BEFORE THE ARIZONA CORPORATION COM.

Bob Stump, Chairman
Gary Pierce, Commissioner
Brenda Burns, Commissioner
Bob Burns, Commissioner
Susan Bitter Smith, Commissioner

ORIGINAL

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR APPROVAL OF NET METERING COST SHIFT SOLUTION.	Docket No. E-01345A-13-0248

TASC NOTICE OF FILING STUDY BY ELLIOTT D. POLLACK & COMPANY: "DECONSTRUCTING GOVERNMENT SUPPORT FOR ARIZONA ELECTRIC UTILITIES"

The Alliance for Solar Choice ("TASC"), through undersigned counsel, respectfully submits the attached Study by Elliott D. Pollack & Company: "Deconstructing Government Support For Arizona Electric Utilities" and a summary thereof prepared by Anne Smart, the Executive Director of TASC.

RESPECTFULLY SUBMITTED this 27th day of September, 2013.

By

Hugh L. Hallman
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480-424-3900
Bar No. 12164

Attorney for The Alliance for Solar Choice

CERTIFICATE OF SERVICE

I hereby certify I have this day sent via hand delivery an original and thirteen copies of the foregoing TASC NOTICE OF FILING STUDY BY ELLIOTT D. POLLACK & COMPANY:"DECONSTRUCTING GOVERNMENT SUPPORT FOR ARIZONA ELECTRIC UTILITIES" on this 27th day of September, 2013 with:

Docket Control
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

I hereby certify that I have this day served the foregoing documents via regular mail on all parties of record and all persons listed on the official service list for Docket No. E-01345A-13-0248 on the Arizona Corporation Commission's website:

Arizona Corporation Commission	Janice Alward	1200 W. Washington St. Phoenix, Arizona 85007
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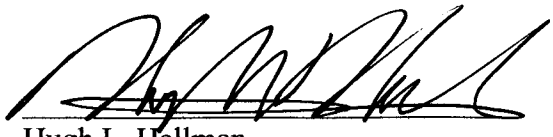
Western Resource Advocates	David Berry	P.O. Box 1064 Scottsdale, AZ 85252-1064

Dated this 27th day of September, 2013.

By 

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SUBMMITALOF A STUDY BY ELLIOTT D. POLLACK & COMPANY:
"DECONSTRUCTING GOVERNMENT SUPPORT FOR ARIZONA ELECTRIC UTILITIES"

The Alliance for Solar Choice (TASC) submits the following study prepared by Elliott D. Pollack & Company entitled "Deconstructing Government Support for Arizona Electric Utilities." The study examines the state and federal government subsidies to Arizona electric utilities for fossil and nuclear energy sources. Elliott D. Pollack & Company find the following:

- Arizona electric utilities have received no less than $900 million - $1 billion in subsidies for fossil and nuclear energy sources since 1985.
- The total annual subsidy to electric utility companies in Arizona is currently approximately $67 million.
- Subsidies for renewable sources are far smaller than that for non-renewable energy sources at the same point in their life cycle.
- Many of the tax exemptions, deductions, and credits received by the utilities for fossil and nuclear energy production are hidden in the tax code and thus difficult to quantify.

Pollack & Company conclude that

> "No emerging energy source in the history of the United States, be it biomass, coal, oil, gas, nuclear, hydro, biofuels or renewables, has ever expanded or grown without substantial support from federal and state governments."

On a related matter, TASC takes issue with 854 computer-generated letters that have thus far been submitted to the docket with subject "Real Net Metering Reform," which have been generated from the website http://prosperhq.org/email-your-commissioners. These emails state

> "If more individuals receive subsidized power, there will be fewer who remain to foot the bill for the grid. That is not sustainable."

As substantiated by the attached study, all energy sources in Arizona are subsidized. Ratepayers in the state of Arizona do not have the option to obtain power that is not subsidized. The statement above is uninformed and, considering the state of energy subsidies in this country, unrealistic.

The intent of energy subsidies is to allow an emerging industry or product a chance to become cost-competitive and thrive in a market alongside more established products or industries. In the case of rooftop solar in Arizona, the state tax credit has gradually decreased since its inception in 2008. In Arizona Public Service territory, the rebate bank has depleted; that is to say, there is no longer a subsidy in the form of a state tax credit offered to new rooftop solar installations.

Respectfully submitted this 27th day of September, 2013.

Anne Smart
Executive Director
The Alliance for Solar Choice
45 Fremont Street, 32nd Floor
San Francisco, CA 94105
Phone: (415) 580-6900
Email: anne@allianceforsolarchoice.com

Trisha A. Morgan

From: marysonny20=aol.com@mailgun.org on behalf of Felix <marysonny20@aol.com>
Sent: Wednesday, September 18, 2013 2:19 PM
To: Stump-Web
Subject: Real Net Metering Reform

Dear Commissioner,

All Arizonans benefit from a reliable electrical grid that sustains our economic and population growth and powers our critical infrastructure, such as water facilities, hospitals, schools, and more. The successful adoption of solar in our community has not lessened the need for a reliable grid, and
solar users continue to need access to the grid just like non-solar users.
The challenge we now face is that the net metering subsidies designed to spur the adoption of solar are outstripping their benefits, and the situation is only going to get worse unless you vote to reform the system now.

If more individuals receive subsidized power, there will be fewer who remain to foot the bill for the grid. That is not sustainable.

In a free market, individuals should be able to choose solar, and many stand in support of preserving that choice. But utilities subject to the existing net metering policy are being forced to pay solar users more than three times the market price, and other Arizonans are left paying the bill.

This is NOT about solar. It is about fairness and ensuring reliable power.
Solar has a bright future in Arizona. Arizona is number one in total installed solar capacity per capita, and ranks second, behind California, for total installed solar energy capacity. Updating the state's net metering policy will protect our commitment to solar, but not doing so would jeopardize our ability to provide a reliable power grid for future Arizonans.

I urge you to vote for net metering reform this year.

Sincerely,

Felix Goins

Deconstructing Government Support for Arizona Electric Utilities

Prepared for:

The Alliance for Solar Choice (TASC)

September 2013

Prepared by:

Elliott D. Pollack & Company
7505 East 6th Avenue, Suite 100
Scottsdale, Arizona 85251

Table of Contents

Executive Summary

Elliott D. Pollack and Company has been retained to study government subsidies and incentives related to the development of various forms of energy throughout the history of the United States and, in particular, to those subsidies that impact the electric utility industry in Arizona. Forms of energy that are discussed in this report include timber, coal, oil, gas, nuclear, hydro, biomass and bio fuels. This study will not directly evaluate incentives and subsidies provided to renewable energy sources, such as wind and solar. Rather, the study is intended to demonstrate the level of support and subsidies provided to non-renewable energy sources, particularly in their formative, early years of development, and the resulting impact on Arizona electric utilities.

Federal Energy Subsidy Policy

Energy subsidies are defined as any direct or indirect financial contribution or financial exclusion (tax credit or exemption) that affects the development and allocation of energy technologies and resources. Subsidies may include direct and off-budget expenditures, revenue losses through the tax code and implied subsidies such as research and development.

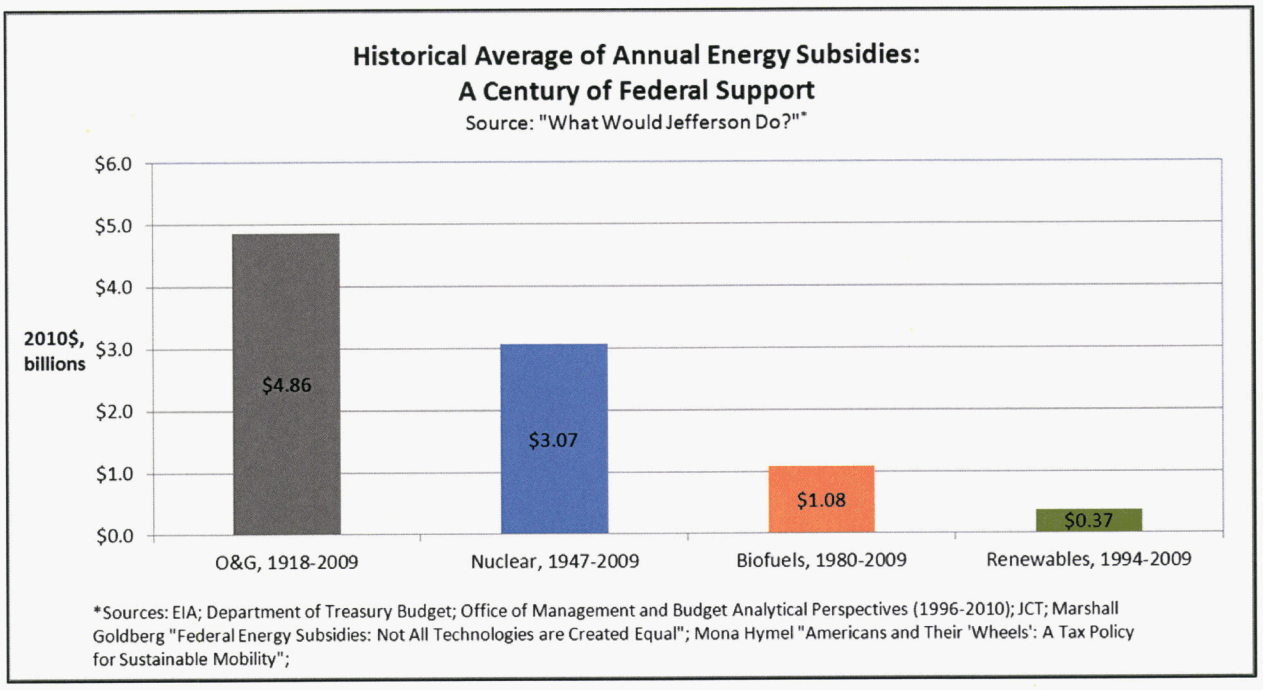
Federal subsidies and support for energy industries date to the 19th Century in the form of land grants to citizens at below-market prices, initially designed to encourage settlement and economic development of the country. With the introduction of the federal income tax in 1913, incentives for energy industries shifted to tax credits and deductions. Fossil fuels were the initial primary beneficiaries of these incentives and those provisions still remain in the tax code today.

Federal energy incentives have been justified on two bases:

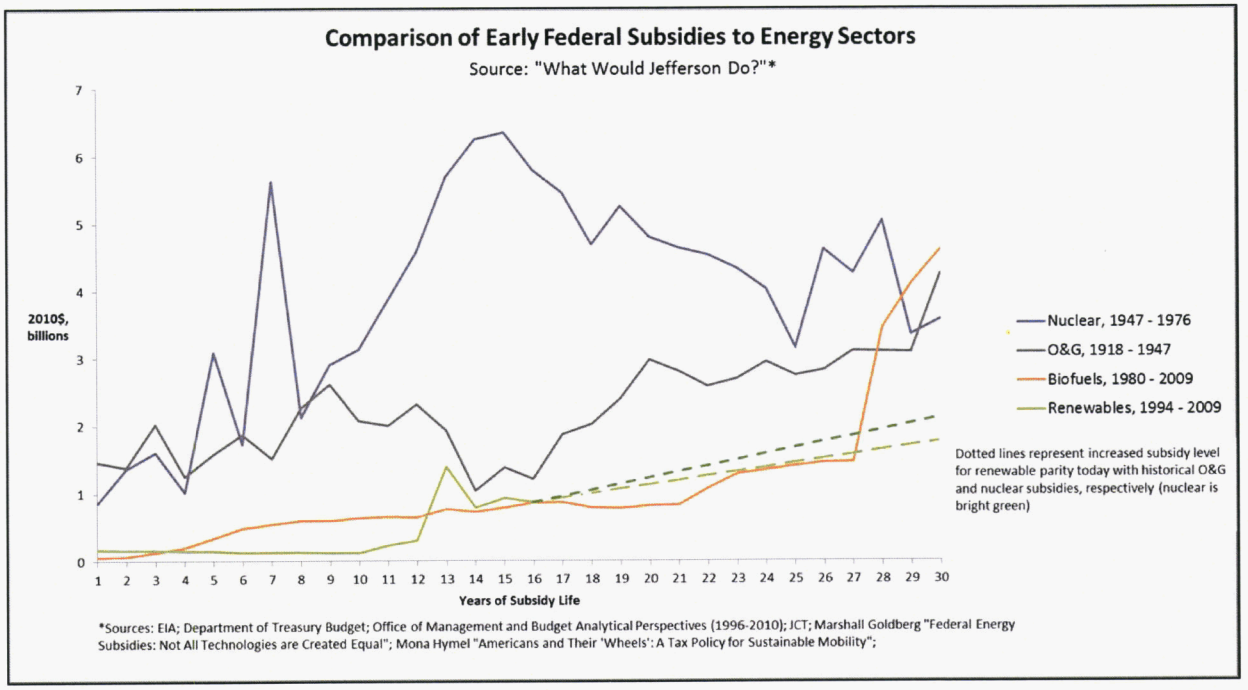
- To promote new technologies in their early developmental stage due to their high start-up costs and risks, and
- To help bridge the difference between the value of a particular energy resource to the private sector and its overall value to the public.[1]

Based on annual subsidy averages over the life of the energy resource, oil and gas and nuclear energy have received nearly 85% of all federal subsidies. Oil and gas tax incentives averaged $4.86 billion per year, or 51.8% of total annual federal subsidies. The nuclear industry averaged $3.07 billion per year, or 32.7% of annual subsidies. Bio fuels and renewables received $1.08 billion and $0.37 billion respectively, or in total 15.5% of annual federal subsidies.[2]

[1] Mona L. Hymel and Beth S. Wolfsong, J.D., Arizona Legal Studies, "Americans and their 'Wheels': A Tax Policy for Sustainable Mobility", (Feb 2006).
[2] Nancy Pfund and Ben Healey, DBL Investors, "What Would Jefferson Do?", (September 2011), updated to 2009 estimates.



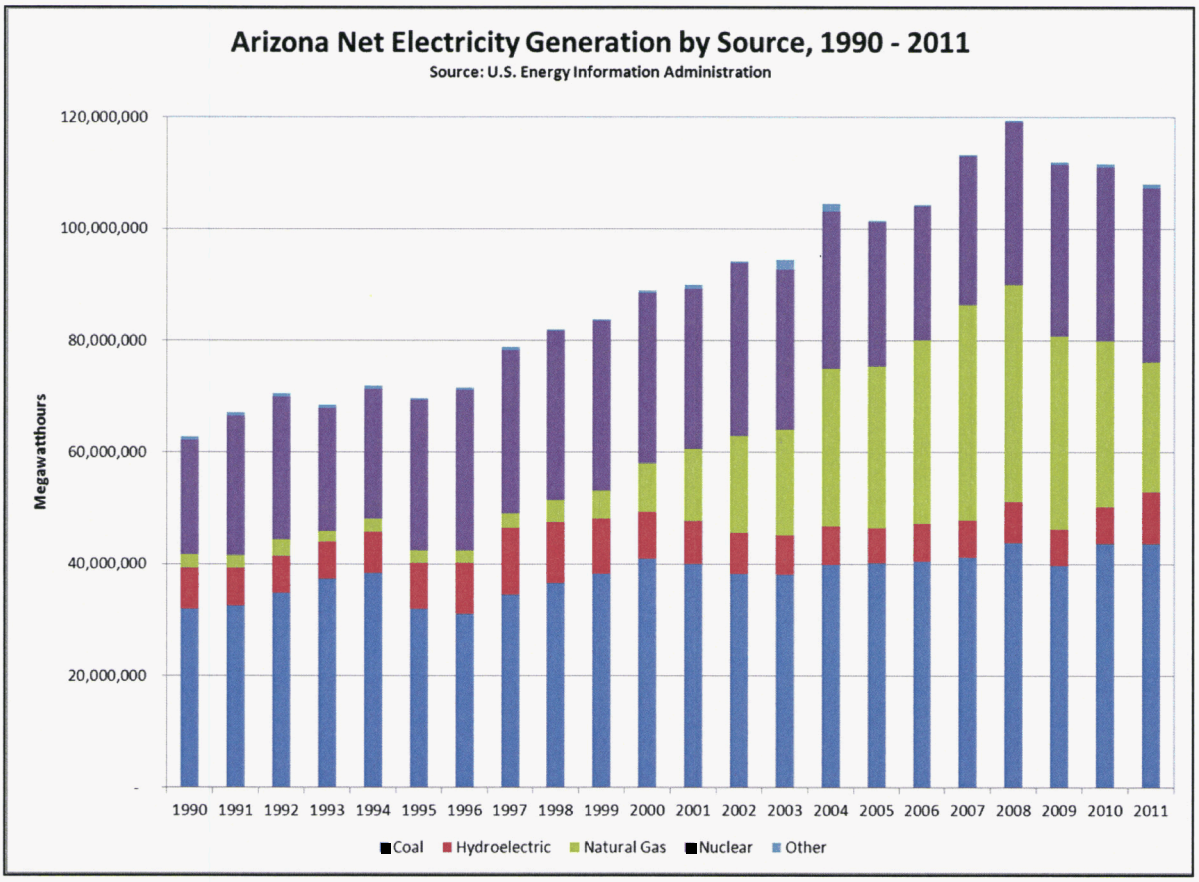
The impact of subsidies and incentives in the formative years of an energy industry has significant consequences. Starting with the first year of available subsidies, nuclear and oil and gas received significant assistance in their early years. Comparatively, subsidies for renewable sources are significantly less but could increase if they follow the trends set by the oil, gas and nuclear industries.



Arizona Overview

Very little data exists on the impact of federal subsidies on energy sources at the state level. Subsidies for non-renewable energy sources from the state of Arizona are primarily directed at sales tax exemptions and income tax credits. This section estimates the impact of federal energy subsidies and state tax exemptions and credits on electric generation in Arizona.

The state's generation of electricity is dominated by coal and nuclear energy. Since 2000, the production of electricity using natural gas has drastically increased due to environmental concerns, its plentiful supply and low cost. The following table shows the net electricity generation from conventional energy sources in Arizona from 1990-2011.



While data on the impact of federal incentives on Arizona's electric utilities is not available, an estimate of the implicit subsidy for each energy source in the state was calculated based on Arizona's percentage of total U.S. energy consumption (methodology developed by Ben Healey). Arizona's estimated share of federal energy subsidies totals approximately $460 million (in 2010 dollars) over 25 years with nearly 94% of that amount attributed to the nuclear industry, specifically Palo Verde. On average, the benefits of the federal subsidies to Arizona utilities total $18.4 million each year (in 2010 dollars).

Implicit Subsidy To Arizona Utilities (In 2010 $, Millions)					
Year	Coal	Nat. Gas	Oil	Nuclear	Total
1985-2009	$23.0	$5.1	$0.7	$430.9	$459.7
Percent of Total	5.0%	1.1%	0.1%	93.7%	100.0%
Source: EIA data, "What Would Jefferson Do?", Ben Healey					

Palo Verde, the nation's largest nuclear generating facility, receives a significant subsidy under the Price-Anderson Act which indemnifies utilities in the event of nuclear accidents up to $12.6 billion per occurrence.

Arizona Tax Expenditures

Arizona provides several transaction privilege tax exemptions and income tax credits for various non-renewable and renewable energy industries. These exemptions and credits are known as a "tax expenditure": revenue that is not collected by the state and is, therefore, considered an expenditure. Some of the more important tax expenditures related to the state's electric utilities are the following:

- A corporate income tax credit for taxes paid on coal consumed in generating electric power.
- A tax exemption for machinery, equipment or transmission lines used in producing or transmitting electrical power.
- A tax exemption for pipes or valves used to transport oil, natural gas, artificial gas, water or coal slurry. As generating plants are built or reconfigured for natural gas service, gas pipes will need to be constructed to deliver fuel.

It should be noted that credits and exemptions similar to those available to the state's utilities have also been provided to a wide variety of industries across the state. The credits and exemptions provided to utilities are not unique, but they are largely unseen and unnoticed and, until now, unquantified. Such subsidization of the state's utilities may be an important consideration as the state launches into debate on various renewable energy issues.

Estimated Subsidies to Arizona Electric Utility Companies

The total annual subsidy to electric utility companies in Arizona is approximately $67 million (in 2010 dollars) and includes the benefits of the Price-Anderson Act to the Palo Verde nuclear plant, the corporate income tax credit for taxes paid on coal used to generate electricity, and the tax exemption for machinery, equipment or transmission lines used in producing or transmitting electrical power.

Estimated Annual Subsidies to Arizona Utility Companies
(In 2010 $, Millions)

Subsidy Type	Estimated Annual Subsidy
Implicit Subsidies - Non-Renewable Energy Sources*	$18.39
Corporate Income Tax Credit on Taxes Paid on Coal Used to Generate Electricity	$1.13
Tax Exemption on Equipment & Machinery Used to Produce/ Transmit Electricity	$47.75
Total	**$67.27**

*Includes allocated federal subsidies for coal, natural gas, oil and the Price-Anderson Act.

Sources: Pfund & Healey, AZ Dept. of Revenue, Elliott D. Pollack & Co.

The total subsidy to electric utility companies in Arizona since 1985 is likely close to $1 billion. This estimate is a combination of:

- The implicit federal subsidy since 1985 of approximately $460 million to Arizona utilities that flows from tax laws and, most significantly, the Price-Anderson Act, and
- The Arizona tax exemption on machinery and equipment used to produce and transmit electricity which has been in effect for more than 20 years. While tax expenditure data for this exemption is not available from the Department of Revenue before FY 2005, even if the average annual expenditure over the last 20 years was only approximately one-half of the current amount or $25 million, the total benefit to the state's utility companies would be $500 million.

Combined federal and state subsidies to the utility companies in Arizona are likely between $900 million and $1 billion since 1985. This estimate does not include a variety of subsidies that cannot be calculated including those related to hydropower.

Concluding Thoughts

No emerging energy source in the history of the United States has ever expanded and grown without substantial incentives created by federal and state governments. In fact, subsidies often extend far beyond the period of transition from one fuel source to another and, in most cases, continue today.

As a result, unconstrained and free energy markets have simply never existed in our country's history. The past is full of examples of massive subsidies to emerging fuels and technologies – subsidies that often continue in perpetuity. Indeed, given the political realities, there will likely never be a level playing field in future energy markets.

The Pfund-Healey study clearly shows that the level of subsidies for renewables is far smaller in terms of real dollars and as a percent of the federal budget than was the aid for non-renewable energy sources at the same point in their life cycle. It is also clear from the research outlined in this report that the debate should not be about the necessity for assistance from the federal and state governments but rather about the extent and continued timing of that assistance.

1.0 Introduction

Elliott D. Pollack and Company has been retained to study government subsidies and incentives related to the development of various forms of energy throughout the history of the United States and, in particular to those subsidies that impact the electric utility industry in Arizona. Forms of energy that will be discussed in this report include timber, coal, oil, gas, nuclear, hydro, biomass and bio fuels.

Subsidies directed at energy have taken many forms throughout history at both the federal and state levels. Most commonly, these incentives involve tax policy in the form of special exemptions, allowances, deductions, and credits related to the tax code. However, they take other forms as well. Regulations are also an incentive since they can contribute to public confidence in and acceptance of facilities and devices employed in new technologies or otherwise hazardous technologies. Incentives also occur in the form of research and development. Other types of incentives include direct involvement of the government in the marketplace through government services. Dredging waterways and ports in order to make ports accessible to large oil tankers is one such example.

This study will focus on two aspects of energy subsidies. The first part of the analysis will provide an overview of subsidies and incentives provided at the federal level. A significant source for this report was a December 2011 study entitled, "What Would Jefferson Do?" by Nancy Pfund and Ben Healey. The study outlined the historic role of federal subsidies to the development of various forms of energy or fuels. This information makes it possible to examine the types and level of support from the federal government received by various technologies over the first thirty years of their development. In addition to the Pfund/Healey report, numerous other publications and interviews have been used in the development of this study (see Appendix for a complete listing or resources). The second section of the report focuses on Arizona's share of federal subsidies as well as incentives provided directly by the state.

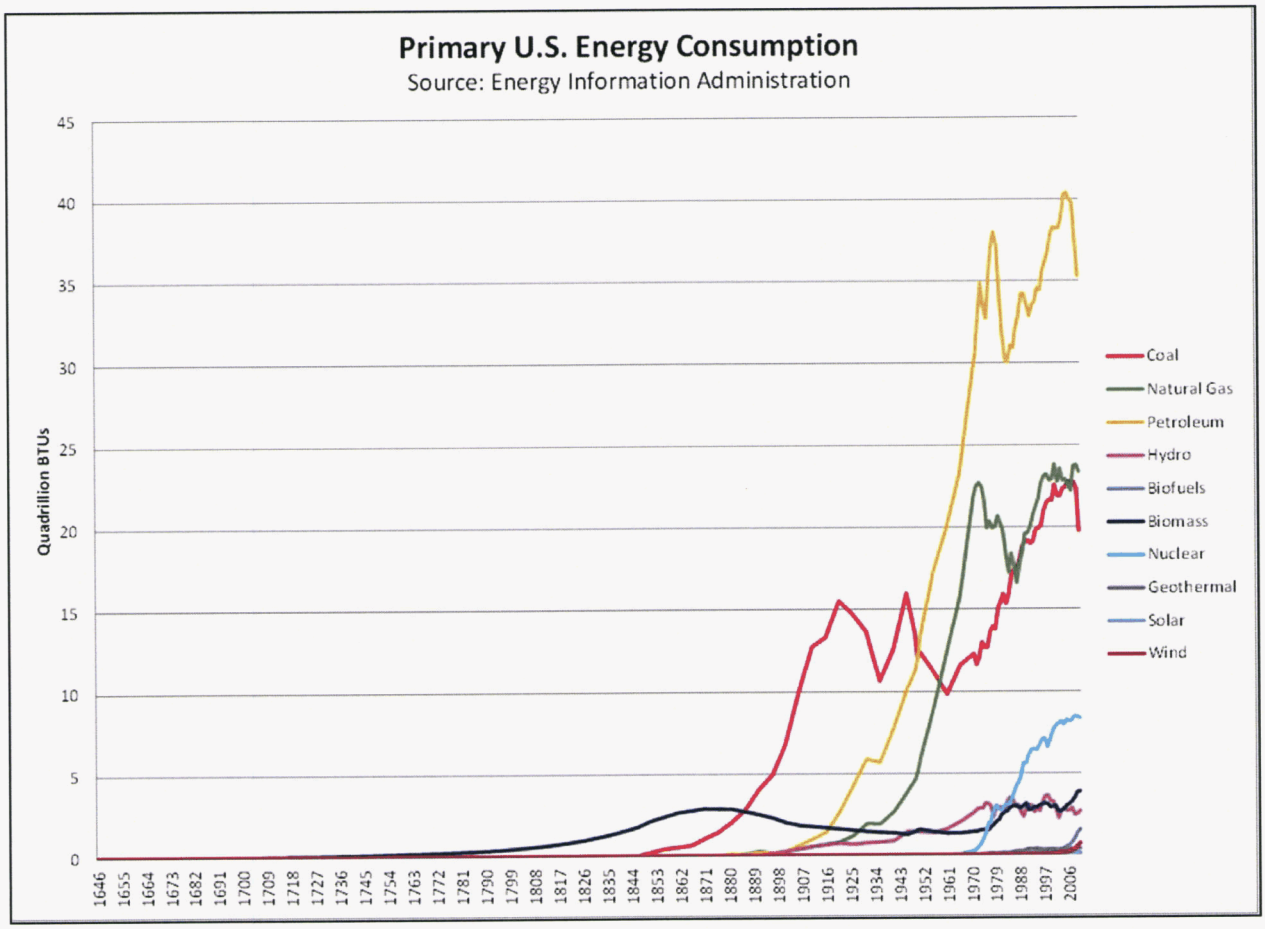
This study is intended to demonstrate the level of support and subsidies provided to non-renewable energy sources particularly in their formative, early years of development. The study will also address the impact of subsidies on the electric utility industry in Arizona. It will not directly evaluate incentives and subsidies provided to renewable energy sources, such as wind and solar.

The following section provides a historical and fact-based account of national incentives for the various energy sources as previously listed. Section 3.0 addresses specific energy subsidies and incentives by type that affect the electric utility industry in Arizona.

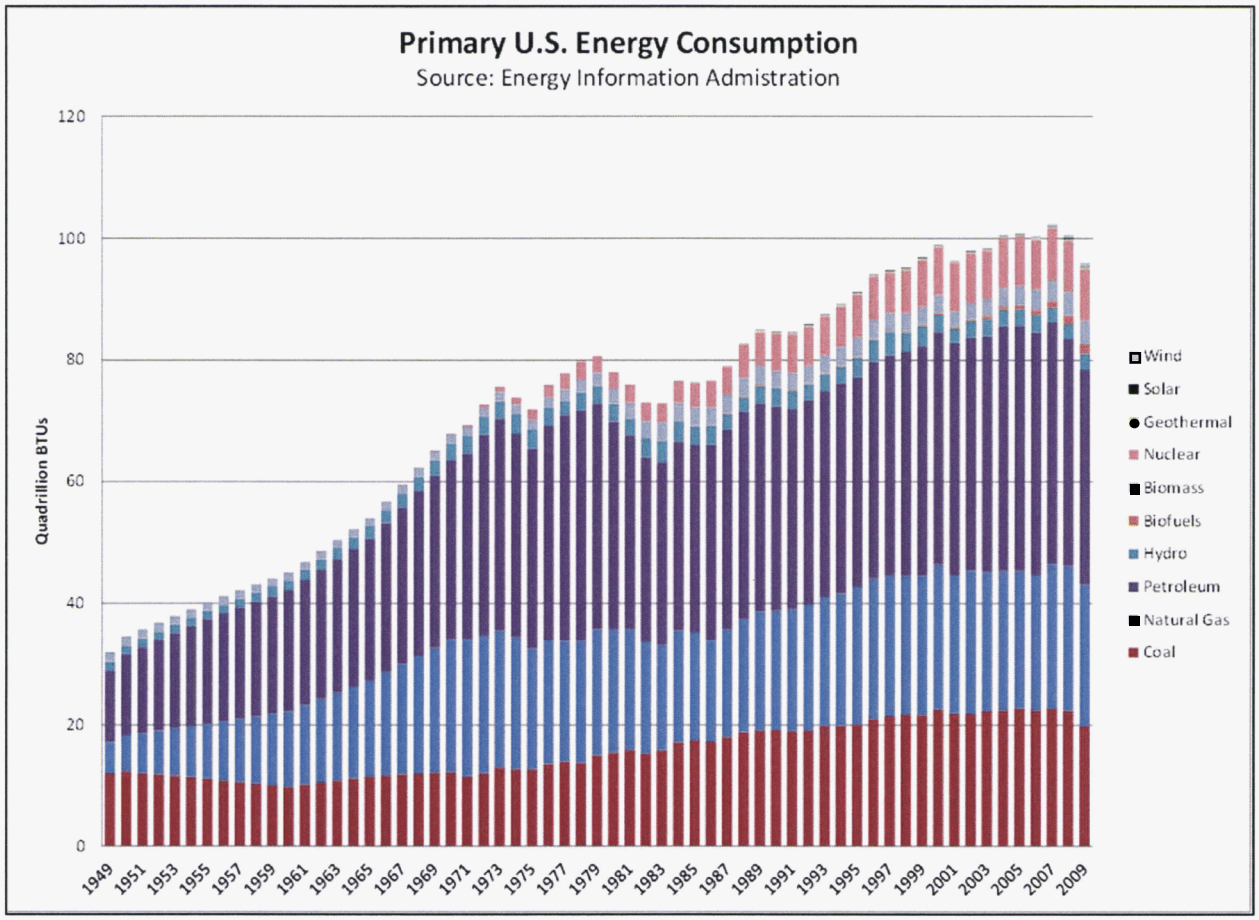
2.0 National Overview

2.1 U.S. Energy Consumption

In order to provide a reference point for the consumption of energy in the U.S., the following charts outline the consumption of energy by type over the last few centuries. Of particular note is the transition over time from one energy source to a new source or technology. Since the late 19th century, energy consumption has grown exponentially starting with the introduction of coal. Remarkably, coal was the major source of energy through the mid-20th century, before giving way to petroleum and natural gas. Today, the primary use of coal is in the production of electricity. Nuclear energy became a factor starting in the 1970s and is a significant source of electric generation today. However, in terms of total energy consumption, fossil fuels still predominate.[3]



[3] Nancy Pfund and Ben Healey, DBL Investors, "What Would Jefferson Do?", (September 2011).



2.2 Energy Subsidies

Energy subsidies are defined as any direct or indirect financial contribution or financial exclusion (tax credit or exemption) that affects the development and allocation of energy technologies and resources. Subsidies may include direct and off-budget expenditures, revenue losses through the tax code and implied subsidies such as research and development. This report will also refer to subsidies as "incentives" that are designed to induce certain responses, such as increased exploration and production.

Subsidies and support for energy industries date to the 19th Century in the form of land grants to citizens at below-market prices. Initially designed to encourage settlement and economic development of the country, land grants also included the natural resources of the property such as timber and minerals. With the introduction of the federal income tax in 1913, incentives for energy industries shifted to tax credits and deductions. Fossil fuels were the initial primary beneficiaries of these incentives with the passage of the depletion deduction in the tax code.[4] Fossil fuel tax incentives still remain in the tax code today, decades after the initial introduction.

[4] Molly Sherlock, CRS, "Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures" (May 2, 2011)

Historically, the United States has incentivized new energy sources early in their development in order to stimulate supply. These incentives are generally termed "revenue losses" or "tax expenditures" which essentially refer to foregone taxes that otherwise would have been collected. Most incentives and subsidies have extended well past the energy source's infancy, and, in fact, many have been in effect for decades. Once these incentives are codified, they generally do not disappear. Since 1977, provisions within federal tax laws have resulted in tax expenditures for energy and non-energy industries totaling between 5% and 10% of gross domestic product.[5] As of 2001, the subsidy ratio for fossil fuels versus alternative renewable technologies was estimated at 10 to 1, although some experts suggested it could be as high as 35 to 1.[6]

Federal energy incentives have been justified on two bases:

- To promote new technologies in their early developmental stage due to their high start-up costs and risks, and
- To help bridge the difference between the value of a particular energy resource to the private sector and its overall value to the public.[7]

Government support for energy innovation has been in effect for centuries. Energy incentives have affected nearly every energy source: timber and biomass, hydro, oil, natural gas, coal, nuclear, bio fuels and renewable energy sources. However, the amount given to each source varies considerably. For instance, during the 1990s, fossil fuels and nuclear energy account for 84% of total energy subsidies.[8] The following sections outline federal incentives provided to each energy source by type.

Timber

Incentives for timber represented the first form of government subsidies in the 19th Century. However, because there were limited tax mechanisms at the time, the timber industry of the 1800s was incentivized through land grants. Several laws (such as the Preemption Act of 1841, the Homestead Act of 1862, and the Timber and Stone Act of 1878) enabled the federal government to make land grants available at below market prices to encourage exploration and economic development. The total scale of the assets available for transfer was enormous—on the order of an annual deficit of 30% of annual federal budgets. Not all of the land grants were used exclusively by the timber industry for energy purposes. However, Pfund and Healey estimate that if only a small percentage of the land grants were used for timber extraction, the subsidy would amount to $25-billion per year as an equivalent percentage of today's federal

[5] Molly Sherlock.
[6] Norman Meyers and Jennifer Kent, "Perverse Subsidies: How Tax Dollars Can Undercut the Environment and the Economy", (2001).
[7] Mona L. Hymel and Beth S. Wolfsong, J.D., Arizona Legal Studies, "Americans and their 'Wheels': A Tax Policy for Sustainable Mobility", (Feb 2006).
[8] Norman Meyers and Jennifer Kent.

budgets.[9] These figures do not include land grants provided to railroads to build spur lines to logging areas.

Coal

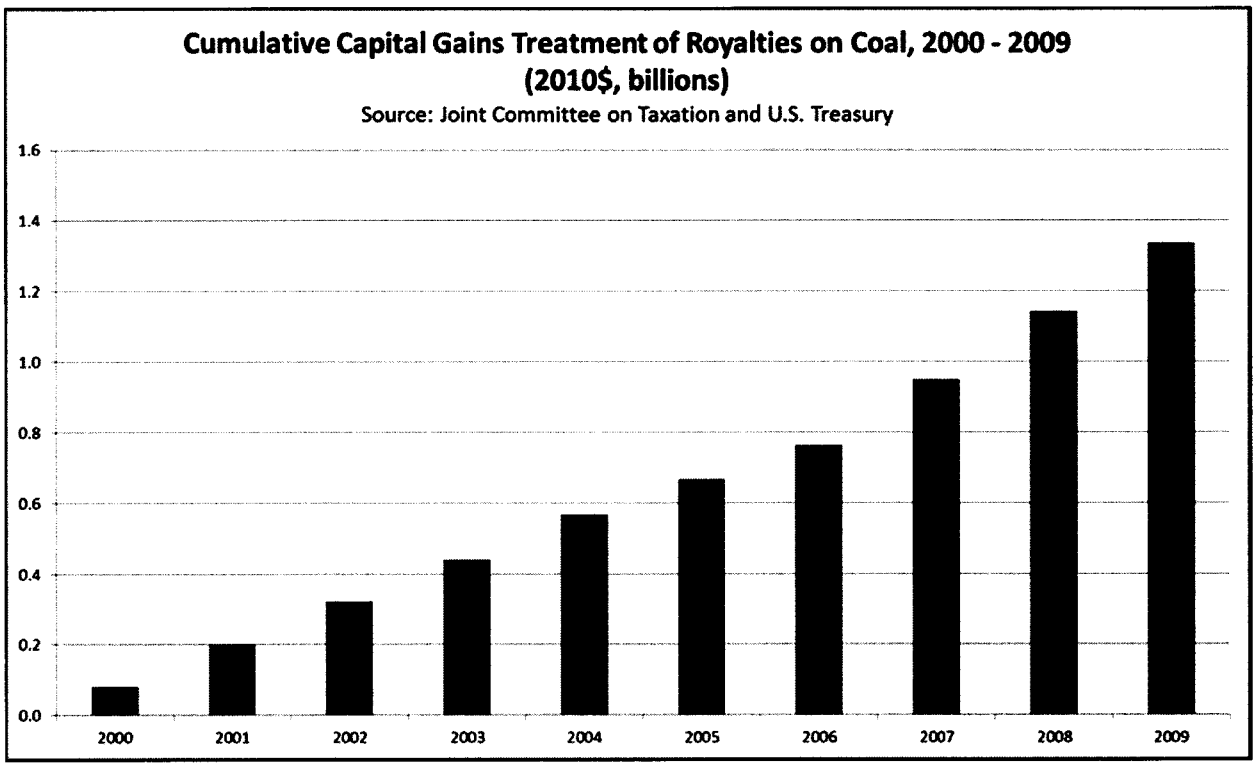
The coal industry benefitted from the same land grants that enabled the timber industry and railroads to thrive in the early 1800s. The industry also benefitted from protective tariffs of the late 1700s and state-sponsored geological surveys. [10] Due to the lack of information on incentives provided to the coal industry during its early years of development, the level of the historic federal support for the industry is difficult to quantify. Tax subsidies for coal began in 1932 with the extension of the excess of percentage over cost depletion to the coal industry.[11] The tax incentives provided in 1932 continue in some form today (nearly 200 years after the birth of the industry) with a depletion rate of 10%.

In the early years of development of the coal industry, states provided many incentives to promote production. Coal was an essential fuel for steam locomotives as well as for steel production. Over time, competition for the development of the coal industry among states became intense. State-sponsored geological surveys became a way to promote exploration and extraction. These and other incentives helped coal become the dominant fuel source of its time.

The industry is also incentivized by the treatment of royalties paid to the owners of coal mining rights as capital gains rather than income subject to standard income tax rates. Since 1991, capital gains tax rates have been lower than standard income tax rates for certain tax brackets (and equal for others). Between 2008 and 2012, the capital gains tax rate for assets owned for at least one year was 15%, much lower than income tax rates for virtually every tax bracket.

In January 2013, the capital gains tax rates changed due to the Patient Protection and Affordable Care Act for filers with a modified adjusted gross income over $200,000 for single filers and $250,000 for joint filers. However, the treatment of royalties as capital gains is still available to the coal industry and was estimated to be worth $170 million in FY 2009, with a cumulative impact of nearly $1.4 billion between 2000 and 2009.[12]

[9] Nancy Pfund and Ben Healey.
[10] Nancy Pfund and Ben Healey.
[11] Autumn Hanna and Benjamin Schrieber, the Green Scissors Campaign, "Green Scissors 2010", (2010).
[12] Nancy Pfund and Ben Healey.



Hydro

Hydro energy is heavily subsidized in the United States through direct government involvement, namely federal ownership of the facilities. Nearly $80 billion in total federal incentives and subsidies have been provided to hydro energy with roughly 75% coming from market activity which includes federal construction and operation of dams and transmission facilities.[13] Subsidies to hydro energy in its early years are difficult to quantify due to the lack of expenditure data from the 1890s and because hydro projects are usually part of larger development projects such as flood control or river navigability.

An analysis from Doug Koplow of Earth Track, a think tank that works to consolidate and standardize energy subsidy data, studied the "implicit borrowing subsidies" provided by the federal government in the form of below-market-rate capital to the Tennessee Valley Authority, the Bonneville Power Administration, and the other Power Marketing Administrations over 80 years.[14] Koplow was able to calculate $1.6 billion in direct hydro subsidies because of access to capital at below market rates. Through market activity, direct subsidies and government ownership, hydro energy has been heavily subsidized by the federal government.

Even with the analysis conducted by Koplow, data on hydro is illusive. For instance, since most hydroelectric facilities are owned in some manner by the federal government, they can price

[13] Management Information Services, "Analysis of Federal Expenditures for Energy Development", (September 2008).
[14] Nancy Pfund and Ben Healey.

electricity more cheaply than private sector utilities. The scope of this subsidy, according to Pfund and Healey, is difficult to measure and, therefore, comparisons to privately-owned utilities are challenging without more extensive quantitative analysis. As such, evaluating hydro subsidies is beyond the scope of this report.

Oil and Gas

The advent of the automobile was the catalyst for significant oil and gas incentives and subsidies. By as early as 1919, the U.S. had nearly 7.6 million registered vehicles. The introduction of the affordable car along with affordable fuel brought about by oil and gas incentives revolutionized life in the U.S. Even today, tax benefits to the petroleum industry are reflected in lower gasoline prices to consumers.[15]

At the federal level, tax subsidies for oil and natural gas began in the early 1900s. Two major tax preferences were established to speed up the capital cost recovery for investments in oil and gas exploration and production.

1. In 1916, the expensing of intangible drilling costs (IDCs) and dry hole costs was introduced. This provision allows IDCs to be fully deducted in the first year rather than being capitalized and depreciated over time.
2. The excess of percentage over cost depletion deferral was introduced in 1926. Rather than a deduction based on the actual value of the resources extracted, the percentage depletion provision allows a deduction of a fixed percentage of gross receipts. In the 1970s, the rates of excess of percentage depletion was lowered from the original 27.5% to the current rate of 15% for oil, gas and oil shale,[16] and only independent producers (without refining or distribution capabilities) are eligible for the credit.[17]

These tax preferences provided to oil and gas remain the largest energy tax provisions in terms of estimated revenue loss, and both provisions remain in the tax code in limited form today.[18] The tax expenditures also do not include other incentives provided by the federal government in terms of oil tanker loans, the dredging of oil waterways or a naval presence to provide safe passage for shipping.

Due to these tax incentives, marginal effective federal corporate tax rates on domestic production of petroleum production are among the lowest for a major industry.[19] Although some additional restrictions have been placed in the tax code, both provisions (expensing and depletion) still exist some 87+ years after their creation.

[15] Mona L. Hymel and Beth S. Wolfsong, J.D.
[16] Eric Toder, The Brookings Institute, "Eliminating Tax Expenditures with Adverse Environmental Effects" (June 2007).
[17] Gilbert E. Metcalf, MIT Joint Program on the Science and Policy of Global Change, "Federal Tax Policy Towards Energy", (January 2007).
[18] Molly Sherlock.
[19] Thomas J. McCool, et. al., GAO, "Additional Petroleum Production Tax Incentives are of Questionable Merit" (July 1990).

The oil and gas industry also benefits from the use of publicly-traded Master Limited Partnerships (MLP) as ownership entities. A MLP must derive at least 90% of its revenues from natural resource activities, real estate and commodity investments. Today, 83% of MLPs are concentrated in the natural resources area, including oil and gas exploration and production, transportation (pipelines and ships) and coal production. The advantage of a MLP is that it avoids double taxation experienced by shareholders of regular corporations. A MLP does not directly pay taxes. Rather, profits flow through to the individual investors resulting in a lower cost of capital, a highly important factor in a capital intensive industry.[20]

Nuclear

The nuclear industry has been heavily subsidized by the federal government through regulations, research and development, and the Price-Anderson Act. Subsidies to the nuclear industry dwarf all others due in large part to the inclusion of the "off-budget" costs of liability risk-shifting from utility companies to the federal government under the Price-Anderson Act.[21] Liability for any nuclear catastrophe is covered by the government. Without the Act, nuclear generating plants likely would not be built since the cost associated with catastrophe liability would be prohibitive. The Edison Electric Institute concluded that, "no utility company or group of companies will build or operate a reactor until the risk of nuclear accidents is minimized."[22]

The Price-Anderson Act originally limited liability protection to $560 million per accident. The Nuclear Energy Institute reports that liability protection has since been raised to $12.6 billion. At any point, Congress has the ability to amend the coverage for the nuclear industry.[23] According to Marshall Goldberg of the Renewable Energy Policy Project, "passage of the initial liability limitation not only had the effect of reducing industry insurance premiums, but was perhaps the pivotal point in enabling the creation of the civilian nuclear industry." [24] Estimates by Marshall Goldberg of both direct and "off-budget" subsidies to the nuclear energy from 1947 to 1999 totaled $145 billion. When including the off-budget incentives, nuclear subsidies represented 96% of the total subsidies over that time period.[25] The direct subsidies alone for the nuclear industry totaled $30.3 billion from 1947 to 1999.

Bio Fuel

When considering "renewable energy" sources, many distinguish biofuel as its own category. Biofuels subsidies include the income tax credit for alcohol fuels and the excise tax exemption for alcohol fuels that has now transitioned to a credit.

[20] National Association of Publicly Traded Partnerships, "Master Limited Partnerships 101: Understanding MLPs", (2013).
[21] Nancy Pfund and Ben Healey.
[22] Mona L. Hymel and Beth S. Wolfsong, J.D.
[23] Nuclear Energy Institute, "Insurance: Price Anderson Act Provides Effective Liability Insurance At No Cost to the Public", (September 2012).
[24] Marshall Goldberg, Renewable Energy Policy Project, "Federal Energy Subsidies: Not all Technologies are Created Equal", (July 2000).
[25] Marshall Goldberg.

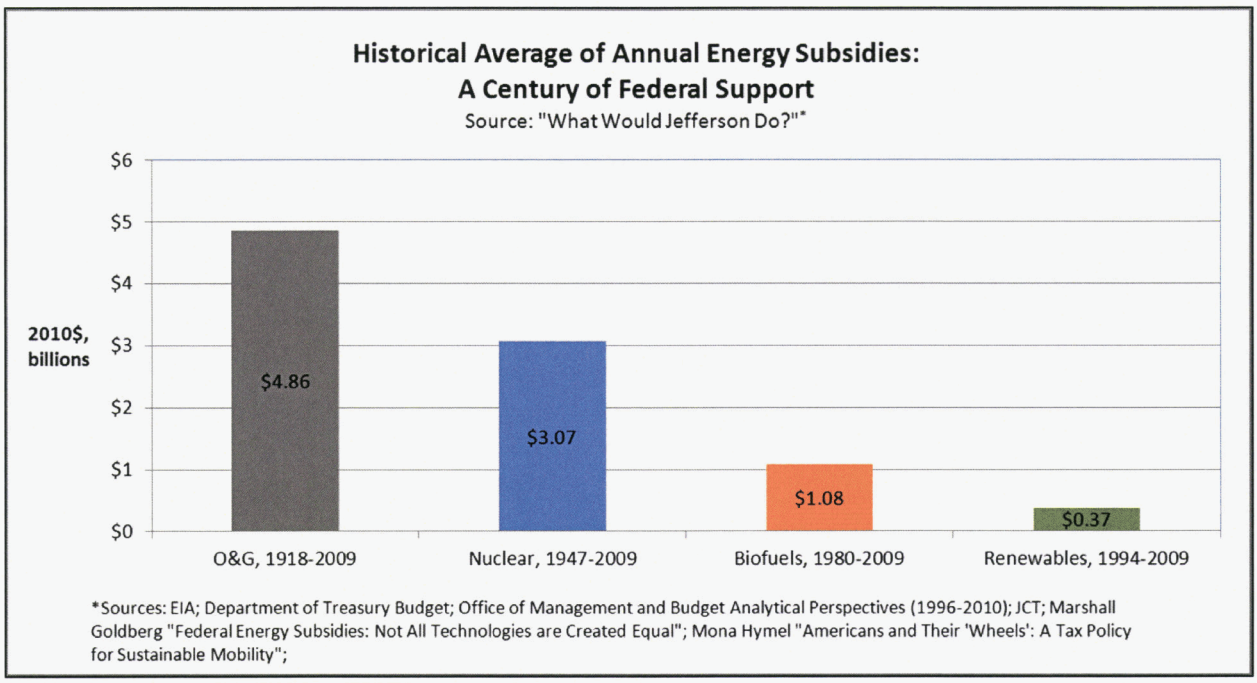
In 2005, Congress created the volumetric ethanol excise tax credit (VEETC) to replace a previously enacted ethanol excise tax exemption. This transition from an exemption to a credit affected federal revenues, specifically reducing income tax receipts and creating an additional subsidy for biofuels.[26]

Pfund and Healey also address arguments that Department of Agriculture subsidies that incentivize corn growth - and result in increased corn ethanol production - should be considered a biofuel incentive. However, they maintain that USDA incentives are not aimed at the creation of fuel. Rather, the creation of corn ethanol can be attributed to the ethanol tax incentives, federal regulations and the price of fossil fuels. Since the 1980s, biofuels have received an average of $1.08 billion per year in subsidies.[27]

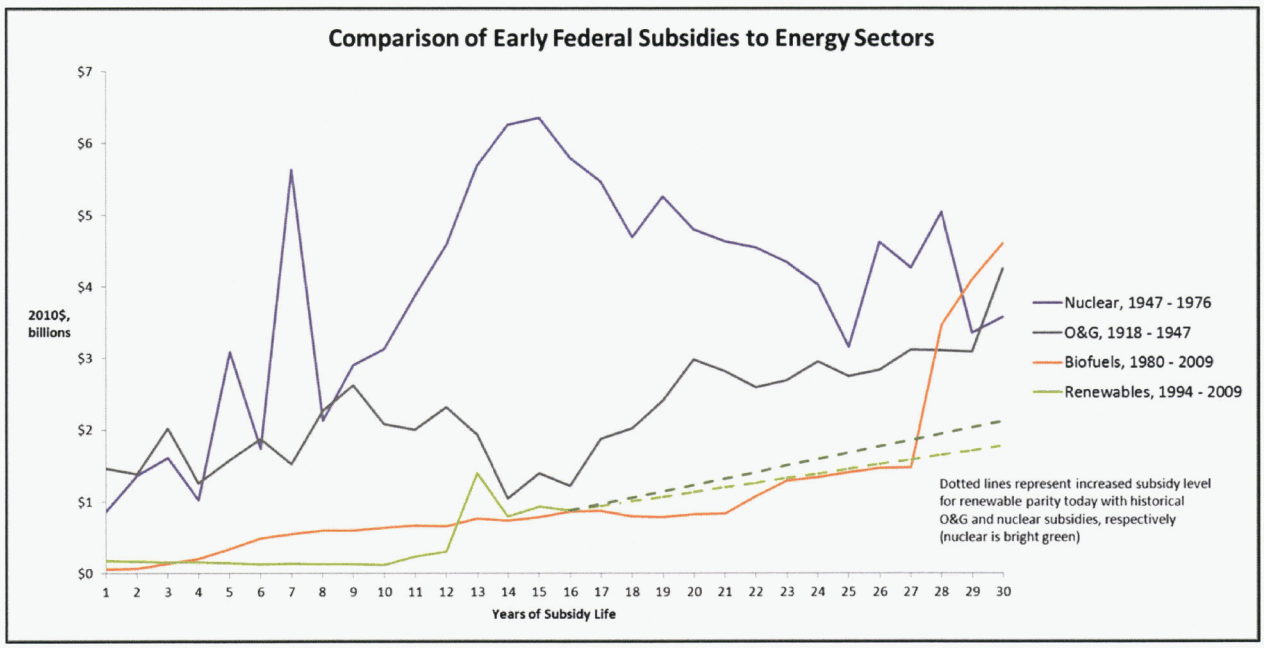
2.3 Comparison of Subsidies in Early Industry Development

The following table shows the historical average of annual subsidies provided to the energy industries from the early stages of their development to 2009 (stated in 2010 dollars). Detailed data was not available for all forms of energy. On an annual basis, oil and gas and nuclear have received nearly 85% of all subsidies. Oil and gas averaged $4.86 billion per year (51.8% of total annual subsidies) in federal subsidies from expensing IDCs and excess of percentage over cost depletion. The nuclear industry averaged $3.07 billion per year (32.7% of total annual subsidies), whereas bio fuels and renewables received $1.08 billion and $0.37 billion respectively, or 15.5% of total annual federal subsidies[28].

[26] Nancy Pfund and Ben Healey.
[27] Nancy Pfund and Ben Healey.
[28] Ben Healey, information updated to 2009.

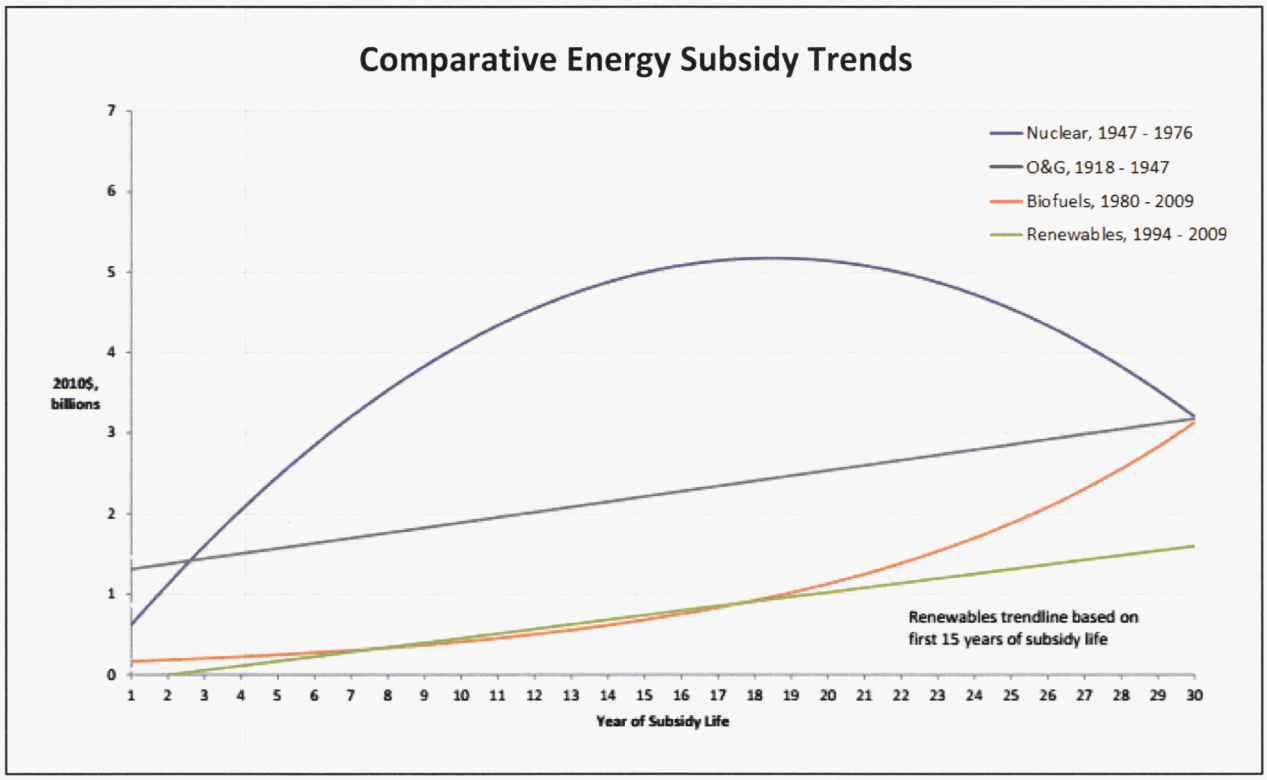


While the average annual cost of subsidies for each energy source is an important fact, of more consequence is the impact of subsidies and incentives in the formative years of the industry. The following charts show the federal subsidies for four energy industries starting with the first year the subsidies were enacted. Since renewable energy sources are much younger than the other three, the dotted lines represent the potential for future subsidies based on the trends set by the oil, gas and nuclear industries.

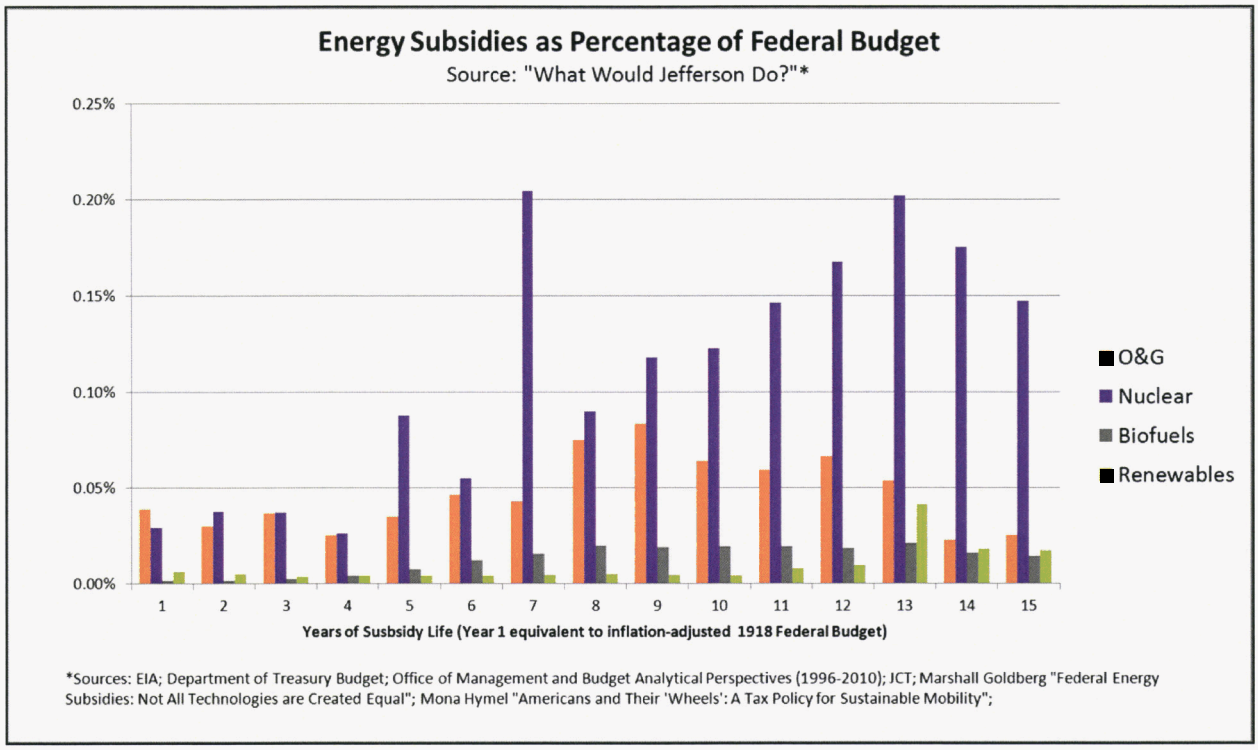


The jagged pattern of federal subsidies illustrated in the chart above reflects how effectively the private sector takes advantage of the subsidies in any given year. Subsidies to the nuclear industry outweigh all others and reflect the off-budget Price-Anderson Act impact and the increasing number of new nuclear plants coming on line.

In order to better illustrate the long term trend in subsidies, the following graph is a smoothed curve fit revision of the above graph using 30-year trend lines. The chart demonstrates the level of subsidies provided to the oil and gas and nuclear industries in their early stages of development.



The following chart is intended to demonstrate federal spending priorities by illustrating energy subsidies as a percentage of the federal budget. Pfund and Healey have adjusted the federal budget from 1918 to 1932 for oil and gas subsidies, correcting for inflation and the growth of the federal budget over time due to the introduction of social and health programs as well as the growth of the defense budget. Nuclear industry subsidies clearly dominate those implemented in other industries, particularly the biofuels and renewable industries.



2.4 National Overview Conclusions

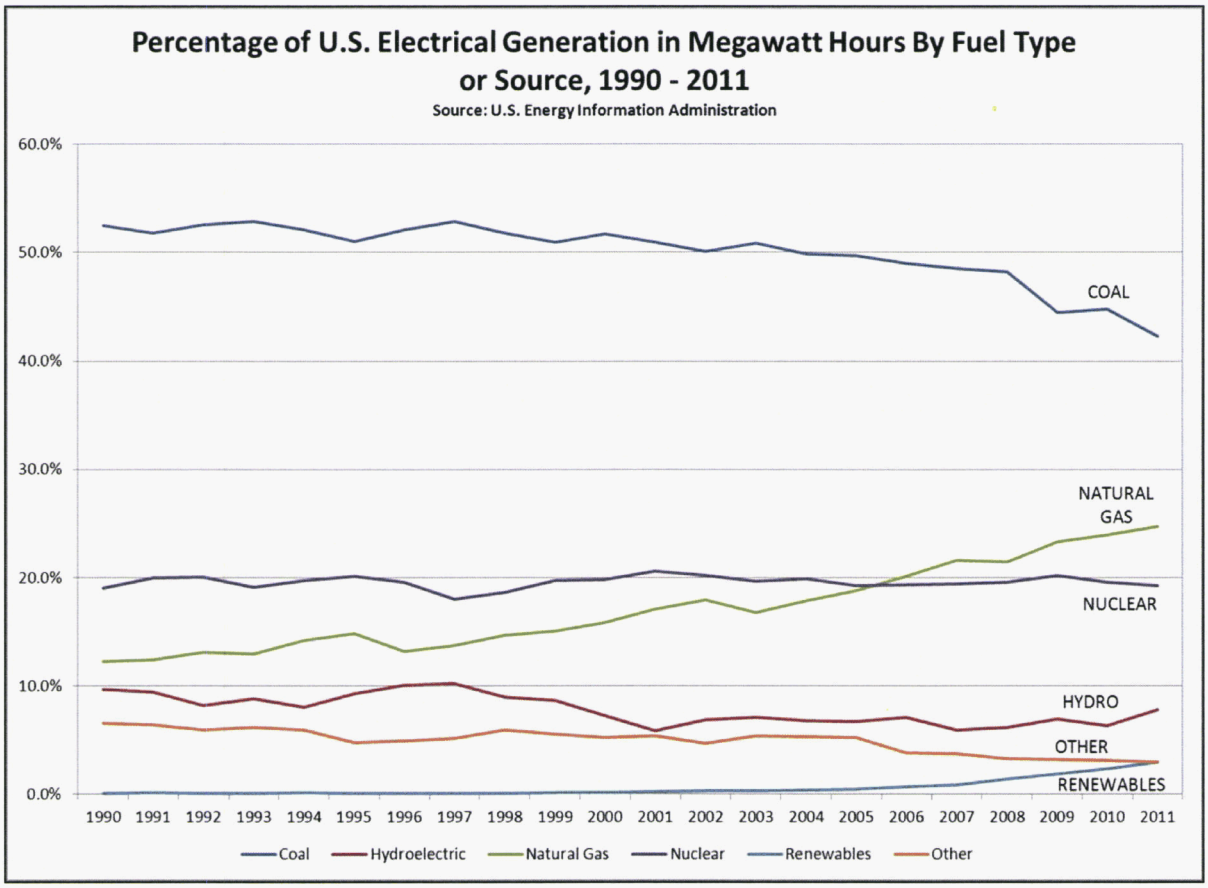
Federal incentives and subsidies have been critical to the development of new forms of energy. Since the country's birth, energy innovation supported by government tax incentives and direct subsidies has led to significant advances in the quality of life for Americans. For the petroleum industry, tax incentives have lowered the effective tax rate for oil companies while ensuring an adequate and inexpensive supplies of gasolines for vehicles. The nuclear industry has also benefited from government research and development as well as risk sharing of liability. Many of these subsidies and incentives live on today, decades after their initial enactment. These incentives have proven invaluable, particularly in the critical early stages of development of new forms of energy.

Of importance to this study is the beneficial impact of energy subsidies on the electric utility industry. Many of the subsidies outlined previously affect countless parts of everyday life, from the price of gasoline to an individual's income tax bill. However, the subsidies also affect electric utility companies who use the various sources of energy to generate electricity. In order to provide perspective on how the subsidies might affect utility companies, the following chart outlines the use of fuel types or sources of energy by the electric utility industry.

Fossil fuels are the predominant source of energy for electrical generation in the U.S., accounting for more than two-thirds of total megawatt hours generated. Coal has been the primary source of fuel for decades but has declined from 52% of total generation in 1990 to 42% in 2011. Between

2000 and 2011, total megawatt hours produced from coal declined by 12%; correspondingly, total megawatt hours produced from natural gas increased by 69% over the same eleven years. As a result, natural gas has more than doubled its share of generation from 12% in 1990 to 25% in 2011. Nuclear energy has maintained a relatively stable 20% share of generation over the past 20 years. Renewables have only started to make an impact in the last few years.

Subsequent analysis provided in this report will focus on the impact of subsidies and incentives on the electric utility industry in Arizona.

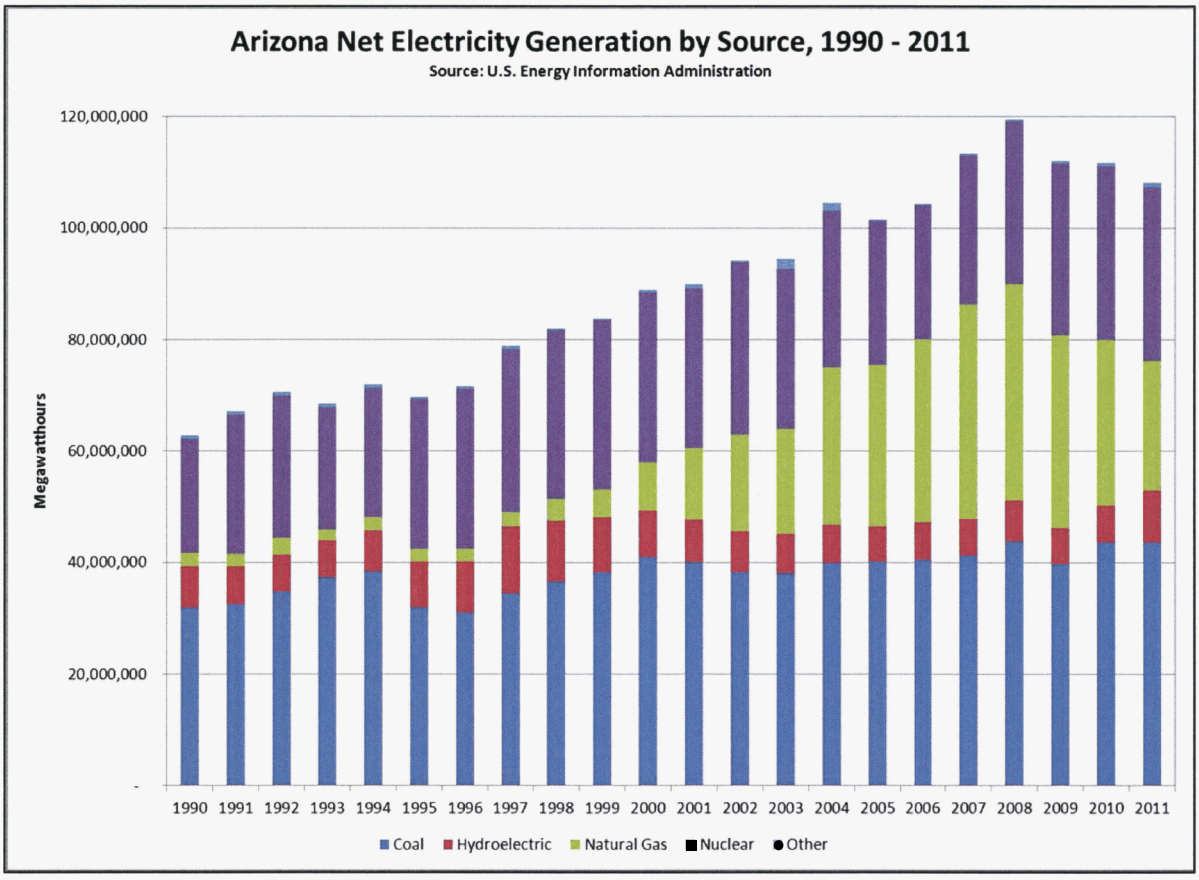


3.0 Arizona Overview

Very little direct data exists on the impact of federal subsidies and incentives on energy sources at the state level. Interviews with various agencies and departments of the state of Arizona also indicate there are no long term historical records on incentives that may have been provided to energy sources directly by the state, especially in the early years of development. More recent records are available, primarily related to tax exemptions and credits adopted by the state for various forms of energy. This section will focus on the impact of federal energy subsidies on electric generation in Arizona as well as evaluate the impact of state tax exemptions and other subsidies on the state's electric utilities.

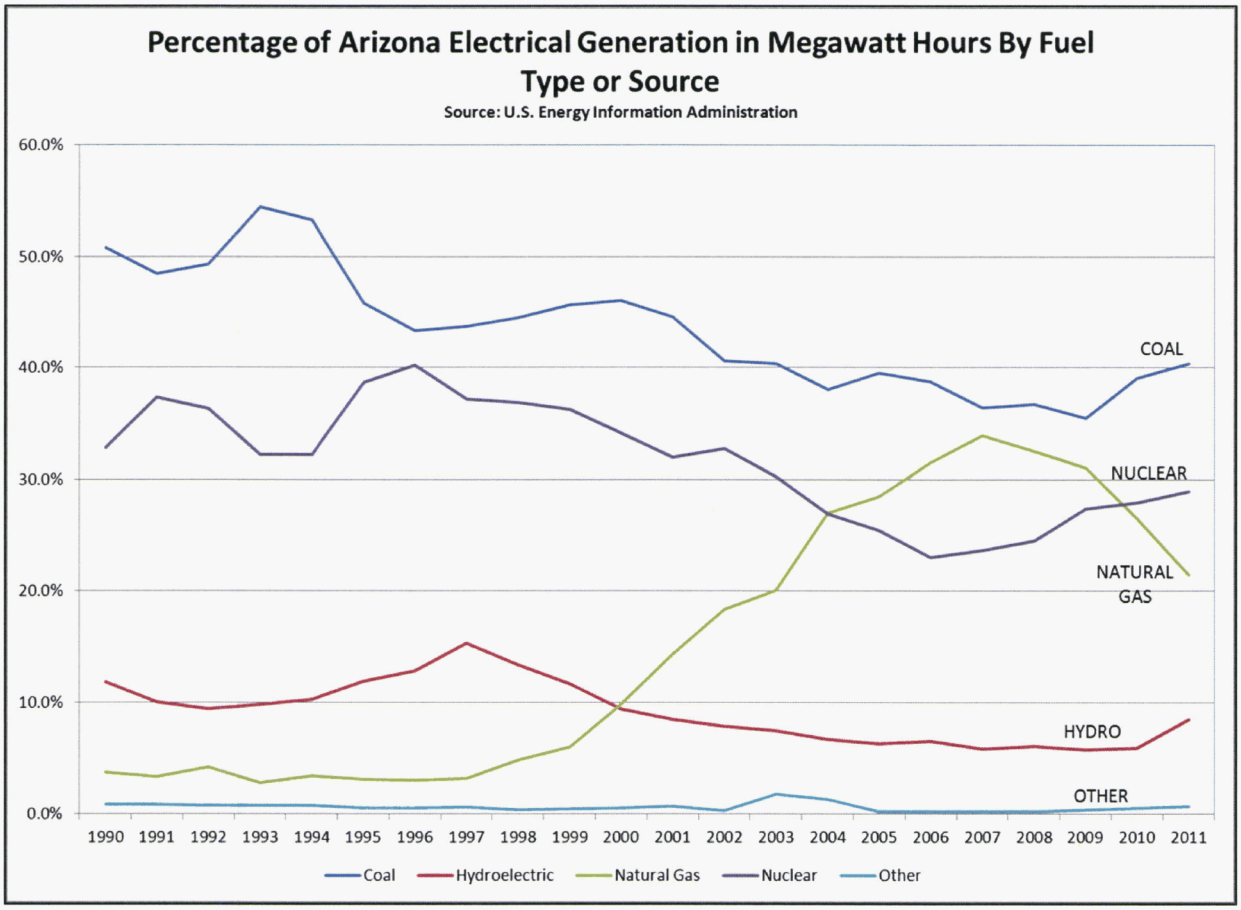
3.1 Energy Generation and Distribution

From 1990 to 2000, coal and nuclear energy dominated the state's generation of electricity. Since 2000, the production of electricity using natural gas has drastically increased, partly due to environmental concerns over air pollution. More recently, natural gas has gained an advantage due to its plentiful supply and low cost. The following table shows the net electricity generation from conventional energy sources in Arizona from 1990-2011.



Coal's share of the Arizona's energy portfolio, as shown on the following chart, has declined from 50% to 40% over the last 20 years while natural gas usage has increased dramatically. Nuclear energy's share has remained fairly consistent in the 30% range. Renewable energy sources are included in the "Other" category and have shown modest growth in the last few years.

While the use of coal for electrical generation has declined as a percentage of total generation, the total megawatt hours of electricity generated from coal actually increased by 7% between 2000 and 2011. This is likely reflective of the demand for electricity from a fast-growing state and the need for utility companies to continue using coal-fired generators. However, it appears that most of the new demand created by population growth in the state is being fulfilled by natural gas generation. Since 2000, the number of megawatt hours generated from natural gas has increased by 166%.



Arizona has three primary utility companies: Arizona Public Service, Tucson Electric Power and Salt River Project. A review of the companies' annual reports indicates that they are still heavily invested in coal-fired generating stations although natural gas-fired plants have the most generating capacity within their generating portfolios. It follows logically that the benefits and

subsidies bestowed by the federal government on the energy sources employed by the state's utilities are necessarily passed through to those companies. The following table outlines the assets and overall capacity owned by each of the utility companies, excluding renewable sources.

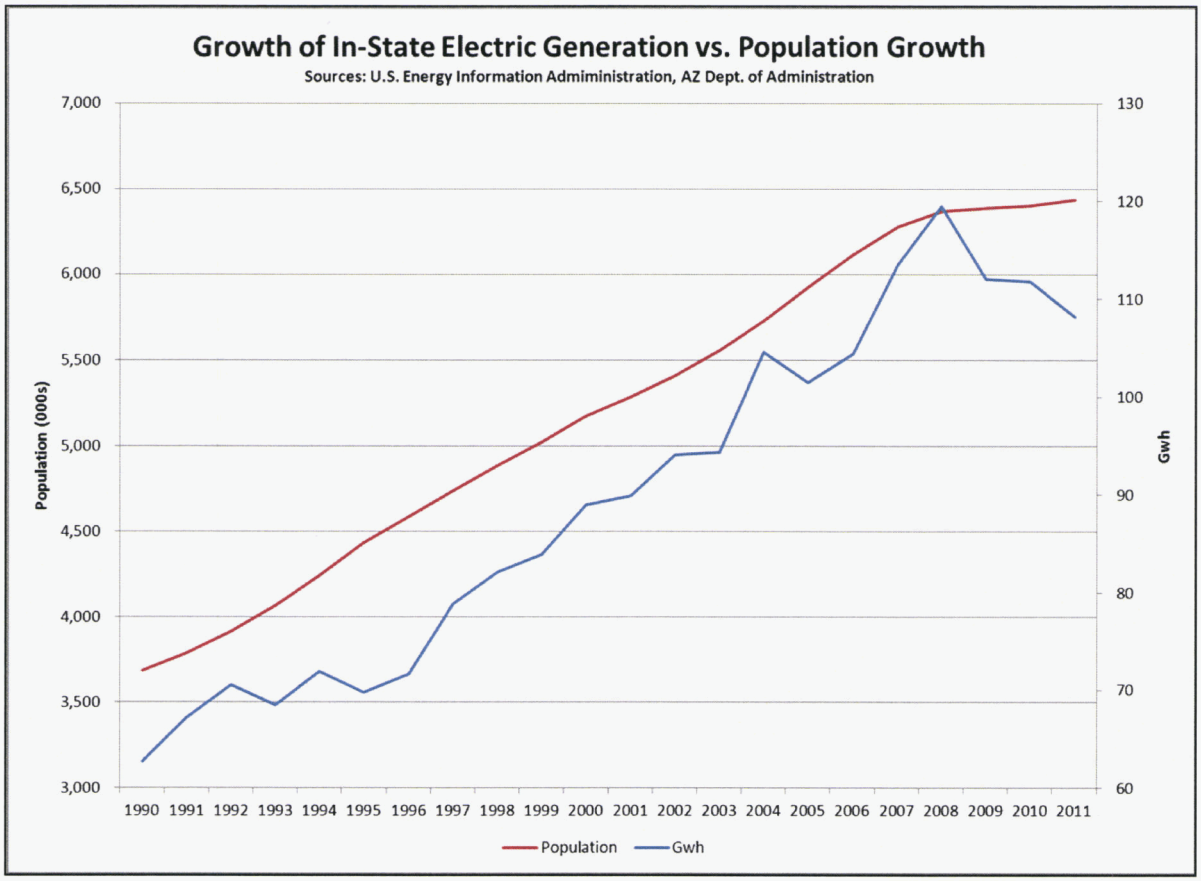
Megawatts of Generating Capacity By Fuel Type
Utility-Owned Plants Located in Arizona

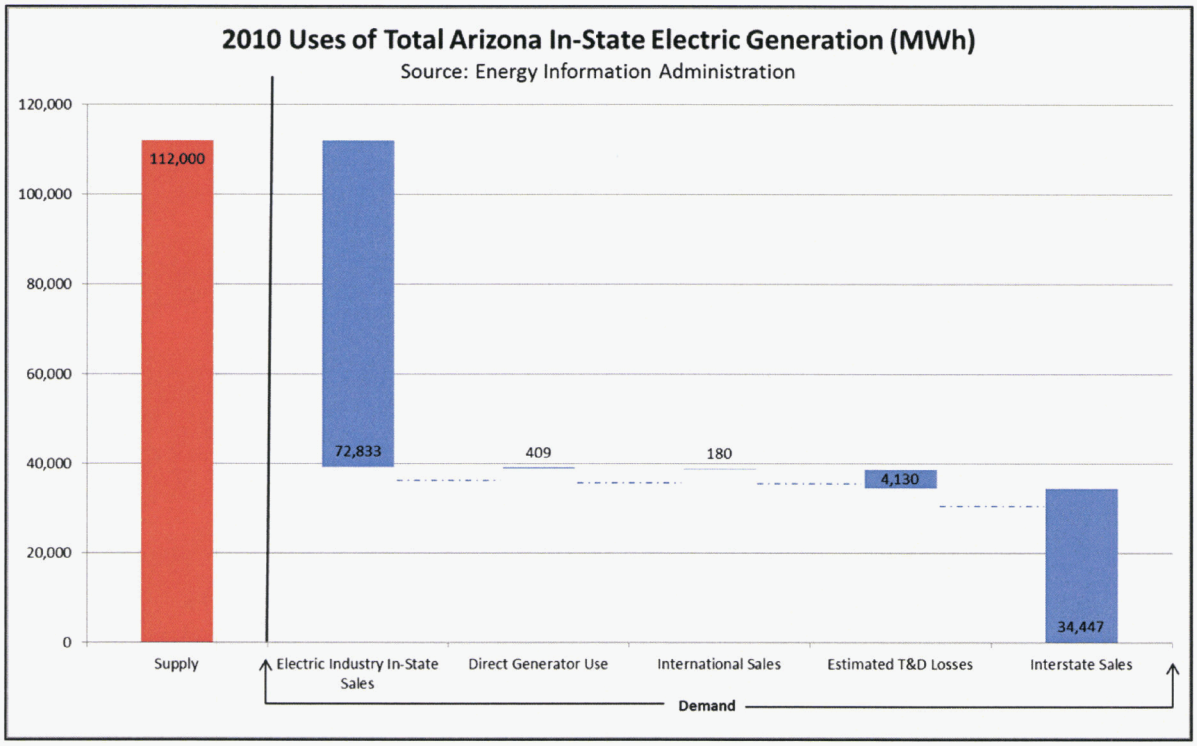
	Utility Company				
Fuel	**APS**	**TEP**	**SRP**	**Total**	**Percent**
Coal	1,753	972	1,690	4,415	31.7%
Gas	2,906	280	2,425	5,611	40.3%
Gas/Oil	413	391	1,036	1,840	13.2%
Oil	70	-	-	70	0.5%
Nuclear	1,146	-	688	1,834	13.2%
Coal/Gas	-	156	-	156	1.1%
Total	**6,288**	**1,799**	**5,839**	**13,926**	**100.0%**

Note: All numbers are in megawatts of generating capacity

Sources: Company Annual Reports

Growth in the generation of electricity in Arizona has been a result of two major factors: the state's population growth and the increase in net exports of electricity to neighboring states. While the increase in electricity generated has grown with the state's population, the exportation of electricity has doubled since 1990 and now represents nearly a third of all energy generated within the state. Utility companies from California, Texas, Nevada and New Mexico all have ownership in a number of generating facilities in Arizona. In addition, many of the new photovoltaic plants in Arizona have been built for the benefit of California utilities which are required to meet stringent renewable energy standards in the coming years. The following charts illustrate Arizona's electrical generation trends relative to population growth and the amount of electricity that is exported to adjacent states.


Growth of In-State Electric Generation vs. Population Growth
Sources: U.S. Energy Information Adminimistration, AZ Dept. of Administration
Population (000s)
Gwh
7,000
6,500
6,000
5,500
5,000
4,500
4,000
3,500
3,000
130
120
110
100
90
80
70
60
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Population
Gwh


2010 Uses of Total Arizona In-State Electric Generation (MWh)
Source: Energy Information Administration
120,000
100,000
80,000
60,000
40,000
20,000
0
112,000
72,833
409
180
4,130
34,447
Supply
Electric Industry In-State Sales
Direct Generator Use
International Sales
Estimated T&D Losses
Interstate Sales
Demand

3.2 Arizona's Share of Federal Subsidies

While data on the impact of federal incentives in Arizona is not available, a methodology to distribute federal subsidies to the state's electric utilities has been developed by Ben Healey. The methodology is based on the state's share of the national electric generation budget and the pro rata value of federal subsidies to conventional generators on an annual basis, adjusted to real, current dollars. This calculation yields an implicit subsidy for each energy source within the state.

Using the federal subsidy calculations in the report "What Would Jefferson Do?", Arizona's share of the federal subsidies is shown on the following table from 1985 (the start-up of the Palo Verde Nuclear Plant) to 2009 (adjusted for inflation to 2010 dollars). Because Arizona utility companies only own 47% of the Palo Verde Nuclear Plant, Arizona's generation of nuclear energy is reduced to reflect the Arizona portion of the federal subsidy.

Based on Healey's methodology, Arizona's share of federal energy subsidies to its utilities totals approximately $460 million over 25 years with nearly 94% of that amount attributed to the nuclear industry, specifically Palo Verde.

Implicit Subsidy To Arizona Utilities
(In 2010 $, Millions)

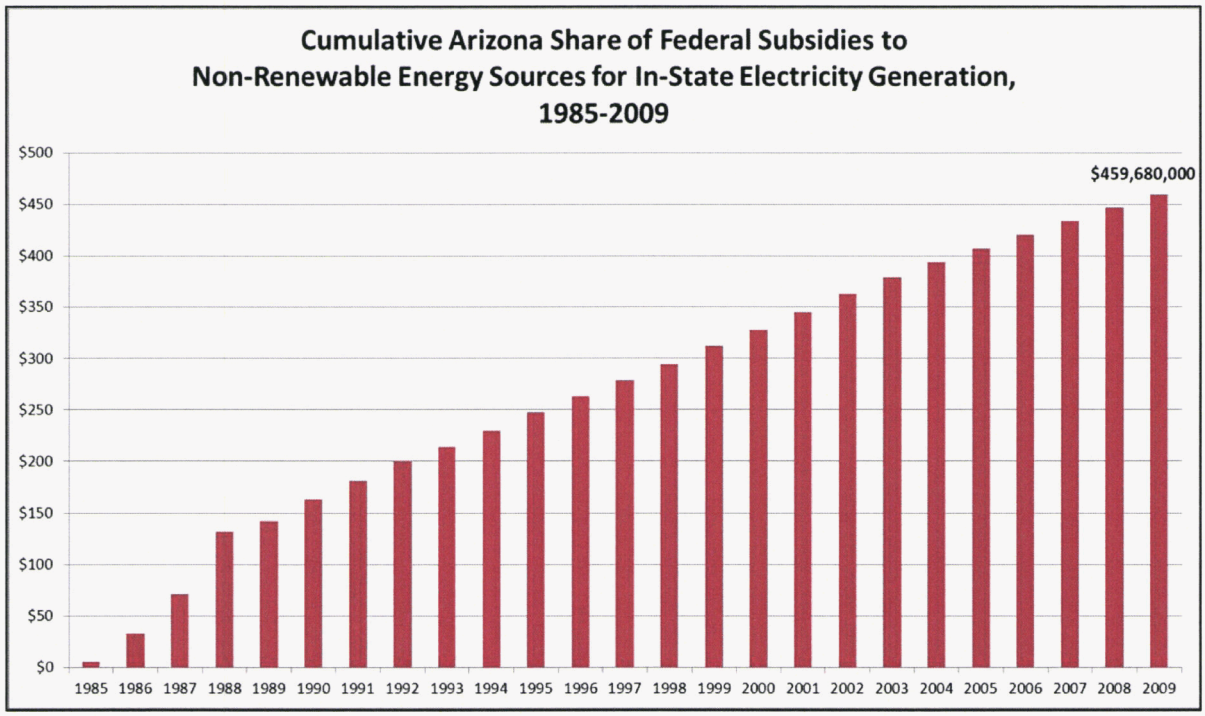
Year	Coal	Nat. Gas	Oil	Nuclear	Total
1985-2009	$23.0	$5.1	$0.7	$430.9	$459.7
Percent of Total	5.0%	1.1%	0.1%	93.7%	100.0%

Source: EIA data, "What Would Jefferson Do?"

Conventional energy generators in Arizona have benefitted from federal policies designed to lower the cost of electricity in the following manner:

- The capital gains treatment of income related to extraction, production, and sale of coal.
- The expensing of intangible drilling costs and excess percentage over cost depletion deferral.
- The Price-Anderson Act which indemnifies utilities in the event of nuclear accidents up to $12.6 billion per occurrence. Palo Verde maintains $375 million in coverage from a commercial insurance carrier. The remaining balance of $12.2 billion of liability coverage is provided through a mandatory industry-wide retrospective assessment program.

Overall, Arizona's share of coal fired generation in the United States is small. However, as the nation's largest nuclear generating facility, Palo Verde receives a significant subsidy under the Price-Anderson Act. The cumulative impact of the non-renewable federal subsidies is shown on the following table. On average, the benefits of the federal subsidies to Arizona utilities total $18.4 million each year (in 2010 dollars).



3.3 State Energy Subsidies and Incentives

The data required to evaluate historical incentives for non-renewable energy sources at the state level over an extended period of time simply does not exist. Meetings were held with representatives from the Arizona Department of Revenue, Arizona Commerce Authority, Arizona Corporation Commission and Salt River Project to determine the extent of available energy subsidy data. Arizona Public Service declined to meet with the authors of this report.

Discussions with these state agencies and utilities suggest that if such data ever did exist, it is no longer available or not in a form that is usable. There is, however, more recent information available in two areas:

- Tax expenditures related to corporate income tax credits and transaction privilege tax exemptions that benefit the electrical utility industry.
- Subsidies/incentives that have been provided to the Palo Verde nuclear plant.

Additional conclusions can also be drawn from federal incentives that have been provided to the oil and gas and coal industries. Because the state's income tax begins with the federal adjusted

gross income, the state's income taxes are affected by federal tax deductions and credits. Thus, incentives that reduce federal taxes for oil and gas, for example, also reduce state taxes. These tax incentives include expensing of IDCs for oil, excess of percentage depletion over costs for investment in oil, gas and coal, and taxing coal income at a capital gains rate. Based on calculations of subsidies developed by Pfund and Healey at the federal level, estimates can be prepared on Arizona's share of those subsidies based on the percentage of production of each source of energy.

Arizona Tax Expenditures

Arizona provides several transaction privilege tax exemptions and income tax credits for various non-renewable and renewable energy industries. Exemptions to non-renewable sources are outlined herein. These exemptions and credits are outlined in a report issued annually by the Arizona Department of Revenue entitled "The Revenue Impact of Arizona's Tax Expenditures." A "tax expenditure" is a deduction or exemption that is not collected by the state and is, therefore, considered an expenditure. This section will outline those expenditures related to non-renewable energy sources.

Some of the more important tax expenditures related to the state's energy industries are the following:

- A corporate income tax credit for taxes paid on coal consumed in generating electric power. In 2012, this expenditure totaled nearly $2.2 million and averaged almost $1.2 million annually from FY 2007 to FY 2012 (in inflation-adjusted 2012 dollars).
- A tax exemption for machinery, equipment or transmission lines used in producing or transmitting electrical power. The cost of this expenditure to the state was $12.1 million in 2012. However, the average annual tax expenditure from FY 2007 to FY 2012 is $50.2 million (in inflation-adjusted 2012 dollars).
- A tax exemption for pipes or valves four inches in diameter or larger used to transport oil, natural gas, artificial gas, water or coal slurry. In 2012, this tax expenditure was $5.1 million. The average annual expenditure between FY 2007 and FY 2012 was $13.3 million (in inflation-adjusted 2012 dollars). Without more detailed information, it is difficult to determine the direct benefit of this exemption to the electric utility industry. However, as generating plants are built or reconfigured for natural gas service, gas pipes will need to be constructed to deliver fuel. Coal slurry has also in the past been delivered by pipeline to generating plants in the region. Clearly this tax exemption provides some benefit to the state's utilities.
- Some exemptions can't be estimated because data is not available from the Arizona Department of Revenue. These exemptions include the sales of ancillary services, electrical distribution services, electric generation services and other services that are related to providing electricity to a retail consumer for use outside of the state. Interstate sales of electricity, natural gas and water are also exempt from sales taxes.

It should be noted that credits and exemptions similar to those available to the state's utilities have also been provided to a wide variety of industries, affecting such businesses as defense contractors, manufacturers, aviation repair companies and many others. The credits and exemptions provided to utilities are not unique, but they are largely unseen and unnoticed and, until now, unquantified. Such subsidization of the state's utilities may be an important consideration as the state launches into debate on various renewable energy issues.

The following table delineates the state tax expenditures partly or fully attributable to the utility industry for FY 2007 through FY 2012 (inflation adjusted to 2012 dollars).

Arizona Tax Expenditures for Non-Renewable Energy
(In 2012 Dollars)

Type of Tax	Description	Statutes	Year Adopted	FY 2012	FY 2011	FY 2010	FY 2009	FY 2008	FY 2007	Annual Average
Corporate Income Tax Credit	Taxes paid on coal consumed in generating electric power	ARS §43-1178	FY 1998	$2,182,000	$672,000	N/A	$1,123,000	$983,000	$924,000	$1,177,000
Transaction Privilege Tax Exemption	Machinery, equipment or transmission lines used in producing or transmitting electrical power	ARS §42-5061B4	FY 1988	$12,100,000	$20,772,000	$40,203,000	$96,739,000	$76,535,000	$54,640,000	$50,165,000
	Pipes or valves four inches in diameter or larger used to transport oil, natural gas, artificial gas, water or coal slurry	ARS §42-5159B6	FY 1988	$5,100,000	$7,963,000	$19,088,000	$13,234,000	$19,451,000	$15,205,000	$13,340,000

Source: The Revenue Impact of Arizona's Tax Expenditures, FY 2008 - FY 2012, Arizona Department of Revenue

Water Subsidy to Palo Verde Nuclear Plant

The availability of water for cooling purposes is a prime prerequisite for the siting of nuclear plants. The Palo Verde Nuclear Plant is no exception and as part of its development, it needed a secure and readily available source of water. The solution for the Arizona Nuclear Plant Project (ANPP), the consortium that owns the plant, was to purchase treated effluent from the 91st Avenue Wastewater Treatment Plant located in the City of Phoenix and owned by the Subregional Operating Group (SROG) comprised of the cities of Scottsdale, Phoenix, Mesa, Glendale, Tempe and the Town of Youngtown. The original contract committed SROG to make available 140,000 acre feet of effluent at a price equal to 40% of the then current price of Central Arizona Project Municipal and Industrial Water with a price floor of $20 per acre-foot and price ceiling of $30 per acre-foot.[29] The contract did not include an inflation escalator, but rather was subject to the $30 per acre-foot price ceiling.

As a result, whether by design or happenstance, ANPP benefitted significantly by locking in a reduced water price for an extended period of time. The original agreement was negotiated in 1973 and was to terminate in 2027. If an inflation factor based on the Consumer Price Index (Western Region) had been included in the original contract, the floor price of $20 per acre-foot

[29] City of Scottsdale, "City Council Report: Public Services & Facilities", (April 13, 2010).

would have increased to $89 by 2004 and the ceiling price would have increased to $134. In effect, ANPP received a significant subsidy on the cost of cooling water from the SROG cities.

In 2004 and 2005, the SROG cities indicated a need to revise the contract to better reflect the true cost of effluent. During negotiations in 2008, ANPP voluntarily began paying $54 per acre-foot in a show of good faith. In 2009, a consensus was reached on a new agreement which took effect in 2010, extending the term of the agreement to 2050. The agreement sets the price of water at $58.57 in 2010 with a price escalator of 10.5% annually through 2025. ANPP is also making additional lump sum payments to SROG in the first four years of the agreement. By 2025, the cost of water will rise to $262 per acre-foot with CPI adjustments to occur starting in 2029.[30]

The original contract between ANPP and SROG resulted in significant savings for the operators of the Palo Verde Nuclear Plant because the price of effluent was capped at $30 per acre foot. Whether this was by design or was just a lack of foresight on SROG's part is unknown. In the early 1970s, alternate uses and costs of effluent may not have been available to properly price the water. In any case, the result was a significant subsidy to the operators of the nuclear plant.

The total amount of the subsidy to ANPP is difficult to quantify because the amount of water actually used by Palo Verde is not available. The first two generating units were built over a ten year period and began operating in 1986. The third unit was completed in 1988. The plant's maximum annual demand for water is now set at 105,000 acre-feet. If it is assumed that Palo Verde began taking its maximum water commitment of 105,000 acre-feet in 1984 at $30 per acre-foot and the price rose annually by the Western CPI, the total subsidy to Palo Verde would be $31.5 million through 2005 or $1.5 million per year (assuming that the maximum actual price of water was set at the contract ceiling of $30 per acre-foot).

Once again, whether by design or happenstance, the subsidy to ANPP was substantial. The situation has now been rectified. The new agreement assists in providing water to an essential component of the electric utility grid as well as providing the SROG cities with a secure and long term source of income and use of effluent.

Expensing and Depletion Credits for Coal, Oil and Natural Gas

The federal tax expenditures outlined earlier in the report also affect the state's income taxes. Federal adjustments on gross income affect Arizona's collection of income taxes. In 2012, approximately $140 million in estimated federal tax expenditures was attributed to the excess of percentage over cost depletion for fuels by individuals. Another $60 million was estimated for the expensing of exploration and development costs for fuel and $90 million for capital gains

[30] City of Scottsdale, "City Council Report: Public Services & Facilities", (April 13, 2010).

treatment of royalties on coal.[31] Expenditures claimed by corporations have been excluded because those numbers are not available.

Assuming that Arizona residents are able to claim deductions or capital gains for oil, gas and coal investments in proportion to Arizona's percentage of the U.S. population, the following table outlines deductions that would be made to the state income tax. These estimates may be optimistic since Arizona is not a significant producer of oil or coal and investors are more likely to be located in states where these resources are found. However, the estimate provides some scale to the potential impact of oil and coal investment on state taxes. The tax losses due to these investments would likely benefit individual investors and not be directly linked to the state's utility companies.

Deductions on Arizona State Income Taxes

Deductions	2012 U.S. Expenditures ($mil)	Arizona's Percent of U.S. Population	Deductions on AZ State Income Taxes ($mil)
Excess of percentage over cost depletion	$140	2.09%	$2.93
Expensing of exploration and development costs	$60	2.09%	$1.25
Capital gains treatment of royalties on coal	$90	2.09%	$1.88

Source: Nancy Pfund and Ben Healey; Anayltical Perspectives from OMB

3.4 Arizona Overview Conclusions

Many tax exemptions, deductions and credits described in this report are hidden within the state's tax code and very little has been published regarding the tax benefits bestowed on utility companies in Arizona. Many incentives have been in the tax code for decades and serve to reduce the utilities' costs of generating and transmitting electricity. As noted previously, the Arizona tax code has literally hundreds of similar expenditures that benefit a wide variety of industries and that are designed as incentives to create jobs and new industries in the state. The exemptions cited herein are those that benefit the energy and the electric utility industries in the state.

Research conducted for this study was not able to determine the historical origins of tax exemptions and credits for electric utility companies outlined above. Most were enacted in 1988, shortly after the start of operations at the Palo Verde Nuclear Plant. Whether they were enacted to promote this new energy source, or merely to reduce some of the costs absorbed by electric companies, is not known. However, clearly there are significant benefits bestowed on the electric utilities and, on a smaller scale, to the oil, natural gas and coal industries in Arizona.

[31] Office of Budget and Management, "Fiscal Year 2014 Analytical Perspectives", (2013).

The total average annual subsidy to electric utility companies in Arizona is approximately $67 million as shown on the following table (all dollar amounts have been adjusted to 2010 dollars to be consistent with the implicit subsidies estimated by Ben Healey). The total subsidies to the utility companies include the benefits of the Price-Anderson Act to the Palo Verde nuclear plant (as estimated by Ben Healey), the corporate income tax credit for taxes paid on coal used to produce electricity, and the tax exemption for machinery, equipment or transmission lines used in producing or transmitting electrical power. The subsidy for cooling water for Palo Verde is not included in the table since it is essentially extinguished at this time based on the new ANPP/SROG agreement. However, for more than 20 years, reduced water rates provided the Palo Verde Nuclear Plant with significant benefits.

Estimated Annual Subsidies to Arizona Utility Companies
(In 2010 $, Millions)

Subsidy Type	Estimated Annual Subsidy
Implicit Subsidies - Non-Renewable Energy Sources*	$18.39
Corporate Income Tax Credit on Taxes Paid on Coal Used to Generate Electricity	$1.13
Tax Exemption on Equipment & Machinery Used to Produce/ Transmit Electricity	$47.75
Total	**$67.27**

*Includes allocated federal subsidies for coal, natural gas, oil and the Price-Anderson Act.

Sources: Pfund & Healey, AZ Dept. of Revenue, Elliott D. Pollack & Co.

The total subsidy to electric utility companies in Arizona since 1985 is likely close to $1 billion. The implicit federal subsidy of approximately $460 million to Arizona utilities flows from tax laws and, most significantly, the Price-Anderson Act. The Arizona tax exemption on machinery and equipment used to produce and transmit electricity has been in effect for more than 20 years. Over the last six fiscal years, the exemption has resulted in an average annual tax expenditure to the state of $48 million in 2010 dollars (or $50 million in 2012 dollars as noted earlier). While tax expenditure data for this exemption is not available from the Department of Revenue before FY 2005, even if the annual expenditure was only approximately one-half of the current amount, or $25 million over the last 20 years, the total benefit to the state's utility companies would be $500 million. **Combined federal and state subsidies to the utility companies in Arizona are likely between $900 million and $1 billion since 1985.** This estimate does not include a variety of subsidies that cannot be calculated including those related to hydropower.

Concluding Thoughts

No emerging energy source in the history of the United States, be it biomass, coal, oil, gas, nuclear, hydro, biofuels, or renewables, has ever expanded and grown without substantial

support from federal and state governments. In fact, incentive periods regularly extend far beyond the period of transition from one fuel source to another.

This renders moot the argument that the marketplace should determine winners and losers in the energy field. Unconstrained energy markets have simply never existed in our country's history. The past is full of examples of massive subsidies to emerging fuels and technologies – subsidies that usually continue in perpetuity. Indeed, given the political realities, there will likely never be a level playing field in future energy markets.

As the country transitioned from one energy source to another, subsidies allowed a higher level of demand to be met at a lower cost. The transition to coal was a function of the industrial revolution, aided by subsidies. The transition to oil was a function of the automobile and the need for a cleaner energy source than coal, also aided by subsidies. The addition of hydro to the energy field was made possible by the public works projects created during the Depression. The transition to natural gas was substantially aided by technology created by research and development spending at the federal level on the jet and turbine engine. The move to nuclear energy was made possible not only by federal funding of research but also by the Price-Anderson Act. The movement to renewable energy sources will continue to occur because of federal government research and development, the continued decline in cost per kWh, and the need for cleaner fuels necessary to help the environment.

The Pfund-Healey study clearly shows that the level of subsidies for renewables is far smaller in terms of real dollars and as a percent of the federal budget than was the aid for non-renewable energy sources at the same point in their life cycle. It is also clear from the research outlined in this report that the debate should not be about the necessity for assistance from the federal and state governments but rather about the extent and continued timing of that assistance.

APPENDIX – Sources Consulted

The following sources have been utilized in the writing of this report:

Publications

1. Autumn Hanna and Benjamin Schrieber, the Green Scissors Campaign, "Green Scissors 2010", (2010).
2. Arizona Department of Revenue, "The Revenue Impact of Arizona's Tax Expenditures FY 2012", (November 15, 2012).
3. City of Scottsdale, "City Council Report: Public Services & Facilities", (April 13, 2010).
4. Eric Toder, The Brookings Institute, "Eliminating Tax Expenditures with Adverse Environmental Effects" (June 2007).
5. Gilbert E. Metcalf, MIT Joint Program on the Science and Policy of Global Change, "Federal Tax Policy Towards Energy", (January 2007).
6. Leah S. Glaser, Arizona State University, "Rural Electrification in Multiethnic Arizona: A Study of Power, Urbanization, and Change", (May 2002).
7. Marshall Goldberg, Renewable Energy Policy Project, "Federal Energy Subsidies: Not all Technologies are Created Equal", (July 2000).
8. Molly Sherlock, CRS, "Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures" (May 2, 2011)
9. Mona L. Hymel, Arizona Legal Studies, "Americans and their 'Wheels': A Tax Policy for Sustainable Mobility", (Feb 2006).
10. Nancy Pfund and Ben Healey, DBL Investors, "What Would Jefferson Do?" (September 2011).
11. Norman Myers and Jennifer Kent, International Institute for Sustainable Development, "Perverse Subsidies: How Tax Dollars Can Undercut the Environment and the Economy", (2001)
12. Nuclear Energy Institute, "Insurance: Price Anderson Act Provides Effective Liability Insurance At No Cost to the Public", (September 2012).
13. Office of Budget and Management, "Fiscal Year 2014 Analytical Perspectives", (2013).
14. Management Information Services, "Analysis of Federal Expenditures for Energy Development", (September 2008).
15. Thomas J. McCool, et. al., GAO, "Additional Petroleum Production Tax Incentives are of Questionable Merit" (July 1990).

Interviews

1. Arizona Corporation Commission
2. Arizona Department of Revenue
3. Arizona Governor's Office
4. Arizona Commerce Authority
5. Salt River Project (SRP)