

# **Taxpayer Financing for Nuclear Power: Precedents and Consequences**

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## **Introduction**

In recent months, the U.S. Congress and the Bush administration have offered extraordinary incentives for the building of new nuclear power plants in the United States. The Energy Policy Act of 2005 offered a production tax credit of 1.8¢ per kWh to some 6000 MW for eight years. In addition, the first six plants were offered insurance against various types of delays. The U.S. statute limiting accident liability to an inflation-adjusted \$10.5 billion and spreading it across all nuclear power plants was extended to new units for the next 20 years.<sup>1</sup>

In 2007 the nuclear industry announced that these benefits were insufficient to stimulate construction of new reactors. The financial community still saw too much risk of loss should the plants cost too much, operate too poorly or be undercut by a drop in the price of alternative sources of power. Since all of these events had occurred within the last thirty years, the concerns were not abstract. Further measures were needed if more than a handful of new nuclear units were to be underway in the next decade.

In December 2007, Congress responded by extending some \$18 billion in loan guarantees for new nuclear plants. The process by which this was done was sufficiently irregular and cumbersome that the extent of the benefit remains uncertain,<sup>2</sup> but Congress's bipartisan determination to override the 30 year market verdict against new nuclear power in the United States couldn't be much clearer.

In addition, the Bush administration has undertaken also to pour taxpayer financing into the reprocessing of spent fuel, an activity even more uneconomic than new nuclear power plants. U.S. reprocessing was suspended by President Ford in 1976 on account of its potential connection to the proliferation of nuclear weapons. President Carter

terminated the suspended programs because he shared President Ford's proliferation concerns and because he saw no economic justification for reprocessing. The latter conclusion was validated when President Reagan four years later withdrew government objections to reprocessing done by the private sector, and the private sector showed no interest.

The interaction of dubious U.S. resource policy with professed devotion to market principles has since the 1930s created a towering pyramid of paradox, hypocrisy and farce atop one of the world's most robust and dependable energy systems. Like a world class sprinter sporting a large belly, the spectacle compels wonder as to what could be achieved if only sensible training principles were followed.

We will not learn the answer as long as the policies of the last few years continue. Instead a disproportionate share of the team food budget will go to milkshakes for the sprinter, whose success against undernourished teammates will encourage belief in the brilliance of the regimen until fitter competition or a cholesterol crisis bring on the realization that better methods are urgently needed.

Much of the inefficiency in the U.S. energy system is traceable to misuse of the government's immense power to coerce capital in order to build or to subsidize energy facilities. This paper discusses this history in the context of current government efforts to assure the construction of new nuclear power facilities. This paper also describes some consequences of subsidies in terms of patterns of growth and economic activity that are demonstrably unsustainable today. It shows that hiding the costs of megaprojects in order to improve their competitiveness against more sustainable and less dangerous alternatives can have serious long term consequences. As to nuclear power, these consequences are not yet as clearly visible as they are in the water and agriculture sector, which makes the latter a valuable light to shine on the former.

The paper begins with a review of the effects of using federal loan guarantees to further particular forms of energy infrastructure development. It then reviews some past energy developments to assess their potential to misallocate resources and expose the tax payer to liability in the event of default. It includes an overview of the package of federal programs that combine water resource development with energy facilities. Because these

programs involve urgently needed resources in two separate realms, the opportunities for subsidy and misallocation were compounded. The paper concludes with a comparison of past uses of federal credit support with the proposed efforts in support of new nuclear units. It suggests that all of the ingredients of past resource misallocations are aligned in such a way as to create high potential for similar results if a similar course is followed with regard to new nuclear units.

## **When Taxpayers Shoulder Investors' Risks**

### **Some Consequences of Targeted Credit Subsidies**

In response to the energy crisis of the 1970s, the Ford Administration proposed an “Energy Independence Authority” to extend loans and loan guarantees to projects making a significant contribution to the energy independence or the energy security of the United States. The necessary legislation was not enacted. However, the legislation did serve as a precursor to the more limited Synthetic Fuels Corporation Act of 1980. This legislation established the Synthetic Fuels Corporation, with initial authority to provide up to \$18 billion in loans, grants and loan and price guarantees to support coal gasification and oil shale development. The SFC was abolished five years later in the face of collapsing oil prices. The only facility it ever built was the Great Plains coal gasification plant, constructed with the aid of \$2 billion in federal loan guarantees. Great Plains went bankrupt in 1988, was sold for \$88 million and emerged to sell overpriced synthetic gas on the basis of federally required purchases for the next two decades.<sup>3</sup>

Although it was never enacted, the more ambitious Energy Independence Authority legislation did give rise to an insightful 1978 critique of government credit subsidies in the context of energy facility development, prepared by Murray Weidenbaum (soon to be the first Chairman of President Reagan’s Council of Economic Advisors) and Reno Harnish.<sup>4</sup>

This thirty year old Weidenbaum/Harnish critique reads like a ringing rebuke to the 2007 nuclear loan guarantee legislation or to Senator Pete Domenici's February 2008 proposal to create a government-run public-private bank to provide financial support (loans, guarantees and equity capital) for U.S. clean energy projects, including nuclear power.

In assessing the potential of subsidy to misallocate energy resources, the Weidenbaum report makes the following points:

- Federal credit programs merely shift funds from one borrower to another. They do not increase the amount of funds available to the economy. Rather, to the extent they succeed, they take capital away from the unassisted sectors of the economy, leading them to request aid (pp. 17-18).
- New and small businesses, school districts and smaller local governments and individuals, private mortgage borrowers not under the federal umbrella – generally the weaker borrowers – are the ones squeezed out. The unsubsidized private borrowers wind up paying higher interest rates” (pp. 52-53).
- Federal credit programs put the government in the position of holding assets of questionable quality or limited use, making it difficult to recover the original value of the loans in the case of default, and complicating the process of liquidating the agency (p. 17).
- A basic function that credit markets are supposed to perform is that of distinguishing credit risks and assigning appropriate risk premiums. This function is the essence of the ultimate resource allocation of credit markets. As an increasing proportion of issues coming to the credit markets bears the guarantee of the federal government, the ability of the market to differentiate credit risks inevitably diminishes. Theoretically the federal agencies issuing or guaranteeing debt perform this role, charging as costs of the programs differing rates of insurance premiums. In practice, all of the pressures are against such differential pricing of risks (p. 13).
- [Quoting MIT Professor Henry Jacoby, a supporter of limited loan guarantees] The problem with loan guarantees is that they tend to hide the true cost of the technology that is being demonstrated....If I thought this bill was a prelude to a massive program of loan guarantees for new energy facilities, for multiple plants with known technology and not just for a limited set of demonstrations, then I would oppose it. I think it would be a terrible mistake to embark on a large scale program of hidden subsidies for energy supply from new capital intensive technologies.....The disadvantage of the widespread use of loan guarantees is that they will obscure the true cost to the economy....More important, they hide the

true cost from consumers and encourage wasteful consumption practices (pp. 41-42).

- [Quoting the General Accounting Office] The bill is not neutral on conservation options. Actually, it would hamper conservation efforts rather than simply fail to promote them....Its guarantees would make projects it assists financially more attractive to private capital than conservation projects not backed by federal guarantees. Thus both its loans and its guarantees will siphon private capital away those conservation projects which might have been able to obtain private financing (p. 12)
- The size of the undertaking in itself does not necessitate governmental assistance; large commercial energy project, such as the \$7 billion (\$35 billion in 2007 dollars) Alaska pipeline project, are proceeding with private finance (p. 49).

### **Nuclear Power and Federal Credit Support**

Uniquely among major industries and energy sources, nuclear power was created by federal expenditures. Controlled nuclear fission was developed as part of the Manhattan Project during World War II. Fission was first used as a nonexplosive energy source in the propulsion of nuclear submarines for the U.S. Navy.

While these expenditures were not targeted to the benefit of the nuclear power industry, they certainly had the effect of bringing nuclear power closer to commercial reality than private capital would have been likely to do during the same period. In addition, they created a pool of skilled labor, a supportive national laboratory capability and an industrial infrastructure that were readily convertible to the needs of the civilian nuclear power program.

This initial support did not take the form of loan guarantees of the sort reviewed in the Weidenbaum study, but there was more to come.<sup>5</sup> Consider, for example, the case of the West Valley reprocessing plant, which operated sporadically in upstate New York from 1966 until 1972 when it closed for "retrofitting" and "expansion". It never reopened. During its six working years, it achieved the equivalent of about two full years of operation.

At the 1963 groundbreaking, Governor Nelson Rockefeller announced the entire cost of the project to be \$28 million (about \$165 million in today's dollars), including \$20 million from W.R. Grace Company to build the facility and \$8 million from New York for support facilities. Governor Rockefeller's speech captures in unusually pure form the extraordinary marriage of free enterprise imagery to government largesse that is a staple of such occasions:

We are launching a unique operation here today, which I regard with pride as a symbol of imagination and foresight on the part of your state government - an operation that will make a major contribution toward transforming the economy of western New York and indeed the entire state...

I would like to express my appreciation of the leadership and imagination of W.R. Grace and Company, in the best tradition of the American free enterprise system, for its decision to pursue this pioneering undertaking in New York State. The company will find here an understanding and congenial home....The project is illustrative of the vigor, farsightedness and boldness, which is characteristic of free enterprise in New York state....

The presence in the state of the nuclear fuel reprocessing industry will, as time passes, have an increasingly favorable impact on the economics of energy production and utilization in the State with a resultant stimulation of over-all industrial development.

In short, this state-sponsored project, operating through private enterprise with federal cooperation, places New York in the forefront of the atomic industrial age now dawning - to the benefit of the health, safety and prosperity of this generation and many generations to come."<sup>6</sup>

Now every hope has ended in disappointment. Expectation has given way to irony; pretense is exposed as nonsense. What was really guaranteed in this "unique operation", and what did it cost?

The state of New York was the "landlord", meaning that it owned the site and built a number of the support facilities, including those for waste storage. In 1976, the "tenant" - Nuclear Fuel Services Corporation, a subsidiary of WR Grace and American Machine and Foundry Company until it was sold to Getty Oil Company in 1969 - notified the state that it would not renew the lease when it expired in 1980. NFS thereby turned the entire contaminated facility plus considerable unprocessed spent fuel over to New York. The taxpayers of New York had - through a lease arrangement that left them with the cleanup

responsibility – guaranteed that the private “tenant” would be indemnified against cleanup costs, an open ended obligation whose full extent remains unclear thirty-six years after the facility closed.

Luckily for New York, a federal takeover of the cleanup responsibilities was arranged in the form of the 1980 West Valley Demonstration Project Act, which provided for a Department of Energy cleanup that is still not complete. The New York share of the cleanup costs was set at 10% of the total. That amount had reached \$250 million in 2006, so the cleanup of that one facility to date has cost federal and state tax payers \$2.5 billion in unadjusted dollars.

### **The Origins of Federal Credit Support in Major Energy and Water Projects**

Thirty years before President Eisenhower’s 1953 “Atoms for Peace” Program launched private sector involvement with nuclear power, the U.S. government undertook its first major involvement in the electric power sector. This involvement came about through an even older effort to support farmers in the western states by federally provided irrigation. Indeed, the revenues from the hydroelectric dams provided one of the funding sources for federal credit support for the irrigation farmers. The complex accounting for costs and benefits of dams that provided hydroelectricity, irrigation, flood control and urban drinking water provided opportunity for subsidy and favoritism of many sorts and made effective oversight difficult.

Because these projects have existed for nearly a century, their consequences – benign and otherwise - are now relatively clear. Their history shows both the potential and the pitfalls of using federal credit support on a long term basis to underwrite established industries and economic patterns. The parallels to the potential misallocations resulting from using such support on behalf of an established nuclear industry are imperfect but often compelling.

### **Demand Forecasting, Climate Science and Mythology**

Much of the western United States between the Mississippi River and the Rocky Mountains was marked as desert on the maps of the 19<sup>th</sup> Century. Not until the 1870s did early experiments in irrigation enable significant settlement based on farming. The 1870s were a decade of exceptional rainfall in the arid regions, resulting in heavier settlement than the normal climate could sustain. While some urged caution in federal policies subsidizing settlement, others felt that it was America's "Manifest Destiny" rapidly to settle the nation from the Atlantic to the Pacific.

The believers in Manifest Destiny and their allies in local real estate and finance found support in a theory of human induced climate change based on the proposition that "rain follows the plow". According to this theory, the rainfall that coincided with the initial settlements was in fact produced by those settlements. Professor Cyrus Thomas exemplified this view:

Since the territory has begun to be settled, towns and cities built up, farms cultivated, mines opened, and roads made and traveled, there has been a gradual increase in moisture.....I therefore give it as my firm conviction that this increase in moisture is of a permanent nature, and not periodical, and that it has commenced within eight years past, and that it is in some way connected to the settlement of the country, and that as population increases the moisture will increase.<sup>7</sup>

Politicians, newspaper editors, believers in American expansion and promotional land development policy combined to lure refugees from American and European cities and rocky eastern soil westward with visions of endless easily farmed land. The truth was quite different.

John Wesley Powell, who had headed the first expedition successfully to raft and map the Colorado River, wrote a warning document entitled *A Report on the Arid Lands of the United States* in which he forecast that even with irrigation only a small portion of the land into which settlement was pouring could be sustainably farmed. He recommended major reforms in land grant practices and the development of carefully sited reservoirs to assure that the best land received adequate water to maximize its productivity. He cautioned that the subsurface waters available in the West were not likely to be a sustainable basis for farming in the long term.

When he explained his recommendations to the Congress, Powell was vilified by the representatives of the Western states that he sought to protect. As Wallace Stegner described the scene in his biography of Powell

They clamored to know how their states had got labeled “arid”....What about the artesian basin in the Dakotas? What about irrigation from that source? So he gave it to them: artesian wells were and always would be a minor source of water....If all the wells in the Dakotas could be gathered into one county, they would not irrigate that county.

Senator Moody thereupon remarked that he did not favor putting money into Major Powell’s hands when Powell would clearly not spend it as Moody and his constituents wanted it spent. We ask you, he said in effect, your opinion of artesian wells. You think they’re unimportant. All right, the hell with you. We’ll ask someone else who will give us the answer we want.

Powell, then the head of the U.S. Geological Survey, was defunded and forced into retirement, replaced by successors whose opinions were more congenial. But time was to prove him far more right than wrong. Only federal assistance for water and energy projects on a scale that turned a blind eye to both economic logic and the laws of nature could maintain the settlement flows across the Great Plains and into the Rocky Mountains, for a while.

### **Developing a Federal Role**

Droughts in the 1890s made nonsense of the proposition that settlement increased rainfall. Many farmers and developers faced ruin. Combinations of private citizens and state governments failed at the task of organizing and financing broader irrigation projects. Despite strong belief in the importance of preserving private enterprise and individual initiative against government encroachment, western state representatives acquiesced in the passage of the Reclamation Act of 1902.

The Reclamation Act established the Reclamation Service, whose projects were to be financed by a federal Reclamation Fund. Monies for this fund were to come from the sale of federal land. The fund would be replenished from the sale of water to farmers. However, the farmers were to be excused from paying any interest on this money, the first of many substantial subsidies.

The Reclamation Service attracted idealistic graduates of the country's finest engineering schools, who

headed west in a fog of idealism ready to take on the most implacable foe of mankind: the desert....The engineers who staffed the Reclamation Service tended to view themselves as a godlike class performing hydrologic miracles for grateful simpletons who were content to sit in the desert and raise fruit. About soil science, agricultural economics or drainage they sometimes knew less than the farmers whom they regarded with indulgent contempt. As a result, some of the early projects were to become painful embarrassments and expensive ones.<sup>8</sup>

More aggressive subsidy was needed to prevent the embarrassing failure of the initial subsidy program. First came a \$20 million loan from the Treasury to the Reclamation Service in 1910. In addition to the Treasury loan, Congress extended the repayment period for the farmers from ten years to twenty. Still, by 1922 only ten percent of the money paid from the Reclamation Fund had been repaid and sixty percent of the irrigators were in default on their obligations.

Congress responded by doubling the repayment period again, to forty years. However, crop prices fell following the end of World War I. Farmers continued to default. The Reclamation Service (renamed the Bureau of Reclamation) rarely cut off the water. Instead, monies from oil production and potassium mining on federal lands were channeled into the Reclamation Fund rather than into the federal treasury, a further subsidy from the U.S. taxpayer to the Reclamation Fund.

All of this might have ended in relatively modest financial loss had it not been for the election of Franklin Roosevelt and the onset of the Great Depression, a combination of need and visionary hope that was to elevate reclamation project expenditures to an entirely new level, based on the concept of river basin development.

### **Complex Variants of Federal Credit Assistance**

The concept of river basin development got its start on the Colorado River in the 1920s. The Colorado – far from the largest U.S. river – begins in the Rocky Mountains of central Colorado and flows southwest through Utah and Arizona, becoming the border first between Arizona and Nevada and then between Arizona and California before crossing

into Mexico. It drains mountains whose snow pack pours prodigious spring runoffs into desert lands with few other water sources. It was also the only river whose water could be diverted in sufficient quantity to meet the growing demands of urban Los Angeles and agricultural southern California, whose earlier grab of the entire but ultimately insufficient Owens River in southeastern California is loosely commemorated in the movie “Chinatown”.

Because the Colorado flows were so seasonal, massive storage was required to meet year round demands. So the Bureau of Reclamation built the Hoover Dam, the world’s largest hydroelectric project and reservoir upon its completion in 1935.

The Hoover Dam was completed just as the cataclysmic Midwestern drought that turned the center of the United States into “the Dust Bowl” entered its final stages. Hundreds of thousands of farmers fled westward from Oklahoma, Kansas, Nebraska and the Dakotas, potentially overwhelming the ability of the West Coast states to absorb them. One essential part of the response fashioned by President Franklin Roosevelt was the building of more dams to create more farmland.

The Bureau of Reclamation and the Army Corps of Engineers undertook river basin projects in central California constituting the Central Valley Project, vastly increasing the agricultural potential of a large part of the center of the state. Even this was inadequate to cope with the dislocations caused by the Dust Bowl and the Depression. The Roosevelt Administration responded with an even greater river basin development on the Columbia River in the Pacific Northwest.

The centerpiece of the Columbia projects was the Grand Coulee Dam, three times larger than the Hoover Dam. But Grand Coulee was just one of many dams built on the Columbia and its tributaries over the next three decades, dams that provided the cheapest power in the United States.

With the completion of the Hoover and Grand Coulee dams, as well as the Shasta Dam in California’s Central Valley Project, considerable political pressure developed for additional Colorado River projects to serve the “upper basin” states of Colorado, Utah and Wyoming. However, these states – at higher altitude with colder climates – lacked the agricultural potential of Southern California. Smaller crops of lower value were all

that could be grown even with water from expensive projects. Repayment potential was nonexistent. Yet the Bureau of Reclamation and the elected officials wanted more projects. The answer to their financial dilemma was the “cash register dam”.

The cash register dams had their roots in a Bureau of Reclamation creation called “river basin accounting”. In the world of river basin accounting, the profits generated by the sale of electricity from a dam could be used to offset losses from other projects, such as irrigation, rather than going into the federal budget. The concept differed subtly but crucially from the accounting by which electric sales paid off the nearly all of the bonds issued to build the Hoover Dam even though that reservoir was essential for both electricity and for irrigation. Under river basin accounting, electric revenues could be used not just to offset such common costs but also to offset the costs of irrigation trenches and other expenses that had nothing to do with electricity, as long as those expenses were Bureau of Reclamation outlays on the same river basin.

Thanks to this “accounting”, water was provided at little or no cost to grow products and raise livestock in the late 1940s and the 1950s, when the nation had a surplus of both, a surplus that would have lowered prices ruinously but for the fact that the government was paying farmers elsewhere not to grow or to raise the commodities that it was subsidizing in the river basins that it was developing.

The leading Congressional opponent of these practices was Senator Paul Douglas of Illinois. He pointed out that the cash register dams were producing electricity considerably more expensively than fossil fuels might have done, and far more expensively than the dams of the Tennessee Valley Authority and the Bonneville Power Administration in the Pacific Northwest, dams that had been the original justification for the federal government’s going into the electric power business. He noted the irony of the cash register dams being championed by politicians who had opposed the TVA and Bonneville Dams as “creeping socialism”. But his greatest scorn was leveled at the economics of the irrigation projects enabled by the cash register dams.

The original projects tended to be at low altitudes and in fertile soil, and to involve low costs...Now we are being asked to irrigate land in the uplands, at altitudes between five thousand and seven thousand feet, where the growing season is short.....

In my state of Illinois the price of the most fertile natural land in the world is now (1955) between \$600 and \$700 per acre. In the largest (irrigation) project of all, the Central Utah Project, the cost (of supplying water) would be nearly \$4000 per acre – six times the cost of the most fertile land in the world....We are being asked to make an average expenditure (on 16 projects under consideration) of \$2000 an acre on land which, when the projects are finished, will sell for only \$150 per acre.<sup>9</sup>

Senator Douglas's analysis was consistent with a contemporaneous pep talk that Commissioner of Reclamation Michael Straus gave to his Montana employees:

I don't give a damn whether a project is feasible or not. I'm getting the money out of Congress, and you'd damn well better spend it. And you'd better be here early tomorrow morning ready to spend it, or you may find someone else at your desk.<sup>10</sup>

As the economically preferable projects were built, the Bureau resorted to ever more outlandish accounting to justify the less desirable projects. Low discount rates understated the costs. Comparisons to alternatives never included options based on resource conservation. Benefits were overstated, as was demand for power and for irrigation. But at least the Bureau was required to subject its projects to some semblance of cost/benefit analysis. It had a rival far less subject to such awkward limitations.

The details of the dam building rivalry between the Bureau of Reclamation and the U.S. Army Corps of Engineers are fascinating beyond the scope of this paper. Suffice it to say that for more than three decades - from California's Central Valley to the length of the Missouri River and its tributaries to the remote vastness of central Alaska - the two entities competed with one another to build increasingly uneconomic and often destructive projects. Citizen booster groups, engineering firms and contractors became adept at playing one off against the other, as did the different Congressional committees to which each agency was accountable.

By the time their rivalry had played itself out in the early 1970s, they had done much to discredit their projects among fiscal conservatives and even among some farm groups. When the Bureau proposed two dams that would flood beautiful canyons on the Colorado River as well as part of the Grand Canyon (and defended the latter by saying that tourists would have improved access by motorboat), environmentalists defeated them with an ad

campaign whose centerpiece asked “Should we also flood the Sistene Chapel so that tourists can get nearer the ceiling”.

A few more examples will serve to illustrate both the realities and the dreams that have emerged from this century old transformation of idealism and social engineering in the best sense into the largest of Congressional pork barrels<sup>11</sup>.

**The Central Arizona Project** – CAP is in essence a 330 mile channel – the Granite Reef Aqueduct – to bring water from the Colorado River uphill to the cities of Phoenix and Tucson, as well as to store and distribute it. Because the aqueduct had to lift the water 1000 feet, considerable electricity was needed. Hence the project included the two cash register dams on the Colorado that were ultimately defeated by environmentalists. To replace the power, the Bureau bought an interest in a large coal plant.

Because the Colorado was overallocated as a result of optimistic forecasts of average flows and because California had succeeded in obtaining a guarantee that its share would be provided regardless of hardship to other states and because Mexico had eventually succeeded in obtaining a guaranteed allotment of reasonably pure water instead of the salty soup that was its lot for most of the 1960s,<sup>12</sup> CAP could not be assured of its full water allocation in dry years. As a result, the cost of the water was unpredictable but likely to be more than Arizona farmers could afford even with the customary subsidies.

The astonishing answer to the Arizona shortage was – in the 1960s – a planned diversion into the Colorado basin from the Pacific Northwest. The Bureau publicly admitted to designs on a river or two in northern California, but its real aim was the much larger Columbia River, further north in Washington. However, the Northwest wouldn’t hear of such a plan, and the pumping costs might well have been insurmountable without the cancelled cash register dams in any case.

Sam Steiger, an Arizona congressman who had been a major CAP supporter, had second thoughts in retirement. Describing a process in which cities would be forced to take large quantities of CAP water in return for long term supply assurances on which their growth depended while farmers’ water continued to be subsidized to whatever extent was needed to make it affordable, he summarized

They'll skin the cat twenty ways if they have to, but they're going to make the water affordable. Congress will go along, because it will be goddamned embarrassing for Congress to have authorized a multi-billion dollar water project when there's no demand for the water because no one can afford it. The CAP belongs to a holy order of inevitability...

There are hundreds of thousands of acres of good farmland right along the Colorado River...But the farmers got established in the central part of Arizona because of the Salt River Project (a smaller and earlier Bureau undertaking). The cities grew up in the middle of the farmland. The real estate interests, the money people – They're all in Phoenix and Scottsdale and Tucson. They didn't want to move, so we're going to move the river to them. At any cost.<sup>13</sup>

**The Teton Dam** – Built in the early 1970s in Idaho, the Teton Dam was in most ways just another uneconomic and environmentally unsound Bureau of Reclamation project. When realistic discount rates were used, the costs were twice the benefits, but the costs were dispersed to the taxpayers while the benefits flowed to a powerful local constituency that already had a groundwater supply ten times the amount used in dry lands elsewhere. As one project critic described these farmers,

Mormons get burned up when they read about someone buying a bottle of mouthwash with food stamps, but they love big water projects. They only object to nickel-and-dime welfare. They love it in great big gobs.<sup>14</sup>

Assistant Interior Secretary Nathaniel Reed, a dam opponent, went to Idaho dedicate the Snake River Birds of Prey Natural Area. Also attending was Idaho Senator Len Jordan, the leading dam proponent. Reed said later

As soon as the photogs went off, Jordan got crude and angry. He yanked me aside and said 'Listen, Nathaniel Reed, we're going to build this...dam and *you're* going to come out and dedicate it. I've used every chip I've got on Teton Dam. What do you think I'm doing here dedicating this goddamned vulture site?'<sup>15</sup>

As the Nixon White House aide John Ehrlichman recalled later, the economics of a bad federal project did not matter all that much in the larger equation

At the time Nixon was about to open the gates to China. Then there was the international monetary agreement, the SALT talks, détente with the Soviets. He couldn't get anywhere on those without Congressional support, and Congress knew that and the Idahoans in Congress wanted that dam.

Once in a while, when political imperatives repeatedly trump prudence, the laws of physics will provide sterner oversight than will the processes of Congress. The Teton Dam site was geologically unsound. Another Bureau dam on a problematic site had nearly failed just five years earlier, and some engineers within the Bureau doubted the wisdom of building the Teton Dam at all. They were overridden. The dam was completed in 1976. The reservoir filled rapidly as springtime melted the snow from the mountains.

At this point, the Bureau took a series of actions that foreshadowed the Chernobyl operators ten years later. Not wanting to lose the water from the snow melt, the project engineer (thirty years old and supervising his first big project) received permission to allow filling at twice the normal rate for a new dam despite the discovery during construction of “unusually large” fissures in the right hand canyon wall. The fissures had not been grouted in order to avoid further expense and delay. In addition, the main outlet through which water could be spilled was not yet complete. The emergency outlet was complete but was sealed off by a huge metal barrier because it was being painted.

In thirty-six hours in early June, the dam went from an initial leak to complete failure. Because the failure occurred visibly during the day, it allowed some minimal time for warnings. Nevertheless, the flood obliterated two towns and badly damaged a third. Thousand of acres that were to have received water from the dam were stripped of topsoil and ruined. Eleven people and thirteen thousand cows died. Had the failure occurred at night, the human death toll would at least have been in the hundreds.

**The Texas Water Project** – In some ways the most grandiose of the Bureau of Reclamation projects, this 1960s scheme would have moved an amount of water equivalent to the lower Colorado River 1200 miles, from the Mississippi River below New Orleans across Louisiana and the low lands of east Texas before pumping it up three thousand feet to the high plains of west Texas.<sup>16</sup> The aqueduct would have had to go under four major rivers, while more than one hundred smaller streams would have had to be tunneled under the aqueduct. The Texas Water Project was thought to be needed because the High Plains farmers had been pumping water from the gigantic Ogallala

aquifer on which the region depended at a rate well above sustainability ever since pumping technology improved in the 1930s to make such excess possible.

In order to pump the needed Mississippi River water up three thousand feet, twelve new power plants providing extremely cheap energy would be needed. The Bureau thought it knew just how to get it.

We took the most pie-eyed projections we could find from the Atomic Energy Commission. We figured the plants would cost \$250 million apiece. The plan required about twelve of them....You couldn't build one nuclear plant in 1985 for what we thought we were going to pay for twelve in 1971.<sup>17</sup>

The Texas Water Project ultimately sank under the weight of cost and hostility from the state of Louisiana, though not before a politician from an adjoining state remarked "If those Texans can suck as hard as they can blow, they'll probably build it".

Depletion of the Ogallala aquifer has slowed as pumping costs have risen and usage has become more efficient, but the aquifer is generally thought to be unable to meet the potential demands on it much after 2025.

**President Carter's Quest for Reform** – Shortly after taking office in 1977, Jimmy Carter announced that he wanted to terminate funding for eighteen water projects, including the Central Arizona Project, because none was remotely cost effective. A furious Congress responded with an appropriations bill that restored all but one of the eighteen and included several new projects that Carter hadn't asked for. A story told by Congressman Bob Edgar, Paul Douglas's successor in lonely opposition to wasteful water and energy projects illustrates the dominance of the energy and water appropriations committees and their business constituents during this period

We are a tyranny presiding over a democracy. Congressman Floyd Fithian of Indiana has a water project planned for his district that he doesn't want...But he hasn't been able to remove the project from the appropriations bill. Congressman John Meyers sits on the Appropriations Committee and its Energy and Water Development Subcommittee. He has some big construction people in his district, which is next door to Floyd's, who would get some big contracts if the project is built. So every time Fithian tries to remove the project, Myers puts it back in.

The struggle over the terminated projects continued for two years. In 1979, President Carter was forced to sign a bill that continued funding for all of the "terminated" projects

in order to secure the votes necessary to implement his agreement to return the Panama Canal to Panama, avoiding a major foreign policy embarrassment.

President Carter's successor, Ronald Reagan, had served as governor of California, a state that had benefited as much as any other from federal water and energy projects. The Bureau and its allies hoped that President Reagan would champion their projects. Instead, the fiscal conservatives in his administration worked in parallel with environmentalists to force more rigorous repayment and state contribution terms which killed many projects.

From that time forward, far fewer energy and water projects – and none of the grand river diversions - have been undertaken. The same cannot be said for the misallocations of resources that the more poorly considered projects have set in place. The growing – for example – of water intensive crops in desert climates through heavily subsidized irrigation has created constituencies that stymie wiser water, energy and agricultural policy. Some of these constituencies, rather than face a reality of diminishing supply and higher price, still talk longingly of the North American Water and Power Alliance (NAWAPA) – the greatest water and energy project of all.

NAWAPA would build high dams, pumps and tunnels in Alaska and western Canada to route immense wild rivers south. Most would move through the Rocky Mountain Trench in British Columbia to unite with some reversed flow from the Columbia and pour south into the Colorado River basin and California, alleviating for decades any fears of drought in those regions.

A considerable amount would also move east into Lake Superior and the Great Plains, there to make its way south to Texas to relieve pressure on the Ogallala aquifer. Variants involve damming off the southern end of James Bay in Quebec, turning it into a giant fresh water reservoir from which water could be pumped south and west to join the NAWAPA water in the Great Lakes and western Canada and to rescue the drought-prone southeastern U.S.

## **Nuclear Revival, Loan Guarantees and the Lessons of History**

With Congress having already allocated \$18 billion dollars in loan guarantee authority for new nuclear units and with the industry and its Congressional champions already complaining that this won't be nearly enough if nuclear power is to play a major role in combating climate change, it seems important to put nuclear credit support in the context of the knowledge that we have acquired over a century of federal credit support for major projects.

We know at least the power of self-interested myth to ride roughshod over fundamental economics. The historical evidence reveals beyond doubt the ineffectuality of mere proof of waste and risk when it comes to dissuading an eager congress from lavishing credit support on a favored technology.

The evidence to date suggests that few if any new nuclear units will be built if they must obtain private capital either in power markets or under the regulatory treatment normally afforded new investment. But it seems equally clear that a major scaling up of nuclear power – while potentially helpful in combating climate change if it were truly a low cost approach – is not essential to doing so. Indeed, something on the order of building three times the existing nuclear capacity in the world is needed to provide 10-15% of the necessary carbon reduction.<sup>18</sup> At current rates of new construction, this goal cannot be attained. Indeed, world nuclear capacity will decline as plants reach the end of their operating lives.

However, many ways to reduce green house gas emissions exist. Principles will be more important than prophecy when it comes to choosing wisely among them. Among the reasons for preferring “technology neutral” options such as a carbon tax or a cap-and-trade mechanism is the likelihood that entrusting the federal government to achieve optimal results by manipulating access to capital is no more likely to produce sensible results now than it has in the past.

After all, the ways in which today's nuclear industry might echo the water and energy history set forth above are compelling:

- Nuclear power too was born in idealism and nurtured in government agencies who believed in it fervently. The Atomic Energy Commission was every bit as promotional as the Bureau of Reclamation and the Corps of Engineers, especially in the climate that followed President Eisenhower's "Atoms for Peace" speech in 1953. Today's Department of Energy is no less enthusiastic, not only for conventional nuclear power but for reprocessing and "advanced" reactors whose economics are outlandish and whose technical feasibility is unproven. Today's Department of Energy has repeatedly shown itself to be incapable of sound economic analysis of the potential risks of nuclear development. Yet it will have responsibility for screening the applicants for nuclear loan guarantees and for setting fees that reflect the risks of default inherent in such guarantees. Its record with similar programs in the past suggests strongly that it will err in ways that impose excessive risk on the public.
- Nuclear power too has been championed by powerful congressmen and senators whose states were home to major nuclear development. Initially, nuclear oversight was housed in a unique "joint committee" of both houses of the U.S. Congress. The Joint Committee on Atomic Energy was so unabashed in its promotion of nuclear power and so indifferent to public concern that it was abolished in 1975. In its place Congress assigned primary responsibility to the same committees that oversaw the Corps of Engineers and the major hydroelectric development entities of the federal government. Initially more vigorous in their oversight of nuclear matters, these committees have over time become increasingly supportive of the economic interests involved with the technology. Senator Pete Domenici in the recent past has had influence over federal nuclear policy and the application of federal support comparable to that of champions of the dam projects of the last century. In short, the allocation of federal credit to nuclear power is every bit as subject to political influence as were the dam projects a generation ago.
- Nuclear power development too was accelerated by competition among two rival developers. Some in the Congress championed public ownership and wanted the

Atomic Energy Commission itself to build the plants. Others wanted private ownership and arranged for subsidy of several sorts to make the plants attractive to investor-owned utilities. When President Eisenhower's AEC chair held out the vision of nuclear power "too cheap to meter", he was presiding over a program of unprecedented government assistance designed to lower costs and risks to companies interested in building the first power plants. The term came to haunt nuclear power as it contributed to a tripling of U.S. electric rates between 1970 and 1980.

- Under Congressional and vendor company pressure to push ahead, nuclear power too grew too fast for its own good, just as the Bureau and the Corps of Engineers pushed the water program into unwise and uneconomic development after the best sites had been developed by mid-century. Operating mishaps of several sorts, including the Brown's Ferry fire and culminating at Three Mile Island, caused vast nuclear cost increases and brought on an environmental backlash. The potential for a similar overacceleration of nuclear development exists again if nuclear power is assumed to be essential to dealing with climate change and is promoted accordingly. At present neither the regulatory process nor the nuclear industry infrastructure are adequate to handle rapid expansion, so the pressure to cut corners will once again be substantial.
- Nuclear power too involved "big government" approaches to choosing and building a particular technology. It too has enjoyed the support of many politicians who normally describe themselves as strong proponents of free enterprise, small business and minimal government. Indeed, many of nuclear power's strongest supporters are small government champions from states that have hosted more a large share of the big water resource projects. New Mexico, Washington, California, Idaho, Texas and Tennessee come to mind. In the early years of nuclear development, the Democrats in this group tended to favor government ownership and used this possibility to push the investor-owned utilities to move faster. By the early 1970s, the distinction between investor-owned and government-owned nuclear development had become unimportant.

However, it has returned in a new form as the Bush Administration has put the Tennessee Valley Authority and now even the Air Force<sup>19</sup> in the forefront of those willing to host new nuclear units while putting the Department of Energy in a position to sponsor and perhaps build a new reprocessing plant, an “advanced recycling reactor” and an advanced fuel cycle research facility. For the time being, only government entities can raise funds for new nuclear projects in the U.S. Meanwhile, the technology neutral approaches to the problems of climate change and energy security – the approaches most compatible with reliance on private enterprise – are shunned by the conservatives most rhetorically eager to rely on markets rather than government.

- Both sets of projects also depended heavily on cost-benefit and environmental impact studies that were distorted in important ways. Demand or need for projects was overstated. Potential for shortage, even catastrophe, without them was exaggerated. Fictitious discount rates were used. Costs were understated and benefits overvalued. Risks and uncertainties were ignored. Alternatives chosen for comparison purposes were the most expensive and objectionable. Yet when the projects were delayed or cancelled, the forecast shortages never occurred because more efficient usage and/or different combinations of alternatives filled the forecasted void.
- Both sets of projects followed a strategy of maximizing the number of states with an economic interest in their programs in order to maximize political support in Washington. The current nuclear industry approach to its asserted “renaissance” reflects this approach, with many more nuclear power plants and Global Nuclear Energy Partnership projects announced than can conceivably be built anytime soon under current levels of federal support. As a result, congressmen will come under pressure to expand the funding and other support to cover a larger population of new plants.
- President Carter failed to constrain the most uneconomic aspects of both sets of policies when he took office. As with the water projects, the nuclear industry went around him to the Congress and – in the case of nuclear power – also went

overseas to urge defiance of the Carter effort to curtail the breeder reactor and reprocessing (never mind that both had originally been suspended by President Ford). And in both cases, the proponents took great comfort from the election of President Reagan only to be disappointed when – despite his supportive record and rhetoric – his actual refusal to put the federal treasury at their disposal doomed their prospects.

- Finally, most fundamentally, when the economic justification for new projects is lacking, coerced capital remains the option of last resort for both sets of projects. Not only does this approach make capital available but it permits charging a lower price for the output of the facilities even though they have not become cheaper. Instead, cost and risk have shifted from the investor to the taxpayer. Providing water to irrigation farmers who sometimes paid less than 5% of the cost of supplying them may have been the most extreme example, but calculations of the impact of the loan guarantee program about to be offered by the Department of Energy suggest that it may cut some thirty percent off the price of nuclear electricity by shifting risk from investors to taxpayers.<sup>20</sup>

## **Conclusion**

This paper does not argue that all federal credit support is undesirable. But it does argue that proponents of such support confront a heavy burden to show that the program that they put forward has built-in checks against the pitfalls described in this paper. In particular, they need to provide reason to believe that analysis of need and of alternatives will be more rigorous than has been the case in past. They need also to show isolation from political pressure and a capacity to charge participants an amount commensurate with the benefits that they are receiving and with the risk of default that they present. For the nuclear industry, this will require coming to terms with its brush with economic catastrophe in the 1990s, when only the willingness of state regulators to allow extraordinary surcharges for the excess costs of the last generation of nuclear units avoided massive write offs for many utilities.

Proponents should have to establish also that the problem that they seek to address cannot be solved in the absence of federal credit support. The shortcomings of such programs are clear enough and persistent enough that they should be an option of last resort, one that is turned to upon a showing that the capital needed to solve a major problem cannot be raised in any other way.

If the Congress does not insist on more rigorous analysis in the face of the nuclear industry's current loan guarantee claims, it risks seeing again a play that it has seen before. In the name of urgent societal necessity, we have literally moved mountains to deliver resources that the private sector alone would not put forward. But we have also seen what happens as these programs develop privileged constituencies who become expert at corralling strong political support. In particular, we have seen that the use of federal credit can indeed hide costs, but federal credit does not make those costs go away. It assures only that they will not have to be paid in the prices of the favored projects - the irrigation tunnels, nuclear power plants or federally built reprocessing infrastructure.

### **A Modest Suggestion**

For three decades, U.S. energy policymaking has been dysfunctional. Better ideas abound, but the ability to implement them does not. Occasionally elements combine in such a way as to make possible the enactment of plausible nonsense that can only make matters worse. We are in such a time now, and the forthcoming election may be crucial in determining just how deep we will dig our hole this time. This paper cannot hope to be insightful at that level. There is, however, a modest step that might prove helpful.

Between 1972 and 1995, the U.S. was able to turn to its Office of Technology Assessment (OTA) for assistance in evaluating difficult questions involving the interplay between technology and wise public policy. OTA was abolished in 1995 because the newly elected Congress considered it unnecessary. Whatever the merits of that decision, it is time to revisit it.

The Office of Technology Assessment did not prevent Congress from making mistakes as to nuclear power and energy policy when it was in existence, but abuse of science has not been seen in the U.S. government on the scale that we have seen it in the last eight years. Restoring OTA would be a first step toward putting matters right.

## ENDNOTES

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<sup>1</sup> This legislation – the Price-Anderson Act – was originally enacted in 1957 with a liability limit of \$500 million to encourage private industry to build the first few nuclear power plants.

<sup>2</sup> In December 2007, Congress enacted a provision in its report on the Energy and Water Appropriations Act for Fiscal 2008 which purported to approve \$18.5 billion for in loan guarantees for new nuclear plants in FY 2008 and 2009 based on non-legally binding report language. The provision fails to resolve major Congressional conflicts over law and policy, such as the applicability of the Federal Credit Reform Act and the role of congressional oversight. It also creates more hurdles for the Energy department to overcome before it can execute its program. Even if DOE decides it has sufficient legal authority and is willing to overcome a likely legal challenge, it will be difficult to issue the loan guarantees by the end of FY 2009.

<sup>3</sup> Economists Linda Cohen and Roger Noll were to conclude that “The entire synfuels program had a quality of madness to it. Project after project failed. Cost estimates were connected to the price of substitutes rather than to the program itself. Goals were unattainable from the start. Official cost-benefit studies estimated net benefits in the minus of billions of dollars.” The Technology Pork Barrel (Brookings Institution, 1991).

<sup>4</sup> Murray Weidenbaum and Reno Harnish, with James McGowen, “Government Credit Subsidies for Energy Development”, (American Enterprise Institute for Public Policy Research, 1978). For a more amusing and recent critique, see “Nusubsidies Nuclear Consortium: Where the Taxpayer is Our Favorite Investor” (Earthtrack Institute, 2005) ([www.earthtrack.net/earthtrack/library/NNC\\_Overview.pdf](http://www.earthtrack.net/earthtrack/library/NNC_Overview.pdf))

<sup>5</sup> This paper is concerned only with support taking the form of a commitment to assume liabilities, whether in the form of loan guarantees or other obligations. It does not, for example, deal with the grants made toward reactor development by the Atomic Energy Commission, the limitation of liability in the Price-Anderson Act, the assumption of responsibility for waste disposal in the Nuclear Waste Policy Act, or the production tax credits in the Energy Policy Act of 2005.

<sup>6</sup> Remarks of Governor Nelson A. Rockefeller at the ground breaking ceremony for the reprocessing plant of Nuclear Fuel Services at West Valley, New York, June 13, 1963.

<sup>7</sup> Quoted in Marc Reisner, Cadillac Desert: The American West and Its Disappearing Water (Penguin Books, revised edition, 1993), p. 36. This book, from which most of the history of water resource development is drawn, is a remarkable review of the American water development saga. As water resource issues take on increasing importance around the world, it is worth the attention of anyone with an interest in that field.

<sup>8</sup> *Ibid*, p. 114.

<sup>9</sup> *Ibid*, pp. 142-143

<sup>10</sup> *Ibid*, p. 148

<sup>11</sup> “Pork barrel” is an Americanism describing the process by which Congressmen obtain financial support for projects that lack economic justification. It derived from the old Southern custom of putting out a barrel of pork that slaves often fought over.

<sup>12</sup> Here is Reisner’s discussion of the government’s solution of the Mexican problem, which resulted largely from agricultural practices in Arizona’s Wellton-Mohawk district: “The solution of choice at Wellton-Mohawk has been construction of a reverse osmosis desalination plant – ten times larger than any in the world – which, while consuming enough electricity to satisfy a city of forty thousand people, will treat the wastewater running out the drain canal....What Congress has chosen to do, in effect, is purify water at a cost exceeding \$300 an acre foot so that upriver irrigators can continue to grow surplus crops with federally subsidized water that costs them \$3.50 an acre foot.

“If the farmers at Wellton-Mohawk adopted efficient irrigation methods” says Jan van Schilfgaarde (of the Department of Agriculture’s Salinity Control Laboratory, “you could solve the problem without even retiring the lands....I’m not even taking about installing drip irrigation. I’m talking about laser-leveling fields and reusing water on salt tolerant crops and not doing stupid things like irrigating at harvest time...A lot of these guys are actually absentee owners farming by telephone from their dentists’ offices in Scottsdale...They’re not in this business to farm crops, or even to make a profit. They’re farming the

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government. They're growing tax shelters. But even if you do have a highly competent farmer who wouldn't mind reducing his wastewater flows, he has no incentive to conserve. Federal water is so cheap it might as well be free. What's the point of hiring a couple of additional irrigation managers to save free water? He's being *forced* to consume water."

In fact, the desalination plant was completed in the late 80s but operated for just a few months before shutting down because some wet years coupled with rising energy costs made it too expensive. It may soon be reopened in light of increased demands for Colorado River water. Marc Reisner, who died in 2000, would not have been surprised.

<sup>13</sup> Reisner, *op. cit.*, pp. 304-305.

<sup>14</sup> *Ibid*, p. 386. Jerry Jayne, the nuclear engineer who was also president of the Idaho Environmental Council, a dam opponent, said of the farmers, "I can talk to the loggers. I can talk to the ranchers. I can talk to the mining companies. I can say nothing to the irrigation farmers. They're not reasonable. They don't listen. They're true believers. They're like communists – only in reverse."

<sup>15</sup> *Ibid*, p. 394

<sup>16</sup> A benefit undervalued at the time was the use of the earth that would have been removed in digging the aqueduct to enhance the levee system protecting New Orleans from hurricanes.

<sup>17</sup> Jim Casey, deputy chief of planning Bureau of Reclamation, quoted in Reisner, *op. cit.*, p. 447.

<sup>18</sup> For a thoughtful analysis of carbon reduction options, see Robert Socolow and Stephen Pacala, "A Plan to Keep Carbon in Check", (Scientific American, September 2006), p. 50. See also "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies" S. Pacala and R. Socolow, Science, 13 August 2004, pp. 968-972. [http://fire.pppl.gov/energy\\_socolow\\_081304.pdf](http://fire.pppl.gov/energy_socolow_081304.pdf);

<sup>19</sup> "U.S. Air Force May Lease Land for Nuclear Plant", Nucleonics Week, March 6, 2008, p.1.

<sup>20</sup> Doug Koplrow, "Nuclear Power in the U.S.: Still Not Viable Without Subsidy" presentation, Airlie House, November 2005 ([www.earthtrack.net/earthtrack/library/NuclearSubsidies2005\\_NPRI.ppt](http://www.earthtrack.net/earthtrack/library/NuclearSubsidies2005_NPRI.ppt)), p. 6.