific technologies since subsidies are not merely unneeded, they can be unfair, with only certain states involved yet all required to pay. Nor is it facetious to note that the Internet enables any education sought, and is free.

Misguided Renewables Provisions

Provisions emphasizing renewable energy use and investigations into mitigating desalination's own potential negative environmental impacts control the proposed agenda, but among much else, true markets compel a polluter to internalize or treat waste streams.

Federal Desalination Policy vs. Market Pricing Solutions

Desalination as highly promising on its own appropriate terms; it's already crucial in some areas. Many appear to see it playing a growing role especially and obviously in select areas near the oceans and where transport and other costs are low or made low by complementary infrastructure investment. It plays important roles globally given certain geographical and political circumstances.

¹ Library of Congress link for H.R. 2664: <http://thomas.loc.gov/cgi-bin/query/z?c112:H.R.2664.IH:>

Still, scarcity of water itself in a free, highly mobile society—if that is what drives the desire to subsidize desalination research—is a creature of poor policy. We ought to recognize the causes of scarcity, and avoid perpetuating the “Declaration of *Dependence*” on federal dollars and decisions that affects some of America’s most crucial infrastructure industries and technologies, of which desalination may well eventually be one.

If we are to judge by private sector involvement, desalination is on a trajectory to become increasingly cost-effective for certain applications, particularly if prices for water are allowed to respond to market signals as demand for fresh water increases. A federal hands off is warranted if it’s a good, profitable idea. Conversely, however, even if the private sector did not invest “enough” in desalination, that too is reason for federal restraint. Desalination need not be a federal public policy concern. States where the process matters may have a role, but that’s their business and prerogative to fund. It’s not clear in every case that the private sector should be investing either, particularly if subsidies or grants are the cause.

The costs and benefits of desalination should always be apparent and not hidden, and the process should not mask underlying scarcity. Federal and local policymakers’ primary task should be dismantling interference with water price signals. Investing effort into policies that may further disguise real prices by spreading costs to non-involved taxpayers will further delay any needed general or specific reckoning with the way water is marketed and priced in the United States.

Politicians frequently defend a significant, even pivotal, governmental role in areas like desalination. But when it comes to the creation of technological knowledge wealth itself, that’s a worrisome stance and better alternatives exist. Misunderstandings persist of what markets even are, of how infrastructure wealth (including water facilities) is created.

Scope of Desalination

According to the U.S. Geological Survey, “In 2002 there were about 12,500 desalination plants around the world in 120 countries. They produce some 14 million m³/day of freshwater, which is less than 1% of total world consumption.”²

In the U.S., states and regions are the proper locus of investment rather than the federal government, particularly if policymakers persist in enabling desalination’s detachment from marketplace pressures.

The feasibility of large scale desalination is still not fully apparent, even after decades. Florida, California and Texas are researching and employing it, to greater or lesser success. Private investment aside, other nations rely more heavily on this technology, and

² U.S. Geological Survey, “Thirsty? How 'Bout a Cool, Refreshing Cup of Seawater?”
<http://ga.water.usgs.gov/edu/drinkseawater.html>

logically we can learn from their greater urgency and incentives to success, and perhaps resultant comparative advantage.

According to the Congressional Research Service,³ some 2,000 plants larger than 300,000 gallons per day operate in the U.S., but their total capacity is less than ½ percent of total U.S. water use. Two thirds of U.S. capacity is for municipal supply. Industry uses about 18 percent of the total.⁴

CRS also notes that, globally, seawater desalination dominates, representing 60 percent. In the U.S., that particular method comprises only seven percent of all desalination.⁵ Instead, half is desalination of brackish water (the emphasis of H.R. 2664), a quarter is river water treated for industrial facility use. Of course, power plants and commercial applications can and do fund desalination themselves. Their efforts and that of states implies sufficient scope to supplant the need for the federal research called for in H.R. 2664.

Avoid Having Government Steer While the Market Rows

Aggressive taxpayer funding of scientific and manufacturing research is incompatible with a future of optimally and lightly regulated science and manufacturing specifically, or with limited government generally. We already observe in H.R. 2664 the seeds for new regulation created by the direct impacts and externalities of desalination itself.

Moreover there are opportunity costs. Politics cannot determine optimal research portfolios: Why H.R. 2664's brackish groundwater desalination instead of seawater; or for that matter, why not investment in pipelines for transport parallel to the Keystone or other corridors, or repair of leaky infrastructure, or cargo shipping.

We should avoid distortion or bubbles created by governmental investment undisciplined by markets. The dilemma is by no means special with regard to desalination. In other sectors, why do we witness National Nanotechnology Initiative and a National Broadband Plan instead of a biotech agenda? Why not space travel instead, or fuel cells and the hydrogen economy? Why not one-wheeled SegWays? The proper emphasis for research is impervious to political resolution, and can create an economy disconnected from actual consumer demands.

No political party is immune from channeling federal dollars to districts in defiance of scientific or economic merit. Problems arise when the federal government heavily

³ "Desalination: Technologies, Use, and Congressional Issues," *Congressional Research Service Report for Congress*, Congressional Research Service, August 15, 2011. p. 2.

⁴ Congressional Research Service, 2011, p. 3.

⁵ Congressional Research Service, 2011, p. 2.

involves itself in the very production of knowledge itself, rather than in protecting rights in intellectual property that expanded knowledge generates.

Desalination is a special case, but it highlights how government-centered science policy spawns artificial conflicts over:

- The fundamental merit of basic vs. applied research
- The impact of private vs. public funding on discovery and progress
- The alleged objectivity of government vs. “industry” science and the improper chastisement of industry science in the marketplace of ideas
- Potential confusions over the ownership or intellectual property status of federally funded discoveries
- The more general right to not fund projects with which one disapproves
- Purported (but often exaggerated) conflicts of interest among federally funded scientists⁶

Policy ought not disconnect science from the market process. Science can advance human welfare and remain most relevant when pulled into being by the actual needs of mankind, including practical ones; we see that occurring in private sector investment in desalination, we don't have to force it.

To advance desalination technology, the committee is asking what the federal government should be doing; but rather than run with the implied invitation to propose spending on scientific endeavors (obviously Washington can't fund them all), Congress should foster private research rather than try to steer research and investment.

Adding to the thousands of subsidies in existence shouldn't necessarily be regarded as promotion of science and technology. There's also a bit of the “broken window fallacy”⁷ here: not seen is the science not created by the redirection of resources to this or that temporarily favored project or field.

Bolstering manufacturing and science requires vigorous competition among ideas for private funding. The national government's role in actually fostering such knowledge wealth is limited, but its role in liberalizing the American economy so that *others* can foster that wealth is a profound responsibility.

Also, it is not proper for sciences and applications to proceed walled off apart from one another in an appropriations environment, as proposed here with desalination (and

⁶ Iain Murray, “The Nationalization of Basic Science: Overzealous Attempts to “Protect” Scientific Integrity will Damage American Science as a Whole, *CEI OnPoint No. 100*, July 21, 2005. <http://cei.org/pdf/4696.pdf>.

⁷ Read about it in Frederic Bastiat, “That Which is Seen, and that Which is Not Seen,” 1850. <http://bastiat.org/en/twisatwins.html>

seemingly everywhere else); that undermines the swirling competition, cooperation, and “co-opetition” needed for the U.S. economy, such as hypothetical alliances with other network industries for water transport instead of desalination.

Outcome-oriented desalination interventions (as opposed to broader liberalizations that leave outcomes up to the choices of others) will produce prominent successes, but fall short taken as a whole and compared to the potential. Interventions, subsidies and regulations create an economy made up of suboptimal entities and approaches that don’t resemble what they would under free enterprise, and the inefficiencies propagate throughout the economy and over the years.

There’s Plenty Water, But We Must Still Cope with Scarcity

Charles Fishman, author of *The Big Thirst: The Secret Life and Turbulent Future of Water*, penned a recent article on myths about water, noting even our ignorance of where it goes once it goes down the drain.⁸ In terms of quantity, water is actually not getting more scarce; it’s constant on earth. And the salty oceans? They’re actually:

Olympian springs of fresh water — every day, the sun, the sea and evaporation combine to make 45,000 gallons of rainwater for each man, woman and child on Earth... Even in the United States, where we use water with profligacy, the oceans are making more fresh water for each of us in a month than we’ll use in a decade.

Fishman continues, “We never really use it up. Water reemerges from everything we do with it, whether it’s making coffee or making steel, ready to use again.”

But it doesn’t always rain in the same places, and over time populations shift (sometimes even in response to artificially prolific water supplies).

Water is both a necessity and a luxury good. We use more as we get wealthier, which requires more energy, which itself also requires still more water. Nonetheless, overall the nation uses less water than in the 1980s (agriculture and power remain the largest users); families use a little more than back then.⁹

On top of past mismanagement of what we actually use less of than we did before, challenges loom. “America’s population is expected to grow by 100 million—a 30-percent increase—by the middle of the 21st century,” notes Bonner Cohen in *Fixing*

⁸Charles Fishman, “Five Myths About Water,” *Washington Post*, April 6, 2012.

http://www.washingtonpost.com/opinions/five-myths-about-water/2012/04/06/gIQAS6EB0S_story.html

⁹EPA on average family use <http://www.epa.gov/WaterSense/pubs/indoor.html>

America's Crumbling Underground Water Infrastructure.¹⁰ And infrastructure won't be cheap, apart from desalination's meager share. Cohen continues, "Over the next 20 years, upgrading municipal water and wastewater systems is expected to cost between \$3 and \$5 trillion. Building and replacing water and sewage lines alone will cost some \$660 billion to \$1.1 trillion over the same time period."

There's no need for Malthusianism, because in the face of it all, gallons of water cost Americans less than a penny. But nor is there any excuse for the perpetual tendency to see water as free, which amplifies calls for costly interventions like desalination.

As G. Tracy Mehan III. writing in *The Environmental Forum* put it, "Scottish lawns and recreational swimming are luxury items in arid areas and should bear the cost of scarcity in the price of water. Moreover, low water rates are basically middle- and upper-class subsidies."¹¹

In that sense, it's not always even obvious that the private sector should be doing desalination. They may be reacting to such broader mismanagement and extra-market pricing.¹²

Some Alternatives to Desalination as a Water Supply Augmentation

Desalination at bottom is an energy-intensive, by-product-laden means of making expensive potable water. As CRS notes, given its energy intensity, more expensive electric power is a factor undermining its prospects. Higher electricity prices would cause "less electricity-intensive" substitutes like conservation, water purchases, and pricing changes to rise in relative importance.¹³ Some alternatives to desalination follow, but are by no means exhaustive.

Better Pricing of Existing Supplies

¹⁰ Bonner R. Cohen, "Fixing America's Crumbling Underground Water Infrastructure," Competitive Enterprise Institute, *Issue Analysis 2012 No. 3*, April 11, 2012.
<http://cei.org/sites/default/files/Bonner%20Cohen%20-%20Fixing%20America%27s%20Water%20Infrastructure.pdf>

¹¹ G. Tracy Mehan III., "The Future of Water: Technology, Economics, Political Will," *The Environmental Forum*, May/June 2012, p. 6-7.

¹² David Zetland has noted an interesting co-existence of cheap water and bad finances more generally
<http://www.aguanomics.com/2012/02/link-between-cheap-water-and-bad.html>

¹³ Congressional Research Service, August 15, 2011, p. 3.

As Adam Smith and the classical economists teach us, water and diamonds have vastly different marginal and total utilities.¹⁴ Both the supply side of life and the demand side of life matter across the board.

Water utilities are sourcing-to-delivery monopolies, rarely subject to market forces. Problems with investment exist in such models, as do disincentives of local elected officials to tolerate the rate increases that a market would dictate and perhaps implement instead of possible detours like desalination.

The state of play is reviewed in books like *Water Markets: Priming the Invisible Pump* by Terry L. Anderson and Pamela Snyder, which surveys water law and how water markets have emerged in the United States, “including discussion of the restrictions by state and federal governments, which increased over the past century.”¹⁵

Steve Maxwell in *The Future of Water* noted, “The most important job utilities around the world may have in the coming decades is convincing people that water is valuable—and that it is reasonable to pay more for this luxury than the bargain prices we have traditionally taken for granted.”¹⁶

In reviewing the book *The End of Abundance* by David Zetland, Tracy Meehan summarized: “[T]he water sector can encourage better stewardship and a greater degree of social harmony by substituting pricing and market allocation of limited water supplies for political management.”¹⁷

Water isn’t alone: anything politically or bureaucratically managed is vulnerable to quantity and pricing shocks and constraints. Where water prices are artificially low, shortages will result. The chapter “Why Water Crises?” in the book *Water Markets: Priming the Invisible Pump*, by Anderson and Snyder describes the price mechanism’s role in preventing crises:¹⁸

Higher water prices would also reduce the need to build costly supply projects and delivery systems that dam and divert free-flowing streams. Higher prices would encourage private, profit-making firms to enter the water supply industry, taking the burden off the public treasury. If the price mechanism were allowed to

¹⁴ See also G. Tracy Mehan III. and Ian Kline’s reference to the same in “Pricing as a Demand-Side Management Tool: Implications for Water Policy and Governance,” *Journal of the American Water Works Association*, February 2012. pp 61-66.

¹⁵ Terry L. Anderson and Pamela S. Snyder, “Priming the Invisible Pump: Water Markets Emerge,” *PERC Policy Series No. 9*, February 1997. Property and Environment Research Center, <http://www.perc.org/articles/article198.php>

¹⁶ Cited in Mehan, May/June 2012.

¹⁷ Mehan, May/June 2012.

¹⁸ Terry L. Anderson and Pamela Snyder, *Water Markets: Priming the Invisible Pump*, Cato Institute: Washington, D.C., 1997. p. 11.

operate, demand could be reduced, supply could be increased, water would be reallocated, and water crises would become obsolete.

Water shouldn't be made artificially cheap. Proper pricing is an "alternative" to desalination in that sense. David Zetland notes that "Shortages can be ended much more quickly by a change of incentives than supply-side actions to build a desalination plant or transfer water from neighbors who probably can't spare a drop."¹⁹

On the other hand, there's plenty water in the Great Lakes. Politically expanding fundamentally scarce and poorly priced supply in less-blessed places seems to have entrenched artificial new problems by enabling difficult-to-sustain migratory and settlement patterns via desalination and other supply techniques. Policymakers shouldn't use desalination subsidies as a means of making it artificially cheap for more people to move into particular areas like arid regions. That would be illegitimate public policy and perverse justification for current legislation, and worse, sow the seeds "necessitating" more legislation years hence. It echoes the policy of federal flood insurance for building on hurricane-prone areas.

Reduction of Water Waste and Improved Contracting

Another "alternative" to desalination alongside better pricing is to avoid wasting existing supply. Bonner Cohen notes that leaking pipes alone cost 17 percent²⁰ of the annual water supply:

Water main breaks and leaking water supply pipes cost American taxpayers billions of dollars every year in lost water and repair costs. Necessary upgrades promise to place additional stresses on taxpayers long into the future. Building and replacing water and sewage lines alone will cost some \$660 billion to \$1.1 trillion.²¹

Repairs can be cheaper than desalination. Cohen further notes that changing inefficient policies such as restrictions on PVC pipe use, and emphasizing competitive procurement bidding for crumbling underground infrastructure can save great sums. Such forms of non-market inertia make ordinary infrastructure more costly than it needs to be and may improperly inflate the appeal of costly desalination.

Infrastructure Advances and Other Innovations as Substitutes for Desalination

Non-market-priced municipalities that attempt to sell water at average cost by their nature compound the problem of rational adoption of expensive desalination: As David Zetland

¹⁹ David Zetland, *The End of Abundance: Economic Solutions to Water Scarcity*, 2011. p. 6.

²⁰ Cohen, 2012, p. 4.

²¹ Cohen, 2012, p. 3.

put it, desalination “will merely result in greater financial losses from selling more water below cost and do nothing to prevent shortage.”²²

The pricing of regulated-utility water will always suffer, compounding problems over time. In any event, without advocating for any particular alternative to desalination, and while stressing the underlying issue of water as a non-competitive, non-market enterprise, other infrastructure expansion approaches could be more appropriate. These include:

- Better transport, including pipelines/aqueducts/trucking/shipping: Transport can be cheaper than desalination. Advances among these would matter and change economics drastically, particularly if other network industries with rights of way collaborated far more than they do today.²³ Crude oil carriers can be converted to water carriers.²⁴
- Trade: Relatedly, trade allows for coping with competing priorities and grappling with scarcity. Mehan for example notes that “[E]merging water markets allow...for trades between cities, farmers, and even NGOs such as Trout Unlimited.”²⁵
- Gray/wastewater treatment and reclamation is an alternative for sourcing, for agriculture and industry if not for drinking, taking pressure off the latter.
- Stormwater harvesting techniques may improve.
- Conservation: Anderson and Snyder in *Water Markets* note that “Markets are providing agricultural and urban users with more reliable supplies and with an incentive to conserve, and are enabling environmentalists to purchase instream flows to protect fish and recreational opportunities.”

Respecting and Enhancing Legitimate Market Pressures for Desalination

The need to avoid artificially promoting desalination in areas that the market and proper pricing wouldn’t have created demand has been emphasized.

David Zetland’s *The End of Abundance* encapsulated some of the hurdles:

Desalination is one of the most expensive ways to get freshwater. The capital costs of the plant, pumps and pipes are significant. Operating costs (energy and filters) depend on salinity, energy source, plant technology, filter technology and other factors. Environmental costs from the entrapment/entrainment/impingement

²² Zetland, *The End of Abundance*, 2011, p. 18.

²³ See introduction in Adam Thierer and Wayne Crews, *What’s Yours Is Mine*, Cato Institute: Washington, D.C. 2003.

²⁴ Noted in Wikipedia’s entry on desalination, <http://en.wikipedia.org/wiki/Desalination>.

²⁵ Mehan, May/June 2012.

of sea life harmed or killed by suction at intake pipes and saline discharge are important.²⁶

We can be willing to accept that desalination would greatly benefit from a friendlier regulatory environment. Excessive permitting and other regulations that make it overly difficult and a years-long process to construct and operate desalination plants should be reviewed—particularly since legislation like H.R. 2664 would paradoxically promote regulation.

As for legitimate market pressures, some applications naturally and justifiably rely on desalination, such as ocean going vessels and resort properties.

Technologies once expensive often come into their own, as did hydraulic fracturing, or fracking. Autonomous viability is the root of any conversation about sound usage and market adoption.

For desalination to flower, proximity to seawater and energy matter of course. Great improvements in desalination's viability arguably could be had via co-location with power plants such as nuclear and coal, but those appear somewhat off the table given coal's exile by the bill (by implication, given the emphasis on renewable) and by broader public policy.

But nuclear and coal cogeneration could be needed for scale. While desalination costs have dropped over decades, they remain vulnerable to electricity prices, and are still very high regardless of cheap power. As noted, federal policies disdainful of conventional energy are inconsistent with H.R. 2664's presumed goal of advancing desalination. The prioritization of renewable energy compounds expensive water with expensive input energy to create it.

Reducing onerous energy regulations would reduce economic uncertainty, making desalination more attractive. But reducing such uncertainty would also make conventional energy and water production attractive too. Affordable energy in that sense belongs in the necessary-but-not-sufficient category when it comes to rational desalination.

Apart from water source and energy, perhaps the single most important circumstance to justify adoption of desalination processes would be that the water source in need of desalination is independent from and more reliable than other fresh sources rooted in precipitation, runoff and aquifer recharge.²⁷ But these local characteristics, if not sufficient to inspire private adoption, should be the concern of local or regional authorities, not the population at large.

²⁶Zetland, *The End of Abundance*, p. 128.

²⁷ CRS, 2011, p. 2.

Businesses do invest in the technology. The number of desalination techniques is surprising, beyond what the legislation seems to appreciate. So is the number of firms: Lux, Siemens, GE²⁸, and others.

Private desalination investment outstrips public investment, and is subject to market discipline. Public and private investment overseas where the incentives line up differently may inform policy better than anything H.R. 2664 could do.

Desalination is one category of purification; some industries require even higher purities of water than desalination would create, do substantial research, and pay the price of it. Water augmentation, driven by industrial needs, is where the advances are most likely to be most efficient and broadly informative. Lessons from this sweep of experimentation are transferable and more on point than the research and education appeals of H.R. 2664.

Most of us just want water to come out of the tap. As costs do come down, and as inconsistent energy policies are harmonized, desalination could represent a phenomenal, perhaps non-depletable source of water. And if costs are lower, then there's no need for subsidy.

As it stands, the realities of non-scarcity pricing and of permitting and approval barriers seem to defy the vision of instruments like H.R. 2664. As David Zetland put it in a hypothetical regarding supplying California's municipal needs via desalination:

But if it's possible to get approval for this kind of project and raise prices so far, why not just raise prices and skip the project? Higher prices would leave more water for nature, save a lot of money, and still leave humans with adequate supplies...[T]he policies affecting supply and demand are more important for ending shortages than technology.²⁹

We need competitive markets to discover not just desalination's real value relative to the entire range of alternatives, but the value of water itself.

In listing alternatives to desalination above, the importance of broader markets in infrastructures was highlighted. Innovation and basic research itself do not proceed in isolation in genuine markets. Economic sectors can inform and enrich one another, making it advisable to tear down regulatory silos artificially separating our great infrastructure industries wherever possible so that knowledge, ideas, products and collaboration—and water—flow more freely.

²⁸ Descriptions of techniques appear on GE's website, "Desalination: Reliable fresh water supplies from challenging water sources." http://www.gewater.com/what_we_do/water_scarcity/desalination.jsp

²⁹ Zetland, *The End of Abundance*, p. 183.

Subsidies Can Mean “Sub-Prime” Technology Policy

Normally, America urges developing nations to embrace markets and reject government-steering philosophies for enterprises like growing wheat or making shoes. Yet we enable government oversight of advanced networks and infrastructure at home, such as water, the Federal Communications Commission’s National Broadband Plan and net neutrality rules, and the heavy regulation of electricity.

But “investment” in any non “shovel ready,” politically favored project while leaving 19th and 20th Century infrastructure and antitrust regulation intact is rather sub-optimal.

As a free society becomes wealthier, creation of infrastructure like water becomes easier, not harder. The America of 100 years ago that built overlapping tangled infrastructure with a paltry developing-world-level GDP can build today’s, if allowed. Well functioning capital markets already *are* our “infrastructure bank.” Yet unsurprisingly, desalination has been considered as a target for infrastructure bank financing techniques.³⁰ Energy infrastructure, communications infrastructure, electricity infrastructure, the infrastructure capabilities of desalination—all would benefit far more from a concerted deregulation and liberalization campaign than government spending and research. (**Appendix I: Economic Liberalization: An Alternative to Government Spending** presents such an outline.)

Government steering and subsidies can offload technologies onto inefficient paths, and can generate artificial booms. One lesson of the telecom meltdown is that government can contribute to the inflation of unsustainable technology and research bubbles; we may be at risk of a similar “green technology” bubble now.³¹

A subsidy for an unproven or emergent technology can be thought of as a pre-bailout. There’s no way to do every project; everybody has competing priorities. Few know many details about every competing option, and subsidies get a pass: thousands of projects in hundreds of legislative districts.

We are not best served by an environment of researchers chasing politically favored fads and designing grant requests in response to political trends, whether biofuels, energy conservation, smart grids, politically favored medical research, or desalination or other forms of water treatment and augmentation. President Eisenhower warned in his 1961 Farewell Address of the risks of researchers designing proposals to link to politically fashionable themes:

³⁰ CRS, 2011, p. 2.

³¹ Spain’s King Juan Carlos University released findings that each “green job” created by the Spanish wind industry cost 4 other jobs elsewhere. “The Big Wind Power Cover-Up,” *Investor’s Business Daily*, March 12, 2010. <http://www.investors.com/NewsAndAnalysis/Article.aspx?id=527214>

[P]ublic policy could itself become the captive of a scientific-technological elite...Partly because of the huge costs involved, a government contract becomes virtually a substitute for intellectual curiosity...The prospect of domination of the nation's scholars by Federal employment, project allocations, and the power of money is ever present—and is gravely to be regarded.³²

Desalination is small potatoes compared to that, but the essence is the same. Note again that the legislation artificially favors use of renewable energies, precisely the kind of distortions being noted here.

Regardless, we have a regional or state issue on our hands, not a federal one. Advocates could surely desalinate to their hearts' content, but pay for it themselves by convincing the constituents who benefit, not billing the rest of society.

Government Funding Has Strings Attached

Under a Republican administration, Washington passed the bipartisan 21st Century Nanotech Research and Development Act in 2003 to provide nearly \$4 billion to establish numerous research grants for nanotechnology initiatives, set up nanotechnology agencies, programs, subsidies, and steer students toward nanotechnology research.

Federal agencies simultaneously positioned themselves to regulate risks of nanotechnology, not necessarily to the good. Reports from Environmental Protection Agency³³ and the Food and Drug Administration³⁴ call for substantial roles for regulatory bodies to govern nanotechnology endeavors.

Government funding invites such regulation. Regulatory concerns over desalination are pointed to by the CRS, and H.R. 2664's own design welcomes government oversight of the technology as if alternatives were unthinkable.

The thrust will be that government should fund desalination and study (endlessly) its risks. Since recipient businesses and contractors can become so dependent on political funding, they go along with the oversight, cut off from envisioning alternative approaches either to funding or managing hazards.

Fundamentally, we face the choice of treating frontier research, development and production of everything from nanotech to desalination as market enterprises and requiring them to demonstrate both financial feasibility and safety in the marketplace, or

³² Eisenhower's Farewell Address to the Nation. <http://mcadams.posc.mu.edu/ike.htm>.

³³ U.S. Environmental Protection Agency's "Nanotechnology White Paper"

³⁴ Food and Drug Administration's "Nanotechnology"

suffer their being regulated at every stage and their economic potential squelched, without necessarily gaining safety in the exchange.

The drive to regulate safety isn't only undermining wealth creation in science and manufacturing, but threatens the emergence of needed safety and disciplinary practices. It's important to avoid safety regulation that either inadvertently or deliberately preempts superior discipline. Policymakers "safety" regulation can exacerbate risks of new technologies by unleashing them before their time.

Meanwhile, while political funding comes with strings attached on the one hand, the circumstances accompanying funding can indemnify companies for the hazards they create on the other. Homeland security technologies like gas masks for example may be indemnified in the event they fail; Proposed cybersecurity legislation would indemnify firms in the event of certain data breaches (while markets perhaps would not); The Price Andersen Act artificially limited nuclear power plant liability but meant total regulation. A market-oriented development path might have made nuclear power more viable over the past decades but we'll never know.

Naturally we must defend against risks, but also avoid over-regulation of frontier sciences' practical applications. Political funding increases pressures for that regulation, appropriate or not.

Political Failure Overwhelms "Market Failure" in Basic and R&D Investment

The case for taxpayer funding of science and favored manufacturing is often based on the market failure argument. Supposedly research creates value not easily captured, and rivals can free ride. Some also suggest an investment payback period intolerably distant for entrepreneurs, so the private sector under-invests. Of course, rivalry itself is geared toward compressing the discovery-to-deployment phase.

Part of the misunderstanding here is a false dichotomy between basic and applied research. Regardless, price signals are needed to allocate scarce R&D resources to challenges that, once surmounted, would most reward innovators, advance human needs, and increase rates technological progress and job creation.

For public funding, the absence of a residual claimant capable of aspiring toward windfall returns undermines the political appropriations environment's ability to manage resources. On the other hand private investors can rationally invest in a range of low probability projects—like GE's desalination projects—counting on the profits from the rare success to offset the more typical failures.

Taxpayer funding can create other complications like patent disputes between university and corporate collaborators over control of future profits, the rights of taxpayers to the

spoils, and access to research results or data by competitors or the public. An example is the dispute over the ownership status of genetic discoveries or basic molecular information. Pharmaceuticals routinely face compulsory licensing threats globally. Public funding also can create avoidable conflict of interest disputes when government scientists interact with private ones.³⁵ We do not want interventions to undermine the willingness to undertake private research.

Policy should avoid political failures created by public funding, which can exceed the “market failure” used to justify such funding. And policy should legitimize the private-property status of new forms of wealth and avoid policies that delay these underlying institutional innovations.

As for the claims of market failure/private underinvestment, the expansion of government-funded science doesn’t help if the metric is the proportion of a nation’s GDP devoted to R&D. Research by scientist Terence Kealey suggests both that the private sector funds basic research out of competitive necessity in a global economy, and that total R&D expenditures tend to correlate to GDP rather than to particular national policies.³⁶ In other words, where government R&D is low, the private sector simply invests more. Higher GDP begets higher R&D. Substitution and tradeoffs mean taxpayers gain little from increased political R&D, and may lose a lot because of the inefficiencies, sub-par policy and anti-competitive political choices.

Politicians Can’t Choose Technologies Rationally, and There Are Alternatives

The supporters of federal desalination research tend to be from states that would directly benefit, but of course that’s the case with many government programs.

Except when a local earmark or project is at stake, politicians commonly accept that government has no innate ability to pick among competing technologies using taxpayer money. Moreover, government plans operate on an election timeline that doesn’t conform to market schedules.

Politicians cannot assign rational priorities to the stream of “significant” projects, thus will select popular ones benefiting local constituencies; simply note the continuing funding of new libraries in the digital age (as opposed to, say, handing out wireless-enabled laptops), new post offices, and clamoring over tech programs for rural small businesses. In technology funding, scientific merit may be underwhelming, but the rhetoric of science and technology are assured.

³⁵ Rick Weiss, “NIH Bans Collaboration With Outside Companies: Policy Comes After Conflict-of-Interest Inquiry,” *Washington Post*, September 24, 2004; Page A23.

³⁶ See, for example, Terence Kealey, “End Government Science Funding,” Cato Institute, April 11, 1997. http://www.cato.org/pub_display.php?pub_id=6168.

The hazards of a government appropriations process and the accompanying lobbying for sub-optimal projects are numerous. In the space program, entrenched contractors and legislators from flight-center districts enjoy cost overruns, and lobby against cheaper unmanned flights. An ethic of revolutionizing space flight becomes unthinkable. There's no need to recreate or perpetuate such a situation in water policy or any realm.

In the federal R&D sweepstakes, bolstering promising technologies has been compared to efforts to improve the speed records at a racetrack by picking the R&D horses to run—in the case of H.R. 2664, desalination vs. everything else. Beyond the technologies for generating clean water, however, the condition of that racetrack and the rewards available also matter. Greater “speeds” might be had by improving the track, the business and regulatory environment, and by letting “jockeys” (private investors) keep more of their earnings.

The government-picking-technologies model undermines economic liberty, innovation, wealth creation, “national competitiveness” (a frequent rationale for government R&D) and consumer benefits, and is itself a source of risk. Many have argued that viable technology doesn't need a subsidy, and non-viable technologies probably can't be helped by one. Otherwise, we distort markets, create bubbles, and tee up future rippling recessions. Rather than picking the winning horses (or worse, actually *being one* of the horses, which worsens the situation with water policy), government's legitimate role is to improve the track on which all the horses run; that means liberalizing the regulatory environment within which entrepreneurs operate, for starters (again, see Appendix I).

One aspect of liberalization is privatization of federal research efforts rather than creating new ones as H.R. 2664 does (which itself would remove constituencies for government funding). The typical emphasis, to which H.R. 2664 conforms, is on government spending rather than privatization. During the 1990s, it was proposed that essential military aspects of federal labs be transferred to the Department of Defense, while commercial aspects should be privatized by offering them to the industries they supposedly benefit or by allowing research staffs to take them over via an employee buyout approach.

Privatization of federal research is a particularly hard sell when the topic at hand is public funding expansion. Perhaps one approach is to limit federal funding for technologies that do not yet exist, and grow out of the problem. In any event, a worthy idea noted in the 2010 discussions surrounding the America COMPETES Act was that of awarding prizes instead of funding research, the idea being that “Payment to researchers would reward accomplishments rather than promises.”³⁷ We note that here as a transitional alternative, not necessarily an end goal.

³⁷See Iain Murray, “A Wall of Separation Between Science and State,” *Competitive Enterprise Institute*, October 19, 2006.

Taxpayer Funding Misdirects Resources by Prolonging Inefficient Projects

Markets have to be good at killing bad projects as well as creating new ones.³⁸ Appropriations processes are less capable of systematic pruning. The problem with government science is that virtually all interested parties seek to grow government rather than pull the plug on exhausted or ill-considered funding projects, from relatively tiny ones like desalination to the gargantuan like the Superconducting Supercollider. The result is higher taxation and dollars directed to multiplying, uncoordinated ends. Science resembles any other rent-seeking interest in this respect. In testimony before congressional panels, most ask for more money, not less; for more government rather than less government.

Taxpayers should call the shots. Other citizens have goals equally as legitimate as those with the wherewithal to procure lobbyist representation in Washington or to appear at a hearing.

In proposing an end to the Advanced Technology Program years ago, Michael Gough offered a real test of taxpayer support: “Let the government give taxpayers who want to invest ... a deduction from their income ...[and] share in any profits that flow from it. That’s what taxpayers get from private investments. It’s not what they get [when government] takes tax money...and invests it in private enterprise.”

Policymakers Should Ease Private Desalination, Rather than Centrally Orchestrate

Desalination policy appears uncoordinated, involving multiple agencies, states and other entities.

The H.R. 2664 legislation, in response, directs that the [Interior Department] “Secretary shall carry out”:

an outreach program to create partnerships with States, academic institutions, private entities, local public agencies, and other appropriate organizations to conduct research, development, and demonstration activities, including the establishment of rental and other charges to provide revenue to help offset the costs of operating and maintaining the facility.

Note the premise that government-directed coordination is automatically preferred.

In an alternative scenario, private innovators might pool efforts, and in so doing function as a better target for investment. America’s great infrastructure firms are artificially

³⁸Auren Hoffman, “To Grow a Company, You Need to Be Good at Killing Things,” *Summation*, February 21, 2010. <http://blog.summation.net/2010/02/to-grow-a-company-you-need-to-be-good-at-killing-things.html>.

segregated into regulatory silos (telecommunications, electricity, water, sewer, cable, railroad, airline, satellite, air traffic control, roads). They could collaborate to expand infrastructure wealth development, but it would require a mindset different from the constricted one H.R. 2664.

President Obama has suggested a desire to boost antitrust enforcement.³⁹ That's unfortunate. Antitrust can be predatory. Instead, policymakers should relax antitrust so that firms within and across industry sectors can collaborate on business plans to bring capitalism and infrastructure wealth creation to a higher level. That includes water infrastructure.

The antitrust laws remain a significant barrier to a flowering of cooperative business efforts and private R&D. It is precisely in tech industries that private standard setting, joint research and risk sharing arrangements might overcome alleged market failures in basic research output and difficult technologies like desalination. Yet some would block such arrangements, as well as mergers among firms engaged in like research. Markets require competition, sometimes merger, and sometimes merely the kind of cooperation or "partial merger" often miscast as damaging collusion.

Environmental Concerns Weaken the Case for the Bill

Environmental impacts of subsidized desalination, such as the impact on aquatic creatures and the uncertainty over numerous options for disposal of waste streams, are the very type that in other contexts like pipelines and fracking are deal breakers.

Also count on the peculiarities of the source water used in desalination as providing justifications to expand regulation. Government fostering of desalination technology will carry with it an advanced, open-ended regulatory regime.

The Congressional Research Service notes that "current desalination processes are already operating close to the theoretical minimum energy required."⁴⁰ Yet H.R. 2664 specifies that desalination funding be steered such that the technology is fused with expensive renewable energy sources. But desalination is inherently energy intensive compared to options, and "dense" energy like cogeneration with coal or nuclear would seem to be worthy of consideration for emphasis instead.

Free enterprise can excel at managing risks of desalination intake concerns and its waste streams. In normal markets, before firms can attract investors and launch, disciplinary institutions like liability and insurance must be secured. One must satisfy many

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http://www.nytimes.com/2009/05/12/business/economy/12antitrust.html?_r=1&adxnnl=1&adxnnlx=1268514088-MohE/8/mpcqIAEXJNqJ1JQ.

⁴⁰ CRS, 2011, p. 4.

stakeholders including capital markets, insurers, upstream business suppliers, horizontal business partners, downstream business customers, consumers, public and global markets. And one must not pollute a neighbor's property.

Markets should, and do, bring highly risky products forth. But government promotion, subsidies and indemnification can short circuit the risk mitigating disciplines that must emerge alongside the new. That can give emergent industries an undeserved black eye and foster counterproductive regulation and less innovation.

A Better Government Role: Enabling Competitive Desalination

Occasionally the problem confronting research isn't market failure but the failure to have markets. "Doing something" about legitimate water needs is not the same as spending money and initiating research and education. When linking research to human needs and promoting infrastructure, capital markets trump the legislative process—or if not, policy should shift to ensure that they can.

Interestingly, the dollars allocated in the various federal desalination acts over the decades seems to total perhaps a few billion. But removing barriers to private research and manufacturing could yield far greater gains than relying upon appropriations that invite rent-seeking and that may threaten safety improvements.

Government's proper stance is one of benevolent indifference or neutrality, since many technologies, most not in existence yet, will always compete for scarce investment dollars whether the projects are small scale or grand infrastructure.

It was noted earlier that that Congress has a far more important job to do that it can't escape by sprinkling cash around. As discussed in *Still Stimulating Like It's 1999: Time to Rethink Bipartisan Collusion on Economic Stimulus Packages*,⁴¹ there exists a natural tendency toward stagnation when government fails to perform its "classical" function of ensuring that prices of materials, labor and other inputs aren't distorted by interference in the economy.

With water supplies, we have not a funding problem, but a larger resource mismanagement problem.

As David Zetland summarizes in *The End of Abundance*, "The end of abundance means the supply side/cost recovery model of water management no longer delivers the results we want, but that model still dominates the business—from California to China, Florida

⁴¹ Wayne Crews *Still Stimulating Like It's 1999: Time to Rethink Bipartisan Collusion on Economic Stimulus Packages*, Competitive Enterprise Institute, February 2008.
http://cei.org/cei_files/fm/active/0/6425.pdf

to Fiji—and it will cause trouble until we change the way we manage water. Economics offers an alternative focus on balancing supply and demand."⁴²

Markets expand output in tangible products and intangible services. They also help maximize the production of useful information—including *research and scientific information about technologies whose applicability is uncertain yet holds promise*.

The task is to bring modern water resources further into the market process, and to lay the groundwork for tomorrow's discoveries to be informed and funded by market rather than political processes. Reauthorizing federal water desalination projects would do the opposite in many respects. In a sense, as this report describes, it will take legislation of a different form to address the underlying problems in water supply.

⁴² Zetland, *The End of Abundance*, p. 6.

Appendix I: Economic Liberalization: An Alternative to Government Spending

We've noted some specific hazards of government steering the market. We need alternative approaches—other than federal spending—to advance science and manufacturing of which desalination is an example. Such approaches involve fostering a general business environment wherein a private sector flush with health can fund its own research and ventures. Here I point to the need for cataloging and limiting federal over-regulation to foster a wealthier economy, one capable of carrying out an array of research regimes with less temptation to seek an ear in Washington.⁴³

Sunset Regulations and Implement a Regulatory Reduction Commission

More than 60 departments, agencies and commissions issue some 3,500 regulations a year in thousands of *Federal Register* pages (documented in *Ten Thousand Commandments: An Annual Snapshot of the Federal Regulatory State*.⁴⁴)

Costs of regulations are estimated to top \$1 trillion annually. Congress should implement a bi-partisan “Regulatory Reduction Commission” to survey existing rules and assemble a package to eliminate with a straight up-or-down vote, no amendments allowed.

Require Congressional Approval for Major Business Regulations

Of 3,500 annual regulations, 100 plus are “economically significant.” These rules should require an expedited congressional approval before they are effective. Apart from the competitiveness and innovation issues at issue in H.R. 2664, the delegation of legislative power to unelected agencies has long needed attention.

Perform Basic Deregulatory Housekeeping

- Re-discover federalism, that is, circumscribe the federal role regarding investment and regulatory matters best left to states and private enterprise. Congress should look at what federal government does that it could eliminate, or that states could do instead to provide a research and manufacturing boost.
- Improve the ethic of quantifying regulatory costs, and selecting the least-cost compliance methods.
- Codify the executive order on “Regulatory Planning and Review” (E.O. 12866), or, Reagan’s E.O. 12291 which provided for more external review.
- Require OMB’s Regulatory Information Service Center to publish detail on major and minor rules produced by each agency, and strengthen its oversight.

⁴³ More detail on the suggestions here appear in Wayne Crews, “The Other National Debt Crisis: How and Why Congress Must Quantify Federal Regulation,” Competitive Enterprise Institute, Issue Analysis 2011 No. 4. <http://cei.org/sites/default/files/Wayne%20Crews%20-%20The%20Other%20National%20Debt%20Crisis.pdf>

⁴⁴ <http://cei.org/sites/default/files/Wayne%20Crews%20-%2010,000%20Commandments%202011.pdf>

- Reinstating the *Regulatory Program of the U.S. Government*, which formerly appeared routinely as a companion document to the Budget.
- Declare *Federal Register* notices as insufficient notice to small business
- Hold hearings to boost the scope of the Small Business Administrations' "r3" regulatory review program.
- Lower the threshold at which a point-of-order against unfunded mandates applies.
- Implement a supermajority requirement for extraordinarily costly mandates.
- Lower the threshold for what counts as an "economically significant" rule, and improve explicit cost analysis.
- Explore, hold hearings on, and devise a limited "regulatory budget."
- Establish an annual Presidential address or statement on the state of regulation and its impact on productivity and GDP.
- Sunset regulations after fixed period unless explicit reauthorization is made.
- Publish data on economic and health/safety regulations separately
- Disclose transfer, administrative and procedural regulatory costs
- Explicitly note indirect regulatory costs
- Require agencies and the OMB to recommend rules to eliminate and to rank rules' effectiveness
- Create benefit yardsticks to compare agency effectiveness

Implement Annual Regulatory Transparency to Accompany the Federal Budget

In attempting to implement economic liberalization for the wealth creating sector, a "Regulatory Report Card" should be part of the basic housekeeping just noted.

Regulatory Transparency Summary ...with 5-year historical tables...

- Total major (\$100 million-plus) rules and minor rules by regulatory agency
- Numbers/percentages of rules impacting small business
- Numbers/percentages featuring numerical cost estimates
- Tallies of cost estimates, with subtotals by agencies and grand total
- Numbers and percentages failing to provide cost estimates
- Federal Register analysis: Pages, proposed and final rules by agency
- Most active rule-making agencies
- Rules that are deregulatory rather than regulatory
- Rules that affect internal agency procedures alone
- Numbers/percentages required by statute vs. rules agency discretionary rules
- Rules for which weighing costs and benefits is statutorily prohibited
- Detail on rules reviewed by the OMB, and action taken

Wayne Crews

Bio and Selected Writings

Clyde Wayne Crews Jr. is vice president for policy and director of technology studies at the Competitive Enterprise Institute and a former Cato Institute scholar. He is widely published and a frequent speaker at venues ranging from the [DVD Awards](#) in Hollywood, to the [European Commission](#), to the National Academy of Sciences, and has testified before congressional committees on various policy issues. Wayne is a dad of four.

While not a lawyer, Wayne is [cited in dozens of law reviews and journals](#). He [can still do a handstand on a skateboard](#), and enjoys [custom motorcycles](#).

Wayne is a regular [contributor to Forbes.com](#) and is author of the popular [Ten Thousand Commandments: An Annual Snapshot of the Federal Regulatory State](#). His work explores the impact of government regulation of free enterprise on individual liberty, rights and innovation: Areas of interest include antitrust and competition policy, safety and environmental issues, and information age concerns like privacy, online security cybersecurity, broadband policy, intellectual property and frontier science issues.

Wayne authored or co-authored numerous recent reports including [The Other National Debt Crisis: How and Why Congress Must Quantify Federal Regulation](#); [This Liberal Congress Went to Market? a Bipartisan Policy Agenda for the 110th Congress](#) and [Communications without Commissions: A National Plan for Reforming Telecom Regulation](#). Prior to the assorted government bailouts, he wrote the report [Still Stimulating Like It's 1999: Time to Rethink Bipartisan Collusion on Economic Stimulus Packages](#).

Wayne is co-editor of the books [Who Rules the Net?: Internet Governance and Jurisdiction](#), and [Copy Fights: The Future of Intellectual Property In the Information Age](#). He is co-author of the book [What's Yours Is Mine: Open Access and the Rise of Infrastructure Socialism](#), and a contributing author to other books. He has published in the *Wall Street Journal*, *Chicago Tribune*, *Forbes*, *Communications Lawyer*, the *International Herald Tribune* and others. He has made TV appearances on Fox, CNN, ABC, CNBC and the Lehrer NewsHour, and his reform ideas have been featured prominently in such publications as the *Washington Post*, *Forbes* and *Investor's Business Daily*. He contributes to blogs such as [OpenMarket](#), [Tech Liberation Front](#) and the [Daily Caller](#).

Earlier Wayne was a legislative aide in the United States Senate to Sen. Phil Gramm, covering regulatory and welfare reform issues. He was an Economist and Policy Analyst at Citizens for a Sound Economy Foundation, and has worked as an economist at the U.S. Food and Drug Administration and as a Research Assistant at the Center for the Study of Public Choice at George Mason University. He holds an M.B.A. from William and Mary and a B.S. from Lander College in Greenwood, South Carolina. He was a candidate for state senate as a libertarian while at Lander.

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