

Energy and Economic Alternatives to the Desert Rock Energy Project



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Statement of Support from the Diné Policy Institute

"The Diné Policy Institute supports the efforts of Diné CARE in developing a better understanding as to how traditional Navajo principles on environment apply to current issues facing the Navajo Nation. This document is well researched with a lot of forethought and effort that is evident in its findings. We will be able to use some of the framework established in this report in the application of traditional Navajo principles to our forthcoming environmental work. We hope this report contributes to the future discussion of development and environmental policy on the Navajo Nation and will assist tribal leaders with making informed decisions on these matters."

--Andrew Curley and Moroni Benally, Diné Policy Institute

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Table 1. List of Acronyms Used in This Report

APS	Arizona Public Service
BAT	Business Activity Tax
BHP	BHP Navajo Coal Company
BIA	Bureau of Indian Affairs
Btu	British thermal unit--the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.
CI	Confidence Interval
CIGS	Copper Indium Gallium Selenide
CO	Carbon Monoxide, a common air pollutant
CO₂	Carbon Dioxide, the most common greenhouse gas
CoP	Conoco-Phillips
COPD	Chronic Obstructive Pulmonary Disease
COUP	Council on Utility Policy
CPUC	California Public Utilities Commission
DOE	U.S. Department of Energy
DPA	Diné Power Authority
DPT	Distributed power towers
DSM	Demand side management
EME	Edison Mission Energy
EPA	U.S. Environmental Protection Agency.
ESPs	Cold-side electrostatic precipitators, a device used to remove pollutants from power plant emissions.
FGD	Flue gas desulfurization units, used to remove sulfur from coal plant emissions.
GE	General Electric
GIS	Geographic Information Systems
GW	Gigawatt(s): one billion Watts
GWh	Gigawatt-hour: a unit of energy equal to one billion watts * one hour
Hg	Mercury
IGCC	Integrated Gasification Combined Cycle
IPCC	Intergovernmental Panel on Climate Change
ITC	Investment Tax Credit: a 30% federal energy investment tax credit for the installation of renewable energy systems (primarily solar) by homeowners and businesses. After December 31, 2008, the credit reverts to a permanent 10% level unless amended by Congress.
JEDI	Job and Economic Development Impact
kV	Kilovolt(s)
kW	Kilowatt(s): one thousand Watts
kWe	Kilowatts electric; used herein, same as kilowatts

kWh	Kilowatt-hour: a unit of energy equal to one thousand watts * one hour.
LCOE	Levelized Cost of Electricity
LLC	Limited Liability Corporation
MIT	Massachusetts Institute of Technology
MSR	MSR Public Power Agency, formed by the cities of Modesto (M), Santa Clara (S), and Redding (R)
MW	Megawatt(s): one million Watts
MWh	Megawatt-hour: a unit of energy equal to one million watts * one hour
NAU	Northern Arizona University
NEA	Northwest Economic Associates
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NO_x	Nitrogen oxides, a group of common air pollutants
NREL	National Renewable Energy Laboratory
NTUA	Navajo Tribal Utility Authority
PC-SC	Pulverized coal, super-critical
PC-sub	Pulverized coal, sub-critical
PG&E	Pacific Gas & Electric Company
PIT	Possessory Interest Tax
PM	Particulate matter, usually divided into "large" particles 10 micrometers in diameter or smaller, and "small" particles, 2.5 micrometers in diameter or smaller.
PNM	Public Service New Mexico
PTC	Production Tax Credit: a federal tax incentive that is granted primarily to private sector owners of wind farms. The PTC has expired three times in the past decade and has then been renewed. Extension of the PTC was excluded from the 2007 federal Energy Bill, but will likely be reintroduced in federal legislation in 2008.
PV	Photovoltaic
RPS	Renewable portfolio standards
SCE	Southern California Edison
SO_x	Sulfur oxides, a group of common air pollutants
SRP	Salt River Project
SWEEP	Southwest Energy Efficiency Project
TEP	Tucson Electric Power
TFS	Thin film solar
TS&M	Transport, storage and monitoring
TXU	TXU Energy Corporation, a utility in Texas
WGA	Western Governors' Association

1. INTRODUCTION

This alternative study comports with Diné Beehazáanii, Diné Fundamental Laws (Resolution No. CN-69-02) based on Diné CARE's interpretation and applicability of fundamental principles through analogies. The Diné Fundamental Laws precede the Diné Natural Resource Protection Act (DNRPA), which codified elements of fundamental laws to ban uranium mining and its associated activities on Navajo lands in 2005. DNRPA explicitly recognized and asserted elements and concepts from Nahasdzáán dóó Yádilhił Bitsaadeę Beenahaz'áanii--Diné Natural Law (1 N.N.C. § 205); concepts that, Diné CARE believes, are applicable to all types of Natural resource extraction, whatever supply they may be. Diné history shows that mining activities are equally destructive and they cause irreparable harm to the health of the Navajo people and the environment. The influence and imposition of western economics and its practices on the Navajo Nation since the 1920s has proven to be obsolete, invoking the tribe to juxtapose the current paradigm of fossil-fuel development to the discourse of sustainable alternatives on the Navajo Nation.

DNRPA and its incorporation of Diné Fundamental Laws to ban uranium activities make evident the need for Navajo energy development and economy to be “rebalanced” through the traditional concept of Alch'į Silá,¹ rectifying the historical trauma of energy development and mining with sustainable renewable technologies in accordance with foundational principles. The practical means to shift this paradigm is a process that manifests the traditional Navajo concept of “atonement,” where counterbalancing bipolar opposites leads to beauty, balance, and sustenance. In this report, we envision a path of development for the Navajo Nation that is economically and culturally sustainable; one which counterbalances obsolete coal development and overwhelmingly invokes the Navajo Nation to invest in a healthy future for the Diné between the Four Sacred Mountains.

In the Diné Life Way, we have the responsibility to maintain Hozhó.² Everything comes in pairs and bipolar opposites counterbalance each other as insinuated within the Navajo concept of Alch'į Silá. To illustrate, in the Diné language, the environment is called “Nahasdzáán dóó yádilhił.”³ This definition implicates Mother/Father, male/female, up/down, Earth and Sky; these opposites are not mutually exclusive but they relate to each other and are interconnected to maintain equilibrium. This state of balance leads to sustenance, creation, and the concept of k'é⁴; that everything relates to another and nothing is independent in and of itself.

The k'é principle is overly important in the context of Nahasdzáán dóó yádilhił in that at its epicenter is the manifestation of individual, family and community. Section D of Nahasdzáán dóó Yádilhił Bitsaadeę Beenahaz'áanii—Diné Natural Law (1 N.N.C. § 205) states that “Mother Earth and Father Sky is part of us as the Diné and the Diné is part of Mother Earth and Father Sky.” An individual therefore thinks about the future of his or her

¹ Roughly translated as “They face/relate each other”

² Translated as “Beauty and balance”

³ Roughly translated as “Mother Earth” and “Father Sky.”

⁴ Roughly translated to mean “relations.” The k'é concept is the main stalk of the Diné Fundamental Laws.

family and Nít�áhákees⁵ evolves into sustainable concepts and practices. “Living in Hozhó” has preserved Diné culture, language, and natural economy since the dawn of time; the Diné depend on hozhó to maintain healthy⁶ existence.

Diné historiography reveals that the “inverse relationship, where American economic gains are indigenous economic losses [...] entailed either sufficiently disabling or destroying [indigenous] sustainable economies.”⁷ Given that the Navajo Tribal government has thus far embarked on the pathway of western economics and energy development through natural resource extraction, the tribe’s economic gain from such pursuits has come at the expense of its constituents and the traditional Diné economy.

The Diné Natural Resource Protection Act of 2005 codified several concepts and elements of Nahasdzáán dóó Yádilhił Bitsaadeę Beenahaz’áanii--Diné Natural Law (1 N.N.C. § 205) to effectively ban uranium mining on Navajo land, citing these laws specifically to protect the environment and the Diné from “certain substances in the Earth (doo nal yee dah) that are harmful to the people [which] should not be disturbed [...]”⁸ Coal extraction, when compared to Uranium mining, is equally destructive to the health and environment of the Diné. It becomes clear that western energy development in the practice of Tribal government, sovereignty, and politics has wrought irreparable harms to the human, social, and economic balance of the Navajo Nation in relation to the environment. The ill conditions that it creates are in fact referenced in Diné Creation stories and beliefs, mandating that the Diné have a sacred responsibility to rectify the forbidden practices on Nahasdzáán dóó yádilhił;

As the fourth set of laws, to exercise life and culture, the Earth-Surface-Holy-People, Nohookáá Diyin Dine’é, were created to dwell in the Dark World with the guidance of Holy People. They were allowed to alter or balance the nature of the environment or surrounding to meet their way of life with the help from the foremost Holy People.

As the time went on, based on the practices of readjustments and balancing, some went out of control and abused their freedom and powers, which caused the supernatural alternations in the Dark, Blue, and Yellow Worlds. The result of the forbidden wickedness in the Yellow World appeared and developed into the supernatural evils causing supernatural disorders and ordeals in the White World. [...]

Thus, the Earth-Surface-Holy-People conducted various sacred healing and the blessing ceremonies with the guidance from the Holy People, which lead to the establishments of certain moral guiding principles for the future to be free of the legacy of historical catastrophes.⁹

⁵ Roughly translated as “thinking.”

⁶ “Healthy” is the state of mental, spiritual, and physical well-being for humans, community, tangible, and intangible surroundings. Navajo Health is not measured in terms of western science but is conceptualized as the balanced condition of existence. See Section 3: “Desert Rock Health Impacts.”

⁷ Churchill, Ward. *Struggle for the Land: Indigenous Resistance to Genocide, Ecocide, and Expropriation in Contemporary North America*. Monroe, Maine: Common Courage Press, 1993; cited in Valandra, Edward C. “Rethinking Indigenous Underdevelopment in the United States.” *Wicazo Sa Review* 12(1997): 111-142.

⁸ Navajo Nation Code, 18 Section 1301, pg. 798

⁹ Barber, Henry. *Navajo Common Law Project*. Window Rock, Arizona: Office of the Speaker, Navajo Nation Council, 2002. 8.

The alternative scenario presented in this report is thus structured in the spirit of “áná’áál’íí, nítł’iiz níná’nil,” “Atonement by putting things in place”¹⁰ “through the proper protocol of respect and offering.”¹¹ This must occur through the concept of Alch’í Silá, “everything comes in pairs.” The environmental wounds and historical trauma incurred from western energy objectives (mining) must be counterbalanced with sustainable technologies, energy policies, and environmental protections which promote a healthy economy and shift the Navajo Nation’s energy paradigm towards decentralized renewable energy practices.

The proposal from Sithe Global Power, LLC, Diné Power Authority (DPA), and the Bureau of Indian Affairs (BIA) to build the Desert Rock coal-fired power plant south of Farmington, New Mexico on Navajo lands has been insufficiently examined as a possible economic development option for the Navajo Nation concerning their energy resources. It has initiated an important, long-overdue dialogue within the region about the need for greater economic prosperity and opportunity among the Navajo, and the role energy development can play in that vital human need. Having initiated that dialogue, the Draft Environmental Impact Statement (EIS) released in May 2007 for the Desert Rock Energy Project is incomplete and insufficient, in that it does not give sufficient considerations to alternatives to mining and burning coal.

The Navajo reservation is the largest reservation in the United States, both in terms of population and land area,¹² and there are many other energy resources that are available within its borders which are more sustainable and more economically viable when compared to obsolete coal development activities. Utilizing alternative resources such as wind, solar, and currently-available natural gas would bring many economic benefits to the Navajo Nation, without the detrimental consequences of a coal plant, such as air pollution, mercury emissions, health problems, “boom and bust” jobs, premium prices for “green power,” and the loss of potential tax revenue.

The Draft EIS devotes approximately two of its 1,500 pages to an analysis of alternative sources of energy, concluding that:

The BIA has determined that the use of alternative energy sources would not meet the purpose and need for the project [i.e. economic development through sale of Navajo Nation coal resources] or were otherwise unfeasible. Therefore, the BIA determined this was not a reasonable alternative and it was eliminated from detailed evaluation.¹³

¹⁰ Roger Begay, Biculture Training Manager for the Peace Making Program- Judicial Branch of the Navajo Nation, offered this concept to state that the Diné have offerings, ceremonies and prayer to rectify human “wrongdoings” to the environment and our surroundings. Begay notes that the Navajo deities did not give the Diné “knowledge to mine uranium, coal, and oil” so that proper conduct (“putting things in place”) and accordance with Fundamental Laws will help “put things into perspective within the universe.”

¹¹ Roger Begay of Center for Diné Studies at Diné College, offered this interpretation at the 2007 Navajo studies Conference in Tsaile, Arizona, cited in Andrew Curley, “Uranium, Coal and the Logic for Non-Withdrawal: The use of traditional principles in natural resource policy and governance on the Navajo Nation,” 2007. Diné Policy Institute.

¹² Mills, Andrew D. “Wind Energy in Indian Country: Turning to Wind for the Seventh Generation.” Berkeley: University of California. 2006.

¹³ URS, *Draft Environmental Impact Statement: Desert Rock Energy Project*, May 2007, p. 2-33.

With these words, the Draft EIS devotes no further attention to the availability, cost, or economic development aspects of solar, wind, and other alternative energy possibilities. BIA effectively asserts that any relevant economic development project must develop Navajo Nation coal resources, rather than asking the question, “Which energy resources should the Navajo Nation develop to maximize economic opportunity for its people?” or even “What plans and scenarios for economic development would provide the most jobs and economic multipliers with the least severe negative impacts?”

The Draft EIS also does not consider the economic or environmental dimensions of utility-funded efforts to reduce the demand for electricity more cheaply than new supply, even though such programs already receive more utility funding across the nation each year than Desert Rock’s proposed construction cost. Energy efficiency delivers energy savings at 30 to 50% of the cost of Desert Rock’s power.

The Draft EIS for the proposed Desert Rock facility is neither an honest scientific inquiry in the spirit of the National Environmental Policy Act¹⁴ (NEPA) nor an “alternatives analysis” worthy of the name – it is an after-the-fact justification of a pre-determined course of action.

As required by NEPA, the Draft EIS for the proposed Desert Rock facility should fully document and analyze alternative scenarios whereby various mixes of renewable energy resources and energy efficiency options are combined to deliver annual energy and long-term economic development equivalent or superior to Desert Rock. These scenarios should be modeled for their environmental and economic impacts, and compared as true alternatives to Desert Rock.

In order to demonstrate the insufficiency of the Draft EIS, Ecos Consulting provides one such illustrative scenario. The Draft EIS is deficient in that it does not compare the potential environmental and economic impacts of multiple, viable, alternative scenarios for energy and economic development for the Navajo Nation.

¹⁴ Section 102 of the National Environmental Policy Act calls for an investigation of alternatives for projects in the Environmental Impact Statement.

2. DESERT ROCK PROJECT SUMMARY

2.1. Desert Rock

Desert Rock Energy Company LLC (an affiliate of Sithe Global Power LLC), Diné Power Authority (DPA), and BHP Navajo Coal Company (BHP) are proposing to construct the Desert Rock Energy Project (Desert Rock), a coal-fired power plant on Navajo land to the southwest of Farmington, New Mexico in the area known as the Four Corners. This plant is one of two proposed coal-fired generation facilities in New Mexico and 19 proposed in the region. The proposed 1,500 megawatt (MW) Desert Rock coal plant would consist of two 750 MW pulverized coal boilers. In the immediate vicinity of the proposed Desert Rock facility, two aging coal-fired plants (Four Corners power plant and San Juan Generating Station) are currently operating at a total of 3,840 MW of capacity. Including the proposed Desert Rock plant, all three of these plants would operate within 30 miles of Farmington, NM, the largest population center in Northwestern New Mexico (see FIGURE 1).

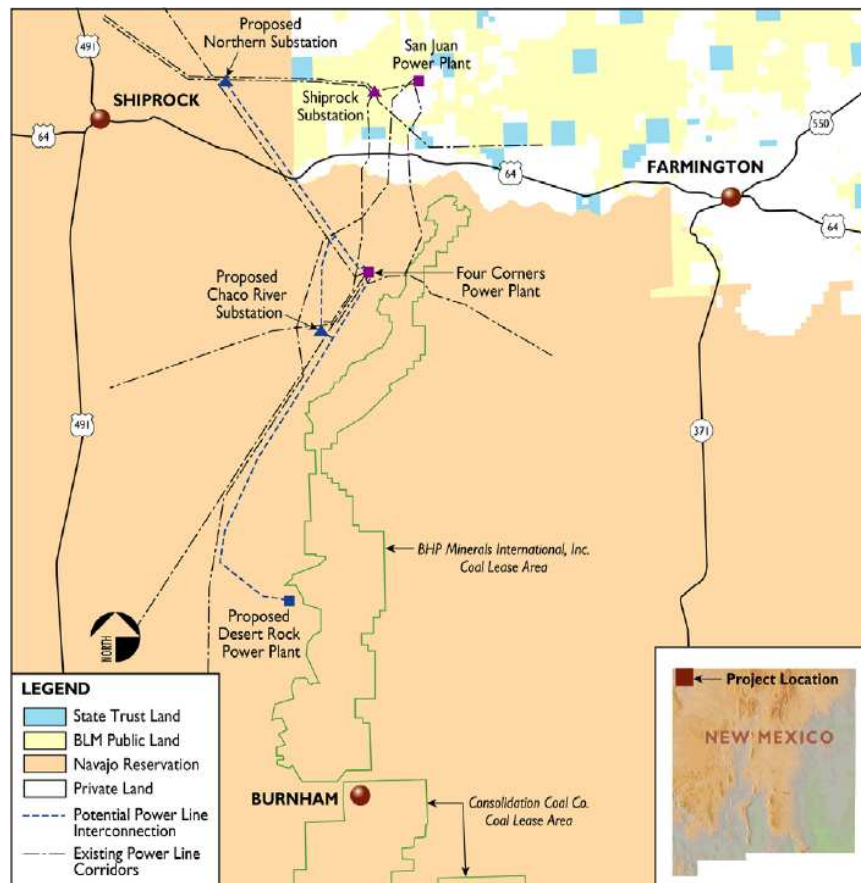


FIGURE 1. Proposed Desert Rock Facility Area Map¹⁵

¹⁵ Presentation Prepared for Office of Energy Efficiency and Renewable Energy Tribal Energy Program. Diné Power Authority. 20 October 2004.

2.2. Nearby Coal-Burning Facilities

The two aging plants in the vicinity of the proposed Desert Rock plant (San Juan and Four Corners coal plants) with capacities of 1,800 and 2,040 MW, respectively are co-owned by regional utilities. San Juan Generating Station consists of 4 units, the first of which was built in 1973. Four Corners power plant originally began operation in 1963 and is now the site of 5 units. The output power from both coal plants is delivered primarily to Public Service New Mexico (PNM), Arizona Public Service (APS), Tucson Electric Power (TEP), Southern California Edison (SCE), Salt River Project (SRP), Southern California Public Power Authority, and MSR Public Power Agency. Each of these facilities is somewhat larger than Desert Rock in total annual electrical production:

Table 2. Local Coal Plant Characteristics – Annual Electricity Production¹⁶

Plant Name	Net Generation (MWh)
San Juan	12,466,870
Four Corners	15,969,176
Desert Rock	10,769,000

2.3. Regional Proposed & Existing Coal Plants

On a regional scale, the interior southwest (NV, UT, AZ, CO, NM) is home to 33 existing coal plants and an additional 19 plants have been proposed to date.¹⁷ About 61% of local electric generation is powered by coal, as compared to an average of 50% across the nation. Existing regional coal plants generate approximately 319,000 gigawatt-hours (GWh) of electricity and 400 million tons of carbon dioxide (CO₂) annually. The new plants in New Mexico would increase the state's CO₂ emissions by 36% and are equivalent to putting over 2 million new cars on the road. The Desert Rock project would emit 12.7 million tons of CO₂ per year, and if built, would result in a 15% increase in the state of New Mexico's overall emissions of CO₂.¹⁸

Large utilities in Arizona and Nevada are Sitrh Global Power's primary targets for power sales from the proposed merchant plant, Desert Rock. Coal is the primary source of anthropogenic CO₂ emissions within the region's energy sector, and it faces great financial exposure to the carbon taxes, emissions caps, and other policy mechanisms under consideration by the Western Governor's Association (WGA), state legislatures, and the United States Congress. WGA has set a goal of bringing 30,000 MW of new clean energy online by the year 2015 and increasing energy efficiency 20% by the year 2020.¹⁹ Desert Rock furthers neither of these goals, and actually aggravates the problem of stabilizing the region's CO₂ emissions.

¹⁶ San Juan & Four Corners data obtained from *Dirty Kilowatts: America's Most Polluting Power Plants*, Environmental Integrity Project. July 2007. <http://www.dirtykilowatts.org/Dirty_Kilowatts2007.pdf>. Desert Rock generation capacity calculated from numbers given in the Draft EIS.

¹⁷ Milford, Jana, Nancy Spencer, Carly Gilbert, John Nielsen, Vickie Patton, *Climate Alert: Cleaner Energy for the Southwest*, Environmental Defense and Western Resource Advocates, 2007.

¹⁸ Holmes, Sue Major. "Richardson Questions Desert Rock." *The Durango Herald*. 28 July 2007. 1+.

¹⁹ "Highlights." Western Governors Association. 9 August 2007. <<http://www.westgov.org/>>.

Until recently, power plant development in the U.S. was heavily focused on natural gas due to its availability, pricing, and potential as a peaking resource. Despite this trend, coal remains the primary energy source for each state in the interior southwest region. Table 3 shows each state's total generation, capacity breakdown, and coal share from 2004.

Table 3. Interior Southwest Energy Generation from Coal²⁰

State	Total Generation (GWh)	Annual Coal Generation (GWh)	Coal as % of Total Generation	Existing Coal Plants	Coal Nameplate Capacity (MW)
Arizona	103,747	40,443	39%	7	5,861
Colorado	47,362	34,398	73%	15	5,308
Nevada	23,037	6,440	28%	3	2,769
New Mexico	34,368	29,857	87%	4	4,382
Utah	38,303	35,158	92%	7	5,022
Total	246,817	146,297	59%	36	23,343

The interior southwest is home to some of the fastest growing cities in the United States. Increasing population, growth in housing stock, and new commercial and industrial enterprises, and expanded use of air conditioning are among the drivers of the forecasted growth in energy load. A number of utilities and private project developers have proposed new power plants in the southwest region to meet consumer demand. Table 4 shows a detailed list of the current coal plant proposals. FIGURE 2, on page 7, indicates their approximate locations.

Table 4. Detailed Characteristics of Proposed Regional Coal Plants²¹

State	Location / Name	Sponsor	Size (MW)	Type	Timing
Arizona	Springerville IV	Tucson Electric Power	400	Conventional	2009
Arizona	Bowie	Southwestern Power Group	600	IGCC	2012
Colorado	Limon	Radar Acquisitions Corp/Kiewit	400-500	Conventional	TBD
Colorado	Colorado Springs	DOE / Foster Wheeler	150	CFB	2008
Colorado	Southeast	Tri-State Gen & Trans	1,000	Conventional	2011
Colorado	TBD	Xcel Energy	300-350	IGCC	TBD
Colorado	Lamar	Lamar L&P / Ark River Power Authority	39	Conventional	TBD
Colorado	Pueblo	Xcel Energy	750	Supercritical	2009
Nevada	Gerlach	Sempra / Granite Fox Power	1,450	Supercritical	2010, 2011 (725 MW each)
Nevada	Dunphy	Newmont Mining Corp	200	Conventional	2008
Nevada	East of Reno	Barrick Gold	115	Conventional	TBD
Nevada	Mesquite	Sithe Global	750	Conventional	2011
Nevada	White Pine	LS Power Assoc / White Pine Energy	500	Conventional	2010
Nevada	Ely Energy Center	Sierra Pacific Resources	2,500	Supercritical	2011 & 2013 (725), TBD (1,000)
New Mexico	Farmington	Sithe Global / DPA	1,500	Conventional	2010
New Mexico	Milan	Peabody Energy / Mustang Energy	300	Conventional	2006
Utah	Emery	PacifiCorp	850	Conventional	2009
Utah	Delta	Intermountain Power	950	Conventional	2008
Utah	Sigurd	Nevco Energy	270	CFB	2008

This information is included here in some detail because the Draft EIS for Desert Rock lacks any sort of discussion about the cumulative environmental impacts that would result

²⁰ Total Generation taken from EIA data from EIA-906/920. Generation and Fuel Data 2006. <http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html>.

²¹ *Climate Alert: Cleaner Energy for the Southwest*, 2007, p. 6.

from some, most, or all of these projects being approved. As a result, individual EIS documents for each project could assert that their individual contribution to air quality and climate change problems is modest by itself, and the federal government could choose to approve many or all of them. Only later would it become apparent that their total energy production greatly exceeds the regional need for new power, their total emissions cause major portions of the southwest to drop out of compliance with air quality regulations, and that their total CO₂ emissions would make compliance with individual state and regional climate stabilization targets impossible. The Draft EIS for the proposed Desert Rock plant should be revised to assess these cumulative impacts.

Table 5 shows the proposed capacity by individual southwestern state.

Table 5. Proposed Coal Capacity by State ²²

State	Current Coal Plant Proposals	Proposed Capacity (MW)
AZ	2	818
CO	6	2,714
NV	6	5,615
NM	2	1,800
UT	3	2,070
Total SW	19	13,017
Total US	151	89,570

In terms of CO₂ emissions, the proposed capacity in this region is equivalent to putting over 16 million new cars on the road. The amount of CO₂ emissions would increase dramatically if the proposed plants are developed, as shown in Table 6.

Table 6. CO₂ Emissions from Proposed Coal Plants ²³

State	Proposed Capacity (MW)	Estimated CO ₂ Emissions (MMT)	% increase in state CO ₂ emissions
AZ	818	8.4	17%
CO	2,714	10.8	27%
NV	5,615	36.8	145%
NM	1,500	12.7	36%
UT	2,070	12.9	37%

For a full perspective on the possible future of coal in the region, existing and proposed coal plants are displayed in **FIGURE 2**. This region is already heavily reliant on the most polluting fossil fuel – coal – for its electricity needs, and will only become more so if Desert Rock and other similar proposed projects are constructed.

²² NETL Presentation, Resurgence of Coal: <<http://www.netl.doe.gov/coal/refshelf/ncp.pdf>>. Slide 7

²³< <http://www.westernresources.org/media/pdf/ClimateAlertReport.pdf>> (The WGA report showed estimated emissions from the proposed Desert Rock plant as 10.5 MMT, which has been corrected here to correspond with the Draft EIS.

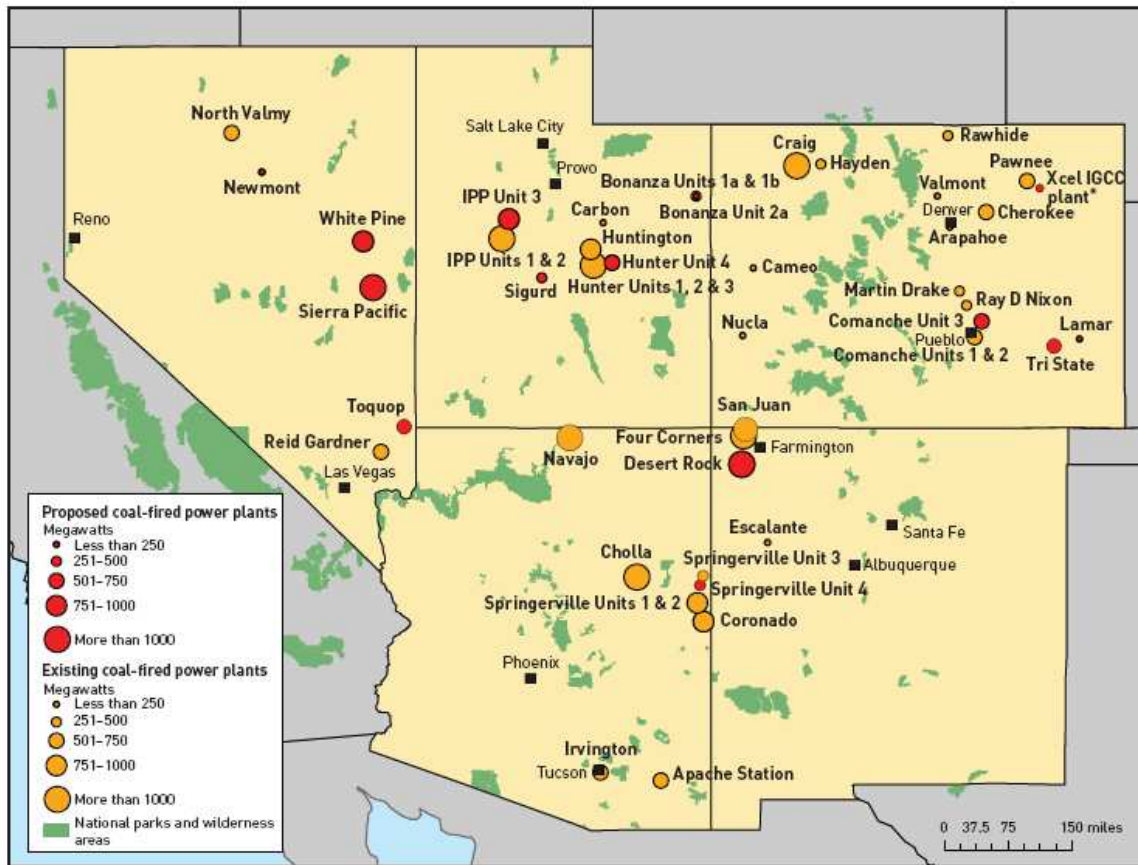


FIGURE 2. New and Existing Coal Plants in the Southwest²⁴

²⁴ *Climate Alert: Cleaner Energy for the Southwest*, 2007, p. 3.

<<http://www.westernresources.org/media/pdf/ClimateAlertReport.pdf>>.

3. DESERT ROCK HEALTH IMPACTS

3.1. Health Care Costs

“Individual health” in Navajo culture is understood within the context of Hozhó²⁵ and k’é²⁶; a complex balanced and interconnectedness of an individual’s relation to, but not limited to, the human, physical, intangible, spiritual, and cultural environment. The “collective health” of a community is thus not conceptualized and limited to quantifiable measurements of respiratory health and other medical conditions but how the individuals who make up the group relate to each other, their surroundings and the environment.

Health, when conceptualized through Nítsáhákees²⁷ and Hozhó is understood as a type of vertical relationship, where “thoughts are like invisible rays to the sun, beginning from the feet up.”²⁸ The analogy of the corn lifecycle illustrates this concept through healthy germination, growth, and the production of corn pollen which is utilized in Diné ritual and ceremonies. The Diné therefore interact and relate to their environment in respectfully ways, “balancing” their relations to create the conditions where one “walks in beauty,” has a healthy body and thus a good mindset. Maintaining individual, community, and environmental health are implicated in the Hózhóójí, Blessingway ceremony, which is the main stalk ceremony protected in Section B of the Diné Natural Resource Protection Act of 2005;

The Navajo Nation Council finds that the Fundamental Laws of the Diné (Diné Bi Beenahaz’annii), as set forth in Resolution No. CN-69-02, support preserving and protecting the Navajo Nation’s natural resources, especially the four sacred elements of life—air, light/fire, water, and earth/pollen—for these are the foundation of the peoples’ spiritual ceremonies and the Diné life way, and that it is the duty and responsibility of the Diné to protect and preserve the natural world for future generations.²⁹

“Health” therefore is the balanced condition of spatial, spiritual, tangible/intangible, and interconnected relationships. It could be argued in the context of Hózhóójí, the Beauty Way, that individual/community health, therefore the Diné life way and existence, is ceremonial, sacred, and is not consistent with coal-fired power plants.

The Desert Rock plant is one of several proposed coal facilities in the Southwest. If all of these facilities are constructed, their added emissions will only exacerbate the already high statewide health care costs, and more so for the growing elderly population in many states.

There are significant health effects related to mining and burning coal which include heart attacks, strokes, chronic bronchitis, asthma, reduced lung function, cancer, and other

²⁵ Translated as “Beauty and balance”

²⁶ Roughly translated to mean “relations.” The k’é concept is the main stalk of the Diné Fundamental Laws.

²⁷ Roughly translated as “thinking.”

²⁸ Roger Begay, Biculture Training Manager for the Peace Making Program, offered this interpretation to emphasize the ‘vertical’ thinking process of the Diné when compared to the linearity of western ideals and culture. Begay states that the Diné think of Nahasdzáán first.

²⁹ Navajo Nation Code, 18 Section 1301, pg. 798.

cardiovascular events; emissions of mercury and other heavy metal toxicity which cause significant neurological issues, particularly in infants and children. These effects will be marked in the local Native American population. Local prevailing winds and frequent high pressure inversion weather conditions will cause these emissions to spread hundreds of miles from the coal plant, reaching residents of the region and visitors to nearby public lands.

Air is part of the complex element and concept “Níłch’í,”³⁰ Wind and Wind Spirit, and they are distinguished in the context of the Diné creation story;

Over the ears of the corn [Hastséyaltsi]³¹ laid the other sacred buckskin with its head to the east, and then Níłtsi [sú], the Wind, entered between the skins. [...] When [Hastséyaltsi] looked the fourth time, he saw that the white ear of corn was changed to a man, and the yellow ear to a woman. It was Níłtsi who gave them the breath of life. He entered at the heads and came out at the ends of the fingers and toes, and to this day we see his trail in the tip of every human finger.³² [...] It is the wind that comes out of our mouths now that give us life. When this ceases to blow we die [...] it shows us where the wind blew when our ancestors were created.³³

Air is distinguished by inhalation and exhalation. “Níłch’í bee iinááni,” “the breath of life,” is the intake of air that gives and sustains all life. “Hayool,” breath, is the exhalation of air which is Níłch’í and also life-giving. Human, animal, and environmental sustenance therefore require both types of air that “give life.” Other elements which do not “give life” leads to the cessation of all life forms, spanning from the micro- to macroscopic, metaphysical, and spiritual environments.

Section B of the Diné Natural Resource Protection Act of 2005 implicates that air as “lifegiver” be protected and recognized from Nahasdzáán dóó Yádilhil Bitsáádeę Beenahaz’aanii--Diné Natural Law (1 N.N.C. § 205). Environmental pollutions and energy development projects which release “certain substances in the Earth (doo nal yee dah) that are harmful to the people [which] should not be disturbed [...]”³⁴ Toxins and air emissions from coal-based projects that do not “give life” therefore calls for alternative energy projects that sustain all life forms and eliminate the chances that health defects may cause imbalances.

We estimate current health care costs borne by the Navajo for cardiovascular diseases, strokes, and asthma at approximately \$200 million per year, as a population-weighted share of the national total. Each of these conditions can be aggravated by exposure to pollutants from power plants or dust from coal mining. The Draft EIS makes no attempt to describe or quantify in dollar amounts how the health care costs paid by the Navajo Nation will increase due to the negative environmental impacts of Desert Rock.

The Navajo make up 10% of the population of New Mexico (181,269 Navajo in NM, Year 2000), with 47.1% of those individuals falling in the age bracket of 21-64 years old.³⁵ By

³⁰ See Section Section 6.2: “Wind”

³¹ “Talking God.”

³² Matthews, Washington. *Navajo Legends*. Salt Lake City: University of Utah Press, 1994. 137

³³ Ibid. 69

³⁴ Navajo Nation Code, 18 Section 1301, pg. 798

³⁵ US Department of Commerce, US Census Data – Projections 2000-2030.

contrast, more than half of the Navajo population consists of either children or the elderly and they comprise the groups most immediately vulnerable to the health effects of coal-burning facilities, especially those individuals with pre-existing chronic pulmonary or cardiovascular medical conditions. Younger residents will face more cumulative exposure to Desert Rock's emissions over its expected 50 year lifetime, while older residents would be at greater risk of near-term mortality from the plant's emissions. If anything, the elderly are expected to become an ever-larger share of the region's population in coming decades (rising from 11.7% to 26.4% of the population in New Mexico by 2030).³⁶

The air emissions of greatest concern here are sulfates (SO_x), nitrates (NO_x), carbon monoxide (CO), mercury, fine particulate matter (PM_{2.5}), and large particulate matter (PM₁₀). Air quality data from the two current plants in the Four Corners Area (San Juan and Four Corners) are shown below in Table 7.

³⁶ Ibid.

Table 7. Annual Air Emissions from San Juan and Four Corners Coal Plants ³⁷

Types of Air Emissions	Combined Emissions from San Juan and Four Corners Coal Plants	Expected Emissions from the Desert Rock Project
CO	4,122 tons	5,526 tons
SO ₂	30,173 tons	3,315 tons
NO _x	72,151 tons	3,315 tons
Mercury	1,246 pounds (0.7 tons)	153 pounds (0.08 tons)
PM _{2.5}	3,769 tons	862 tons
PM ₁₀	1,939 tons	1,105 tons

These pollutants are of significant concern because of the role they play in environmental degradation and/or their risk to human health. SO_x, for example, turns into acid rain and pollutes waterways. NO_x is a major precursor to smog. Mercury is a toxic heavy metal which accumulates in land, sediments, and wildlife (especially fish) over time, leading to resulting human exposure. PM_{2.5} is associated with asthma,^{38, 39, 40} Chronic Obstructive Pulmonary Disease (COPD), chronic bronchitis, and cardiac events.^{41, 42} PM₁₀ has been associated with more distant effects, which include the increased risk of death and hospitalization from congestive heart failure and cardiac events. Research shows that cardiovascular risk is exacerbated with exposure to PM_{2.5}, with higher risk factors for women and individuals with diabetes. With exposure to PM_{2.5} and other elements in smog (sulfates, nitrates, and ozone), the risk of mortality for men over 65 is 24% higher than average and almost 80% higher for women over 65.^{43, 44, 45} The average number of life-years lost by individuals dying prematurely from exposure to particulate matter is 14 years.⁴⁶ The air

³⁷ For Desert Rock Emissions, See Desert Rock Draft EIS, p. 4-11 (projected estimates). As stated in the Draft EIS, p. 4-10, PM_{2.5} is calculated as 78% of total PM₁₀ emissions. For Combined San Juan and Four Corners Emissions, see the Draft EIS, p. 3-21 (2002-2004 historic estimates) for CO, PM_{2.5}, and PM₁₀. For SO₂, NO_x, and Mercury emissions, see www.dirtykilowatts.org.

³⁸ Romieu, I, Meneses, F, Ruiz S, Sienra JJ, Huerta, J, White, MC, Etzel, RA, Effects of Air Pollution on the Respiratory Health of Asthmatic Children Living in Mexico City; *Am J of Resp and Crit Care Med*. Aug 1996; 154(2): 300-307.

³⁹ Gauderman, WJ, Gilliland, GF, Vora, H, Avol, E, Stram, D, McConnell, R, Thomas, D, Lurman, F, Margolis, HG, Rappaport, EB, Berhane, K, Peters, JM, Association Between Air Pollution and Lung Function Growth in Southern California Children, *Am J of Resp and Crit Care Med*. 2002; 166: 76-84.

⁴⁰ Ambient Air Pollution; Health Hazard to Children, Committee on Environmental Health, American Academy of Pediatrics; *Pediatrics* 2004; 114: 1699-1707.

⁴¹ Brook, RD, Franklin, B, Cascio, W, Hong, Y, Howard, G, Lipsett, M, Luepker, R, Mittleman, M, Samet, J, Smith, C Jr, Tager, I, Air Pollution and Cardiovascular Disease: A Statement for Healthcare Professionals from the Expert Panel on Population and Prevention Science of the American Heart Association; *Circulation* 2004; 109: 2655-2671.

⁴² Zanobetti, A, Schwarz, J, Dockery, DW, Airborne Particles Are a Risk Factor for Hospital Admissions for Heart and Lung Disease; *Environ Health Perspect* 2000; 108: 1071-1077

⁴³ Peters, A, Dockery, DW, Miller, JE, Mittleman, MA, *Circulation* 2001, June 12; 103(23): 2810-5.

⁴⁴ Miller, KA, Siscovick, DS, Sheppard, L, Shepherd, K, Sullivan, JH, Anderson, GL, Kaufman, JD, Long Term Exposure to Air Pollution and Incidence of Cardiovascular Events in Women, *NEJM* 2007 Feb 1; 356(5): 447-58.

⁴⁵ O'Neill, MS, Veves, A, Sarnat, JA, Zanobetti, A, Gold, DR, Economides, PA, Horton, ES, Schwarz, J, Air Pollution and Inflammation in Type 2 Diabetes: A Mechanism for Susceptibility, *Occupational and Environmental Medicine* June 2007; 64: 373-379.

⁴⁶ "Dirty Air, Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants." Clean Air Task Force. June 2004. <<http://www.catf.us/publications/view/24>>.

pollution control system proposed for Desert Rock is designed to primarily capture larger particulate matter (PM₁₀) leaving the much more harmful PM_{2.5} particles to impact the lungs and airways of people located hundreds of miles away.⁴⁷

The Draft EIS for the proposed Desert Rock plant fails to address these issues of health and human exposure to pollutants in any serious way, focusing on detailed assessments of statistical increase cancer risk and resulting mortality, but not the aggravation of chronic conditions for which the health care costs are quantifiable and potentially large. These added health care costs should logically be subtracted from any claimed economic benefits to the Navajo as they would reduce or even eliminate the net financial benefits being touted. Likewise, health impacts to other nearby residents should also be quantified on a dollars basis and subtracted from any proposed economic benefit.

3.1.1. Mercury

Toxic metals released from coal burning plants include mercury, lead, nickel, manganese, arsenic and chromium, some of which are associated with male infertility.^{48, 49} The coal plants in the Four Corners area have been emitting high quantities of toxic pollutants since the 1960's and 70's, and rank in the top 50 plants in the nation for mercury emissions. Mercury causes serious neurological damage, especially to developing fetuses, infants and children. The effects include delayed development, cognitive and language deficits, and problems with motor function, attention, coordination, and memory. Mercury is a persistent element that bioaccumulates in the food web. Most of the mercury in the atmosphere is elemental mercury vapor, which circulates in the atmosphere for up to one year. After it is deposited, it cycles between the atmosphere, land, and water. Mercury in the organic form, as methylmercury, bioaccumulates in aquatic life, primarily fish. When it exists in the sediments, such as in a reservoir, and water levels are lowered, as in drought conditions, the sediments are stirred up, increasing the concentration of methylmercury in the water. Anaerobic bacteria in the sediments also transform the inorganic mercury to organic mercury, increasing the concentration in local fish, and the risk to those who ingest the fish.

Studies among Native American tribes and Alaskan Natives have shown high levels of mercury in urine and hair samples, consistent with diets that are high in fish. Warnings are in place for two bodies of water near the proposed Desert Rock coal plant site, the San Juan River and Morgan Lake, which have fish consumption advisories in place for mercury and selenium levels, respectively. In Southwestern Colorado, there are also several water bodies which have fish consumption advisories in place including the McPhee Reservoir, Narraguinnep Reservoir, Sanchez Reservoir, and the Navajo Reservoir.⁵⁰

⁴⁷ Department of the Interior, Preliminary Technical Comments on the Desert Rock Prevention of Significant Deterioration (PSD) Permit Application, September 2006.

⁴⁸ US Dept of Labor, Occupational Safety and Health Administration, Male Infertility and Welding Engineers, 10 October 1992.

⁴⁹ Agency for Toxic Substances and Disease Registry, Centers for Disease Control, Public Health Statement for Lead, Sept 2005

⁵⁰ "Fish Consumption Advisories for the State of Colorado." Colorado Department of Public Health and Environment. 22 August 2007. <<http://www.cdphe.state.co.us/wq/FishCon/FishCon.html>>.

In 1994 the United States Environmental Protection Agency (EPA) estimated that coal-fired power plants emitted 33% of all U.S. airborne anthropogenic mercury emissions in the U.S. The estimated annual emissions rates resulting from coal plants range from 0.5 to greater than 10 micrograms per m³. Based on available data, total mercury removal in coal plant technology varies considerably, ranging from 0 to 82% removal, with a median efficiency of 15% for cold-side electrostatic precipitators (ESPs), and from 0 to 73% removal with a median efficiency of 8% removal for fabric filters. Flue gas desulfurization units (FGD) exhibit limited mercury control, ranging from 0 to 62% with a median removal of 23%. Other prevention methods such as coal cleaning remove, on average, 21% of the mercury contained in the coal. Switching fuels, i.e. from coal to natural gas or chemically different coal formations, would result in decreased emissions of mercury.⁵¹ The fabric filtration system proposed for SO_x for Desert Rock is supposed to eliminate up to 80% of the mercury emitted from the plant, but this has not been measured in situ. Actual mercury emissions are still difficult to predict with precision, given variations from sample to sample of mercury concentrations in the coal itself.

Given that inorganic mercury can often ride with the airborne pollutants hundreds of miles, there is good reason to assert that a significant portion of the mercury emitted from the proposed Desert Rock plant will end up falling onto important waterways to the north, south and east of the plant. Some of these areas are popular for sport fishers and people who fish for subsistence purposes. Those who eat the fish in these areas will be at risk for mercury toxicity because of the bioaccumulation rates of mercury in fish and other wildlife in the area. This has been shown to be a significant risk by EPA studies as reported in the 1997 EPA Report on Health Effects of Mercury.⁵² No recent data on mercury concentrations in Four Corners waterways are presently available, as the Water Quality Evaluation is just getting underway in New Mexico; this data will not be completed for 7-8 years. The information that is available, however, is 15 years old and only approximates the current values in nearby surface waters.

The Draft EIS for the proposed Desert Rock plant gives insufficient attention to the environmental impacts of these mercury emissions, and it fails to provide certainty that the mercury emissions resulting from Desert Rock will be low enough to protect human health in the region.

3.1.2. Carbon Monoxide

Carbon monoxide (CO) is a gas which is harmful to human health because it reduces oxygen delivery to the body's organs and tissues. The health threat from even low levels of CO is most serious for those who suffer from heart disease, and their repeated exposure may lead to additional cardiovascular effects.⁵³ CO also contributes to the formation of ground-level ozone (O₃) which is linked to respiratory problems. Information regarding smog and respiratory health is discussed further below.

⁵¹ USEPA Executive Summary, US Clean Air Act 2005, pg. ES 18-19.

⁵² United States EPA Mercury Study Report to Congress December 1997, Vol. IV: An Assessment of Exposure to Mercury in the United States.

⁵³ "Health and Environmental Impacts of CO." U.S. Environmental Protection Agency. 12 August 2007. <<http://www.epa.gov/air/urbanair/co/hlth1.html>>.

Carbon monoxide is reported to be 50-60% higher from the Desert Rock plant than from Integrated Gasification Combined Cycle (IGCC) plants, according to the Draft EIS. However, it is claimed that this is unimportant “because the proposed plant’s increased CO emissions would eventually become CO₂ in a month or so.”⁵⁴ The proposed Desert Rock coal plant is intended to burn coal and will create CO emissions almost continuously therefore there is no scientific basis for the claim in the Draft EIS that the CO levels in the ambient air will decrease given “a month or so.” In fact, the level will remain constant or even increase over time, because new CO is being released by the power plant at least as rapidly as prior CO emissions are being oxidized to CO₂.

The Draft EIS for the proposed Desert Rock plant is erroneous with regard to its claims about CO concentrations and their impacts. This type of steady state chemistry analysis is elementary and one must question if the air pollution modeling in the Draft EIS was thoroughly reviewed by technical experts prior to its publication.

3.1.3. Smog

Smog is linked with several respiratory issues when humans are exposed to it, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, asthma and also reduce lung function by inflaming the linings of the lungs. Children, older adults, and people with lung disease are at a higher risk for respiratory problems when exposed to smog.⁵⁵

Haze conditions in the Four Corners area are created from an increase in emissions from existing coal plants and frequent high pressure air masses which hold the emissions in the area within canyons over several days at a time. The haze is only dispersed by winds that send the emissions to the north towards Arizona, over Lake Powell and into the Grand Canyon region.⁵⁶ This haze is thereby potentially affecting the health of millions of visitors to these and other national historic park areas annually, or toward the populated areas to the east and south of the proposed Desert Rock site, including Taos and Santa Fe. There is reason to believe that the air emissions from the proposed Desert Rock coal plant could affect populated areas five hundred miles from the plant itself. The Air Quality Trend in National Parks map 1995-2004 (See FIGURE 3), indicates degradation of air quality in the Mesa Verde National Park in New Mexico, as well as the Grand Canyon National Park in Arizona, for nitrates, sulfates, ozone, and ammonium in precipitation, based on July 1997 standards.⁵⁷

⁵⁴ Desert Rock EIS Report, Sithe Energy, 2007: pg. 2-29

⁵⁵ “Health and Environment.” U.S. Environmental Protection Agency. 12 August 2007.
<<http://www.epa.gov/air/ozonepollution/health.html>>.

⁵⁶ National Park Service Air Resource Division—Monitoring—Index 1995-2004, Updated 17 January 2007.
<www.nature.nps.gov/air/Permits/ARIS/index.cfm>.

⁵⁷ Ibid.

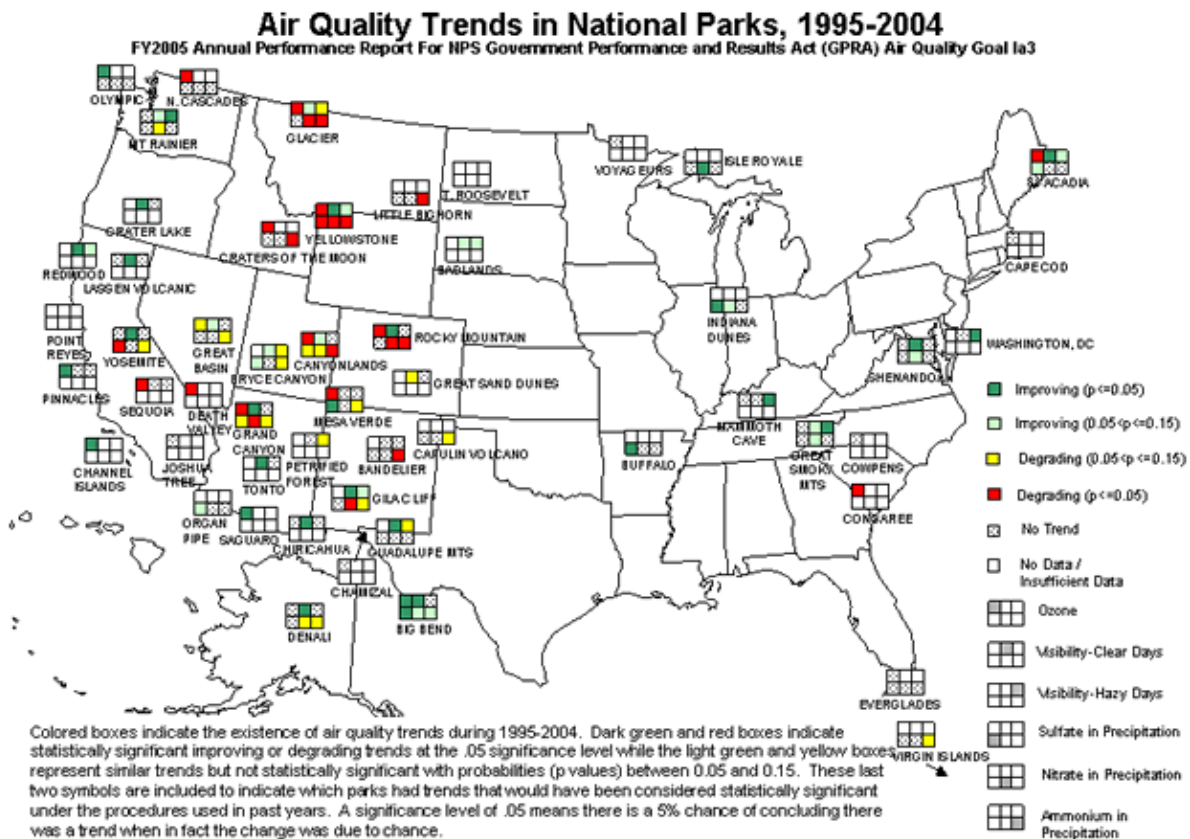


FIGURE 3. Air Quality Trends in National Parks, 1995-2004

3.1.4. Diabetes

From a study published in *Diabetes Care*, 2001, the overall increase in diagnosed diabetes mellitus in the U.S. rose from 4.9% to 6.5% from 1990-1998. A closer investigation of the Native American and Alaskan Native population reveals an increase from 5.2% to 8.5%, a 63.5% increase in the percentage of the population affected over only eight years, which was likely to be an underestimate of the true prevalence. An age-adjusted prevalence of 22.9% among Navajo adults aged greater than or equal to 20 years was reported in *Diabetes Care*, 2001.^{58, 59} The rate of cardiovascular complications for individuals with diabetes ranges from 35-38%, and these types of complications are more likely to occur with exposure to many of the pollutants from coal-burning facilities. In fact, the diagnosis of diabetes is the equivalent, in terms of risk, of having already had one heart attack. Given the high rate of diabetes in the Navajo population, the risk pool of persons likely to be at high risk for cardiovascular and pulmonary complications from coal-fired electricity plants will be 2.5-3 times higher than the general population.

⁵⁸ Mokdad, AH, Bowman, AB, Engelgau, MM, Vinicor, F, *Diabetes Trends Among American Indians and Alaska Native: 1990-1998. Diabetes Care* 2001; 24: 1508-9.

⁵⁹ Will, J, Strauss, K, Mendlein, J, Ballew, C, White, LL, Peter, DG, *Diabetes Mellitus Among Navajo Indians: Findings from the Navajo Health and Nutrition Survey. J Nutr* 127 (Suppl. 10): 2106S-2113S, 1997.

The Draft EIS for the proposed Desert Rock plant fails to address the health risks and impacts to individuals diagnosed with diabetes. Accounting for its costs could materially affect the claim of net economic benefits from the proposed Desert Rock project.

3.1.5. Children and Asthma

Previous studies show that 6% of children (out of 60,926) within 30 miles of New Mexico's coal plants were diagnosed with asthma in the year 2000. In addition, 38% of hospital visits were made up of children 15 years of age and younger, even though they only represent 12% of the population. 30% of the visits were emergency room visits related to asthma made by uninsured individuals, which means higher costs for care and higher severity of symptoms in the uninsured. The data which exist from studies over the last fifteen years link ozone, SO₂, particulate matter and smog with exacerbations of asthma,⁶⁰ COPD, hospital admissions, cardiovascular events, cancer, and mortality.^{61, 62, 63, 64} Braga, et al (2001) found that the health effects from air pollutants, SO₂, CO, O₃, NO₂, and PM₁₀ levels correlated with respiratory admissions for children with asthma in Sao Paulo, Brazil.⁶⁵ The most susceptible were children less than or equal to two years of age with an increase in hospital admissions of 9.4% (95% confidence interval (CI) = 7.9-10.9). The second most susceptible were children aged 15-19, with an increase in hospital admissions of 5.1% (95% CI = 0.3-9.8) per increasing quartile of exposure. For carbon monoxide (CO), each interquartile increase was associated with an 11.3% (95% CI = 5.9-16.8) increase in respiratory hospital admissions. There is also evidence that long-term exposure to air pollutants can affect lung function growth in children.^{66, 67, 68}

The Draft EIS for the proposed Desert Rock plant fails to give sufficient consideration to asthma impacts to children and their associated costs, a significant concern for the uninsured in New Mexico.

⁶⁰ Gent, JF, Triche, EW, Holford, TR, Belanger, K, Bracken, MB, Beckett, WS, Leaderer, BP, Association of Low-Level Ozone and Fine Particles With Respiratory Symptoms in Children With Asthma, JAMA. 08 October 2003; 290(14): 1859-1867.

⁶¹ Pope, CA, Thun, MJ, Namboodiri MM, et al. Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of US Adults, Am. Journal of Resp. and Crit. Care Med., Mar 1995; 151(3 pt): 669-674.

⁶² Dockery, DW, Pope, CA, Xu X, et al, An Association Between Air Pollution and Mortality in Six US Cities, NEJM Dec 9, 1993; 329(24): 1753-1759.

⁶³ Samet, JM, Zeger, SL, Domenici, F, Curriero, F, Coursac, I, Dockery, DW, Schwartz, J, Zanobetti, A, The National Morbidity, Mortality and Air Pollution Study: Pt II, Morbidity and Mortality from Air Pollution in the US, Res. Rep. Health Effects Institute, June 2000; 94(Pt 2) 5-70, Discussion 71-9.

⁶⁴ Pope, CA, Dockery DW, Health Effects of Fine Particulate Air Pollution: Lines That Connect, J of Air and Waste Management Assoc. June 2006; 56: 709-742.

⁶⁵ Braga, AL, Saldiva, PH, Pereira, LA, Menezes, JJ, Concercao, GM, Lin, CA, Zanobetti, A, Schwartz, J, Dockery, DW, Health Effects of Air Pollution Exposure in Children and Adolescents in Sao Paolo, Brazil, Pediatric Pulmonology Feb 2001; 31(2): 106-113.

⁶⁶ Gauderman, WJ, Avol, E, Gilliland, F, Vora, H, Thomas, D, Berbane, K, McConnell, R, Kuensli, N, Lurmann, F, Rappaport, E, Margolis, H, Bates, D, Peters, J, The Effect of Air Pollution on Lung Development from 10-18 Years of Age, NEJM 2004, 351: 1057-1067, AJRCCM 2002; 166: 76-84.

⁶⁷ Gauderman, WJ, Gilliland, GF, Vora, H, et al, Association Between Air Pollution and Lung Function Growth in Southern California Children: Results of a Second Cohort, Am of Resp. and Crit. Care Med. 166: 76-84.

⁶⁸ Rojas-Martinez, R, Perez-Padilla, R, Olaiz-Fernandez, G, Mendoza-Alvarado, L, Moreno-Macias, H, Fortoul, T, McDonnell, W, Loomis, D, Romieu, I, Lung Function Growth in Children with Long Term Exposure to Air Pollutants in Mexico City, Am J Resp. and Crit. Care Med. 2007; accepted 19 April 2007.

3.2. Estimating Health-Related Costs

According to the “Dirty Air, Dirty Power” report commissioned by the Clean Air Task Force, “Hundreds of thousands of Americans suffer each year from asthma attacks, cardiac problems, and respiratory problems associated with fine particles from power plants. These illnesses result in tens of thousands of emergency room visits, hospitalizations, and lost work days each year.” This results in huge amounts of money spent on health care due to power plant emissions, especially for those living in relative proximity to coal plants. This is of particular concern to the Navajo, as there are two older polluting coal facilities in the same area where Desert Rock is proposed to be located.

For asthma, the America Lung Association estimates \$16.1 billion in national health costs for the year 2006. Multiplying that number by .052% (Navajo share of the total U.S. population)⁶⁹ yields \$8,372,000 spent on asthma among the Navajo per year. This amount is not accounting for an estimated 200% increase in the number of people ages 65 years and older in the population in the five southwestern states of Arizona, Colorado, Nevada, New Mexico, and Utah by 2030, as projected by the U.S. Census.

For cardiovascular disease and stroke (not counting hypertension), the American Heart Association also estimates \$365.4 billion in health costs for the year 2006. Multiplying that number by .052% yields \$190 million per year for the Navajo population. Again, this amount is without accounting for large increases in elderly populations in the southwest in the coming years as projected by the U.S. Census. Sample population estimates appear in Table 8, below:

Table 8. SW States, Population Projections for Most Health-Sensitive Age Brackets

State	Projected % change in under 18 population (2000-2030)	% of total population in 2000/2030 under age 18	Projected % change in 65 and older population (2000-2030)	% of total population in 2000/2030 65 and older
Arizona	91%	26.6% / 24.3%	255%	13.0% / 22.1%
Colorado	33%	25.6% / 25.3%	130%	9.7% / 16.5%
Nevada	110%	25.6% / 25.1%	264%	11.0% / 18.6%
New Mexico	10%	28.0% / 21.7%	162%	11.7% / 26.4%
Utah	48%	32.2% / 30.4%	142%	8.5% / 13.2%
Total, 5 SW States	58%	27.2% / 25.3%	201%	11% / 19.5%

Scientifically rigorous estimates should be developed as health data for the Final EIS for the proposed Desert Rock plant, which include asthma, cardiovascular illnesses, and other medical conditions that would be aggravated by emissions of criteria air pollutants and air toxics. Estimates of the incremental medical costs resulting from Desert Rock’s emissions

⁶⁹ According to the US Census, the estimated US population in 2006 was 299,398,484 persons, and the population of Navajo living on the reservation in Utah, New Mexico, and Arizona was 155,214 persons.

should be included as well, so that those additional costs can be weighed against the purported net economic benefits of the project. The Draft EIS is deficient because it fails to estimate existing or incremental health care cost estimates resulting from the proposed Desert Rock coal plant and associated mining activities.

4. DESERT ROCK WATER IMPACTS

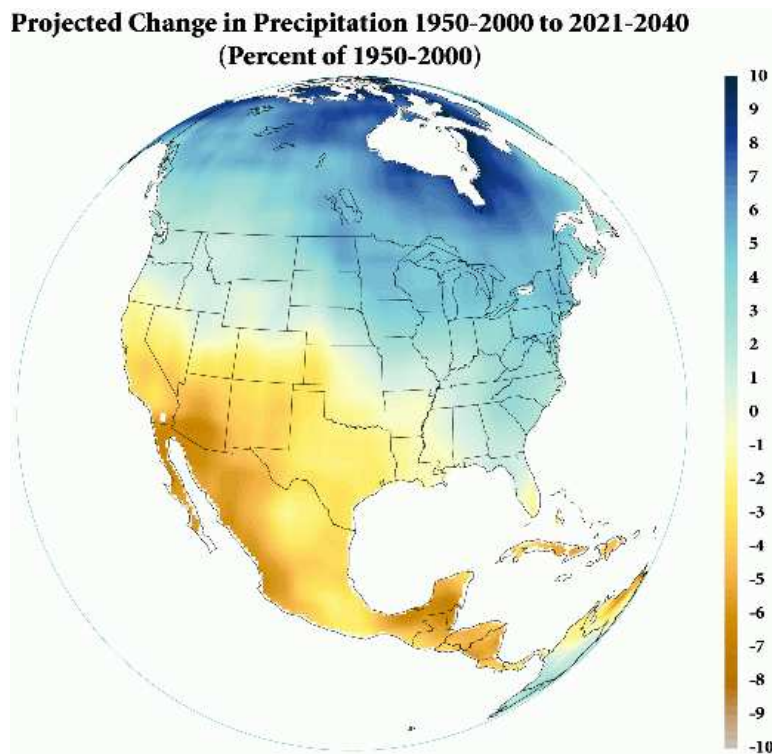


FIGURE 4. Projected Climate Change Impacts on Precipitation in North America⁷⁰

The majority of North America may see increases in precipitation resulting from near-term climate change; however, the driest regions of the country are expected to see further reductions in available moisture as depicted in FIGURE 4, above. Columbia University forecasts average reductions of 2 to 5% in the region occupied by the Navajo Nation between the years 2021 and 2040 relative to average precipitation between the years 1950 and 2000. For an already water-parched area, these are dire projections which the Draft EIS for Desert Rock should have addressed more directly, rather than simply dismissing the adverse impacts of climate change.

The Diné believe that pristine aquifers and groundwater are in their place for a specific reason: they remind the people of the creation time when the floods receded and pushed up all life forms into this land. According to Navajo belief;

It was the Water Monster pursuing the people through the fifth world. Though they retreated to the highest mountain, they could not escape the rising waters. They planted other trees and vines as well, but none grew high enough to help them escape. They finally managed their escape through a large reed that reached the sky of the fourth world [...] The

⁷⁰ Seager, R. 2007. *An Imminent Transition to a More Arid Climate in Southwestern North America*. Lamont-Doherty Earth Observatory of Columbia University. Retrieved August 28, 2007. <<http://www.ldeo.columbia.edu/res/div/ocp/drought/science.shtml>>.

people sent up a locust, who made a small hole, then a badger, who made the hole larger. 'When the Badger came back his legs were stained black with the mud, and the legs of all badgers have been black ever since. Then First Man and First Woman led the way and all the others followed them, and they climbed up through the hole to the surface of this—the fifth—world.⁷¹

Life follows Water. Like the green plants that spring up after water recedes, the Diné were birthed into the landscape between the Four Sacred Mountains; healthy, pure, clean, and free of injurious foreign substances. The Navajo deity, Changing Woman, acknowledges this type of conception in Navajo belief and stories;

In the morning [Changing Woman] found a bare, flat rock and lay on it with her feet to the east, and the rising sun shone upon her. [White Shell Woman] went down where the dripping waters descended and allowed them to fall upon her. [...] Four Days after [White Shell Woman] said: "Elder Sister, I feel something strange moving within me; what can it be?" and [Changing Woman] answered: "It is a child. It was for this that you lay under the water ..."⁷²

Water is thus the basis for existence but moreover, water is "diyin, sacred as well as beea'aanii⁷³ and atsé siléi⁷⁴, laws, and called 'Dzil Binaa Siléi⁷⁵ dóó Iná Betsé Siléi⁷⁶ dóó Baa Siléi⁷⁷, the Surroundings of the Mountains and the Foundation of All Life."⁷⁸ Water, therefore, is mandated and acknowledged as one of the four sacred elements to be protected according to §5. Nahasdzaán dóó Yádilhił Bitsaadeę Beenahaz'aanii--Diné Natural Law (1 N.N.C. § 205), Section A;

The four sacred elements of life, air, light/fire, water and earth/pollen in all their forms must be respected, honored and protected for they sustain life; [...]

The *Navajo Common Law Project*, which was initiated by Honorable Edward T. Begay, Speaker of the Navajo Council, recognizes the sacred use of water in the context of Nahasdzaán dóó yádilhił and the Four Sacred Mountains that create the place and space of Navajo Land;

The water maintains the connection between the Diné and the Holy Spirit, Holy People, Mother Earth, Father Universe, and all walks of life [...] The water flows from mountains onto the land, where rivers are our fathers and the glittering water like lakes, seas, and oceans are our mothers. They are sacred prayers, songs, and stores; therefore water is the law and foundation of life.⁷⁹

⁷¹ Matthews, Washington. *Navajo Legends*. Salt Lake City: University of Utah Press, 1994. 75-76; cited in Sherry, John W. *Land, Wind, and Hard Words*. Albuquerque: University of New Mexico Press, 2002. 23-24.

⁷² Matthews, Washington. *Navajo Legends*. Salt Lake City: University of Utah Press, 1994. 105

⁷³ "With Life"; One lives in accordance with this Law.

⁷⁴ "The Foremost in all Life," which is interpreted to be the Four Elements.

⁷⁵ "Surroundings of the Mountain"

⁷⁶ The concept of "Before One lives his or her Life; the Law precedes Life and a person; One lives Life in accordance with the guiding Law/element."

⁷⁷ "It is there for a purpose; there for One to live by"

⁷⁸ Barber, Henry. *Navajo Common Law Project*. Window Rock, Arizona: Office of the Speaker, Navajo Nation Council, 2002. 10-11.

⁷⁹ Ibid. 11

The unwise and unsustainable use of sacred water is, according to traditional Navajo teachings and philosophy, invoking social ills, natural catastrophe and the gradual decline of health for all life forms. Global warming, unpredictable climate change, and drought conditions created on the Navajo Nation speak to the uncontrolled excessive consumption of water by coal projects that do not take correct measures to sustain all Life.

The Draft EIS fails to note that building the proposed Desert Rock plant would do nothing to mitigate climate risk to the Navajo people, but that it actually exacerbates the problem instead. Desert Rock is projected to consume more water resources than renewable alternatives while also helping to change the climate in ways that reduce water availability.

Differing technologies utilized to affect emissions in coal-burning power plants use different amounts of water. The National Energy Technology Laboratory (NETL) has summarized results on how much water is utilized by these technologies, with and without carbon capture technology. They have found that the water demand for a supercritical coal plant with carbon capture would increase by 123%, straining the credibility of claims made by Desert Rock's backers that sufficient water will be available for the proposed project's needs.⁸⁰ It is not enough for the Draft EIS to show that the proposed project site for the proposed Desert Rock plant has sufficient water to meet initial design criteria. If carbon capture might be required, the Draft EIS should be redrafted to show that the proposed Desert Rock coal plant can accommodate carbon capture technology as its water usage will give context to water availability within the project site.

FIGURE 5, below, demonstrates the increase in the demand for water when carbon capture technology is included in a supercritical pulverized coal plant similar to that of the proposed Desert Rock plant. In the alternatives section below, there is additional discussion regarding the relative water consumption per unit of electricity produced by various renewable energy sources and energy efficiency options.

In its perfunctory treatment of alternatives, the Draft EIS fails to note that a number of other fossil fuel power plant options are available with significantly lower water use than the supercritical pulverized coal technology proposed for Desert Rock. The failure of the Draft EIS to analyze these alternatives from the standpoint of water consumption per unit of energy produced is a vital concern on the Navajo Nation where water is already a scarce resource.

⁸⁰ "Cost and Performance Baseline for Fossil Energy Plants." Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

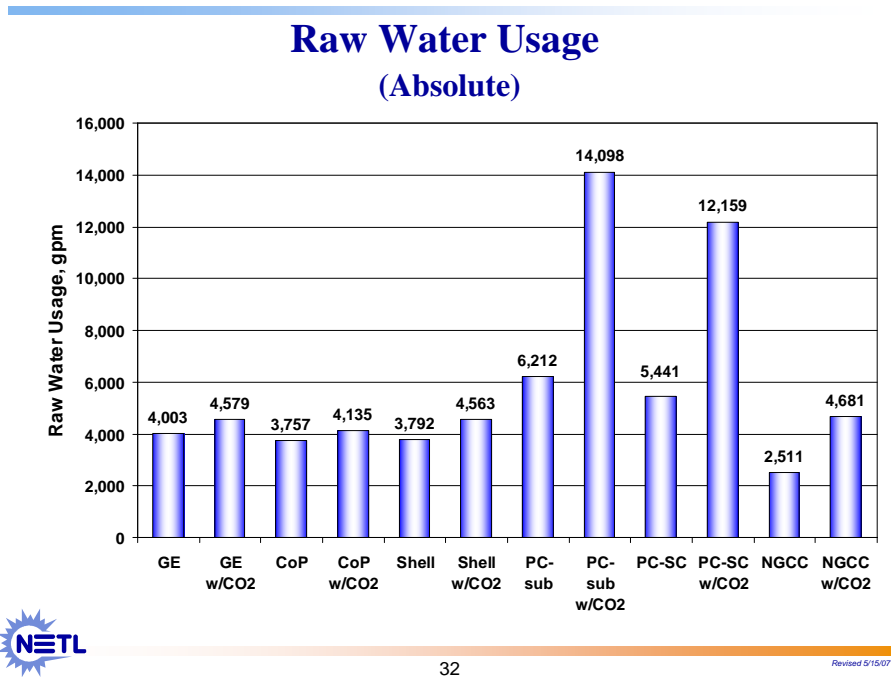


FIGURE 5. Water Usage in Various Coal Plants with and without Carbon Capture⁸¹
* The Desert Rock Plant is of the PC-SC type – Pulverized Coal - Super Critical

⁸¹ Ibid.

5. ECONOMICS OF DESERT ROCK

5.1. Navajo Revenue & Predicted Desert Rock Revenue

The Navajo government currently earns \$102 million in revenue per year, much of which comes from selling coal and other minerals, and it receives another \$400 million in government grants. According to Sithe Global's Fact Sheet, Desert Rock's proponents are promising an additional \$50 million per year in revenue for the tribe through a special tax-paying agreement, water and coal royalties, the land lease, and other income through selling power to off-reservation electricity markets.

The tribe has thus far obtained little direct financial benefit from the operation of other existing coal-fired power plants near or on the Navajo reservation. The Tribal Council is interested to find financing for up to \$750 million to buy a 25% stake in the proposed Desert Rock facility, so that they will have partial ownership in the proposed plant.⁸² This ownership stake could bring with it significant future liability, as regulators move to impose carbon taxes or cap-and-trade requirements on stationary sources of greenhouse gas emissions.

5.2. Cost to Build the Desert Rock Plant

The proposed Desert Rock facility is predicted to cost \$3 billion to construct,⁸³ financed through Sithe Global LLC. This estimate has been rising in recent years compared to earlier estimates of approximately \$2.5 billion. This cost will likely increase due to rises in commodity prices for steel and concrete while permitting delays and possible legal challenges postpone construction. Indeed, cost overruns are frequent when building large fossil fuel electricity plants similar to the proposed Desert Rock plant. In 2006, for example, Duke Energy announced that the price tag for building a coal plant had increased from one year earlier by \$1 billion. North Carolina newspapers reported that they were concerned about a continued rise in the cost as the project is built over the next five years, especially if that cost gets passed on to consumers in the end.

The lengthy permitting and regulatory process for a coal plant of the magnitude proposed for Desert Rock, and especially a plant which would create severe air emissions impacts, inevitably leads to additional costs and financial uncertainty for investors and potential customers. In contrast, renewable energy projects tend to take less time to develop and bring online (2-5 years) when compared to the 5-15 year timeframe that is attached to most large fossil fuel energy projects.⁸⁴ An additional benefit that comes with smaller scale

⁸² Wilson, Jim. "Coal Power on Navajo Land." *New York Times*. 27 July 2007.

⁸³ Ibid.

⁸⁴ Cooper, Christopher and Dr. Benjamin Sovacool. "Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS)." June 2007. Network for New Energy Choices. <http://www.newenergychoices.org/dev/uploads/RPS%20Report_Cooper_Sovacool_FINAL_HILL.pdf>.

renewable energy technologies is that they are able to be located nearer to power loads, making it easier to match smaller increments of demand.⁸⁵

It is difficult to argue that market conditions over the coming decade will become more favorable for building conventional coal plants. NETL, whose motto is, “The Only U.S. National Laboratory Devoted to Fossil Energy Technology,” acknowledges as much in its recent report on coal:

Proposals to build new power plants are often speculative and typically operate on “boom & bust” cycles, based upon the ever changing economic climate of power generation markets. As such, it should be noted that many of the proposed plants will not likely be built.⁸⁶

A similar story emerges from a recent article in *Power Magazine* concerning the impact of construction delays and cost overruns on one customer’s decision whether or not to finance a new coal unit at the Intermountain Power Plant in Utah:

Building a coal plant in western states, and especially on or near the Colorado Plateau, is becoming very problematic. Case in point: The 1,900-MW Intermountain Power Plant (IPP) in western Utah—which sells 45% of its output to the City of Los Angeles—announced in 2002 its intention to join a partnership to add a third 950-MW unit. In August 2004, then-Mayor James K. Hahn pulled the plug on L.A.’s participation in the project and directed the city’s Department of Water and Power to spend the money instead on purchases of renewable energy for the city. How do you anticipate a curveball like that? IPP 3 now looks to break ground in 2008 and be commissioned in 2012—a full decade after the original project announcement.⁸⁷

This is by no means an isolated case. According to NETL, 31,313 MW of proposed coal plants representing nearly \$40 billion of investment were cancelled in the U.S. in the last five years.⁸⁸ In that time, only 2,749 MW of new coal generation have come online at a cost of \$4.1 billion, as outlined in Table 9, below.

⁸⁵ Ibid.

⁸⁶ “Cost and Performance Baseline for Fossil Energy Plants.” Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

⁸⁷ Power Magazine, September 2006

⁸⁸ “Cost and Performance Baseline for Fossil Energy Plants.” Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

Table 9. Cancelled Power Plants from the NETL Database

Sponsor or Plant Name	Location	Size (MW)	Cost (millions)
TVA Bellefonte Site	Alabama	1,500	\$1,500
Usibelli Coal Mine Inc.	Alaska	200	\$421
Reliant Resources – Hopi Tribe	Arizona	1,200	\$1,200
Alabama Electric	Arizona	500	\$500
Fort Chaffee Authority	Arkansas	1,500	\$2,500
Fernald Power	California	2,500	\$2,500
Tri-State G&T	Colorado	1,200	\$1,200
Deseret G&T	Colorado	80	\$140
Florida Municipal Power Agency	Florida	500-600	\$600
Lakeland Electric & Water	Florida	350	\$350
Florida Power & Light	Florida	850	\$1,000
Sempra Energy Resources	Idaho	600	\$1,000
EnviroPower	Indiana	525	\$525
EnviroPower	Indiana	500	\$600
Alliant Energy	Iowa	450	\$450
Kentucky Mountain Power	Kentucky	525	\$600
Global Kentucky Pioneer Energy	Kentucky	540	\$540
Great River Energy	Minnesota	250-500	\$500
Minnesota Power	Minnesota	225	\$200
Great Plains Power	Missouri	750	\$750
Composite Power	Montana	2,000	\$1,500
Bull Mountain Development	Montana	750	\$700
Montana Dakota Utility	North Dakota	175	\$300
Great River Energy	North Dakota	500	\$700
Pacificorp	Oregon	500	\$500
AES Corporation	Pennsylvania	800	\$800
CME North America Merchant Energy	Tennessee	1,000	\$1,000
Pickwick Power TVA	Tennessee	100	\$100
TXU (8 units)	Texas	6,400	\$10,000
San Antonio Public Service	Texas	744	\$1,200
Duke Energy North America	Virginia	700	\$800
U.S. Electric Power Globaltex	Washington	249	\$250
North American Power Group Ltd.	West Virginia	300	\$300
Anker Energy	West Virginia	450	\$600
North American Power Group	Wyoming	500	\$750
Dominion Resources	Undecided	2,150	\$3,200
TOTAL		31,313	\$39,776

NETL's findings show that IGCC coal plants or natural gas plants have become the safer fossil fuel investment than pulverized coal plants. Although they may cost more initially than pulverized coal, their total cost is lower once carbon capture technology is included. The economic assumptions in the Draft EIS for the proposed Desert Rock plant and in public comments made by the project's proponents are erroneous and deficient, having ignored the findings of the federal government's own scientists about the expected cost of

conventional coal-fired power plants relative to other fossil fuel and alternative energy options.

5.3. Jobs Created

The Desert Rock facility will potentially create around 200 full-time direct jobs related to the plant itself, and another 200 full-time jobs from the nearby BHP Navajo coal mine. Additionally 1,000 construction jobs are estimated to exist on average for 4.5 years.⁸⁹

While the Desert Rock project proposes to provide 200 “permanent” jobs associated with coal mining and combustion; solar and wind alternatives have already been demonstrated to create more jobs per unit of energy delivered. The American Society of Mechanical Engineers found that solar and wind energy projects create 3 to 11 times as many jobs as coal projects per MWh.⁹⁰ Analytic tools from the National Renewable Energy Lab (NREL) allow these job impacts to be calculated in some detail, and suggest that 500 or more long term jobs would be created by wind projects on the Navajo Nation smaller in size to Desert Rock.

The Draft EIS for the proposed Desert Rock plant makes no such comparative analysis, so the claimed economic benefits of the coal project have neither context nor credibility. An alternative analysis in the Draft EIS should provide a comparison of the economic impact of alternative technologies such as wind and solar. Burning coal to produce electricity is not neither the best, nor the *only* form of economic development available to the Navajo Nation.

5.4. The Cost of Carbon

The cost of carbon is an increasingly significant worldwide issue, and the energy sources that proactively address climate change and global warming will have a powerful market advantage over those that attempt to address it later via technology retrofits and offsets. **The future predicted cost of emitting carbon into the atmosphere was not accounted for by the Global in their calculations of the cost of building, operating, and maintaining the Desert Rock plant. These costs are extremely likely to play a part in energy development in the very near future, therefore making these numbers a necessary part of the accounting for a planned development that will emit large quantities of CO₂.**

Currently, emitting carbon into the atmosphere is legal and free in the United States, but the political environment that governs the writing of U.S. climate policy is changing rapidly—largely in the direction of greater control over greenhouse gases. At the federal, regional, and state levels, additional interest in carbon restrictions is emerging almost daily.

The outcome of this simmering interest is likely to be some mix of carrots and sticks: incentives to move away from fossil fuels for energy, penalties for emitting carbon, or both.

⁸⁹ Desert Rock Energy Project. “Jobs and Taxes.” 7 August 2007.
<http://www.desertrockenergyproject.com/jobs_and_taxes.htm>.

⁹⁰ Christopher Cooper, Dr. Benjamin Sovacool, *Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS)*, Network for New Energy Choices, June 2007, p. 52.

The specific implications for Desert Rock are simple: prudence requires that carbon liability be factored into financial planning for the plant.

5.4.1. Potential Cost of Expected Carbon Emissions

The risk of carbon regulation is very real and is likely to be a major force in the development of new coal plants and utility purchases. In Minnesota, an assumed carbon tax in Xcel's planning process disqualified coal as a least-cost resource. The California Public Utility Commission (CPUC) requires that utilities use an \$8 per ton carbon adder in their planning process, thus increasing the cost of carbon-intensive resources such as coal. Future legislation at both the federal or state levels may drastically alter the landscape for new electricity production from coal plants, and should be evaluated in further research.

Future legal restrictions on greenhouse gas emissions will likely leave the owners of coal-fired power plants with two basic options for dealing with a carbon liability. They can 1) capture carbon emitted by the plant and sequester it so that it never reaches the atmosphere, or 2) purchase carbon credits from others who have lowered their emissions faster than they were required to.

Either option is likely to be costly, but estimating the costs is difficult because of the absence of an established market for emissions rights in the United States. Still, ballpark estimates are possible, for the near term (2008-2010) and for the medium term (2015-2020).

Table 10. Current Carbon Costs in Selected Regions

Source	Cost (dollars per ton)
EU Emissions Trading Scheme	\$31.50
Chicago Climate Exchange	\$3.28
New South Wales Greenhouse Gas Abatement Scheme	\$10.75
New Mexico PRC	\$8.00-\$40.00

Source: Ecosystem Marketplace ⁹¹

We note that the costs of emissions rights are relatively low (but not inconsequential) at present, for different reasons. In Europe, the establishment of the carbon market was mismanaged: too many permits were originally issued, resulting eventually in a steep decline in the price of carbon there. And in the U.S., the cost for emissions rights are relatively low because restrictions are either voluntary or nonexistent, creating little demand for the rights. But as carbon restrictions become mandatory and as those restrictions are ratcheted tighter over time, the cost of emissions rights should be expected to climb.

⁹¹ The \$5-\$10 figure reflects our estimate of the average of a range of values found in various documents on the EPRI website. See <http://my.epri.com/portal/server.pt?> for more information. \$23 from Intergovernmental Panel on Climate Change, "Carbon Dioxide Capture and Storage: Summary for Policy Makers and Technical Summary, p. 24-25. Note that the IPCC listed value for a ton of CO₂ for a pulverized coal (pc) plant is \$41. Our assessment is that this cost will come down as a new technology (chilled ammonia) comes on line and cuts the cost of capture for pc plants to the same general level as the cost listed for IGCC plants, \$23.

For evaluation purposes for the proposed Desert Rock plant, this report uses carbon price estimates from the Electric Power Research Institute for the near term and from the Intergovernmental Panel on Climate Change (IPCC) for the medium term. Those estimates are \$5 per ton and \$23 per ton, respectively. Rather than treating them as numbers which are not yet affecting energy suppliers, many utilities are already including carbon costs into their resource planning (see Table 11).

Table 11. CO2 Emission Trading Assumptions for Various Years (in 2005 Dollars) ⁹²

PG&E*	\$0-9/ton (start year 2006)
Avista 2003*	\$3/ton (start year 2004)
Avista 2005	\$7 and \$25/ton (2010) \$15 and \$62/ton (2026 and 2023)
Portland General Electric*	\$0-55/ton (start year 2003)
Xcel-PSCo	\$9/ton (start year 2010) escalating at 2.5%/year
Idaho Power*	\$0-61/ton (start year 2008)
Pacificorp 2004	\$0-55/ton
Northwest Energy 2005	\$15 and \$41/ton
Northwest Power and Conservation Council	\$0-15/ton between 2008 and 2016 \$0-31/ton after 2016

In spite of the usual uncertainties associated with future predictions, we believe that the costs projected for the year 2015-2020 timeframe are likely to be firmer than those of the near term, simply because within a decade or less, the magnitude and timing of needed carbon reductions will be known and likely codified in federal law. FIGURE 6, below, is a graph from the Massachusetts Institute of Technology (MIT) report, “The Future of Coal” which projects the rising penalties related to carbon emissions over time. Note that MIT’s scenarios forecast prices higher than our high end estimate of \$23 per ton, well within the projected lifetime of Desert Rock.

⁹² Freese, Barbara and Steve Clemmer. “Gambling with Coal: How Future Climate Laws Will Make New Coal Power Plants More Expensive.” Union of Concerned Scientists. September 2006.
<http://www.ucsusa.org/assets/documents/clean_energy/gambling_with_coal_final_report_sept_06.pdf>.

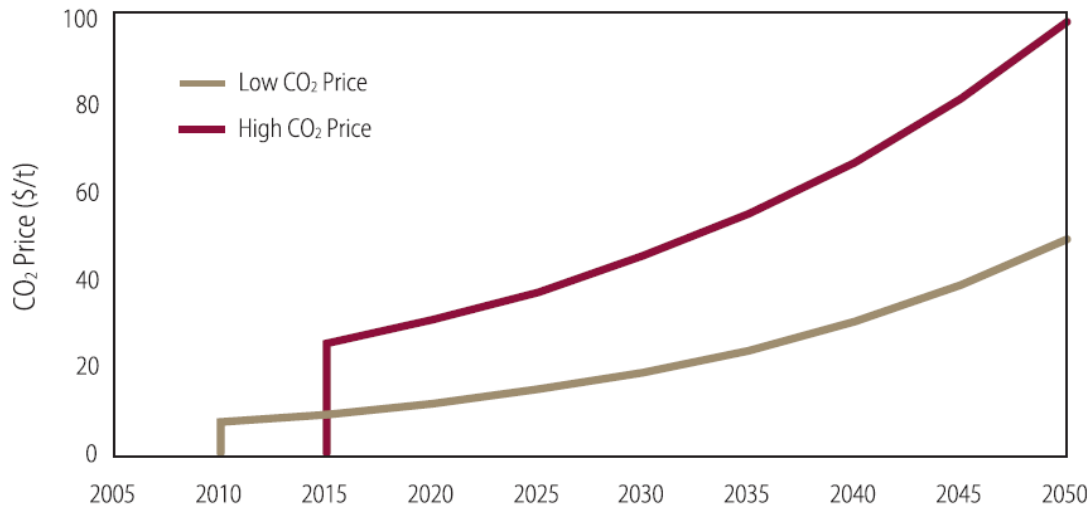


FIGURE 6. Scenarios of Penalties on CO₂ Emissions (\$/t CO₂ in constant dollars)⁹³

We assume that emissions rights will be allocated using market mechanisms and that the cost of those rights will be the same whether the solution used is carbon capture, carbon sequestration, and/or a carbon cap and trade system. The assumption is that the trading price will settle at or near the cost of technical solutions such as carbon capture and sequestration. It is likely that a plant such as the one proposed for Desert Rock will have to include sequestration technologies by the time it is constructed, or it will have to be retrofitted shortly thereafter.⁹⁴

Table 12, below, compares coal plants with and without carbon capture technologies. It becomes evident that adding capture technologies means higher prices to operate the plants. However, MIT's study estimates that generation efficiency drops by 9% after adding carbon capture technologies.⁹⁵ A supercritical plant like the proposed Desert Rock plant, would therefore see an 81% increase in costs with capture technology added and also less energy efficiency. This presents serious questions for initial and projected electricity costs, as merchant coal plants such as the proposed Desert Rock plant require secured contracts with utilities, who wish to purchase electrical power at minimal costs while avoiding the offset costs.

NETL estimates that a plant like Desert Rock (supercritical pulverized coal) would cost approximately \$1,575 per kilowatt (kW) to build and would have electricity production costs of about 6.33 cents per kilowatt-hour (kWh) as shown in FIGURE 7, below. Once carbon capture technology is included, however, the plant costs would rise to \$2,870/kW or 11.48 cents/kWh. It is likely that the carbon capture technology will need to be included on the proposed Desert Rock plant, or they will have to purchase offsets, which will likely raise the

⁹³ *The Future of Coal: Options for a Carbon-Constrained World*. Massachusetts Institute of Technology. 2007. <<http://web.mit.edu/coal/>>.

⁹⁴ MIT's *The Future of Coal* report, cited above, goes into detail about carbon sequestration technologies and their cost as related to power generation without capture technologies, as does the NETL report on fossil energy plant.

⁹⁵ *Ibid.*

price by a smaller but still significant amount. The prospect that customers will pay a price near 12 cents/kWh for coal-fired electricity is unlikely, making the plant seem economically impractical.⁹⁶ The Draft EIS for the proposed Desert Rock plant fails to address the economics of carbon risk, so it grossly overstates the economic attractiveness of a project that emits this much CO₂.

There is some evidence to suggest that the project's backers are hoping to secure a large financial contribution from the U.S. Department of Energy under the FutureGen program to pay for the cost of carbon capture and sequestration.⁹⁷ However, it makes no sense to apply such technology to a conventional coal plant where the private backers of the project have taken no significant steps of their own to minimize CO₂ emissions or make them easier to capture. By contrast, an IGCC coal plant or one employing air separation prior to combustion can greatly simplify that task, ensuring that the federal funds are well spent instead of simply a wealth transfer to the private developers of antiquated technology. The Draft EIS gives no serious consideration to these alternatives in the context of eventual carbon capture, and instead dismisses IGCC technology as a standalone measure, in spite of the recent NETL findings about superior economic and environmental performance.⁹⁸

Additionally, even if 60% of the CO₂ from U.S. coal generation was captured and compressed into a liquid for geologic sequestration, its volume would equal the total U.S. oil consumption of 20 million barrels per day.⁹⁹ This creates extraordinary challenges for locating suitable, proximate and affordable storage repositories for the resulting CO₂. This is a valid argument against building plants such as the proposed Desert Rock plant, particularly when a focus on renewable development will be free of concerns about future climate and carbon liability.

⁹⁶ "Cost and Performance Baseline for Fossil Energy Plants." Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

⁹⁷ Helms, Kathy. "Generating Jobs: Clean Coal Project Could be Coming to Navajo Nation." *Gallup Independent*. 8 May 2006. <<http://www.gallupindependent.com/2006/may/050806genjbs.html>>.

⁹⁸ "Cost and Performance Baseline for Fossil Energy Plants." Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. National Energy Technology Laboratory. Department of Energy. 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

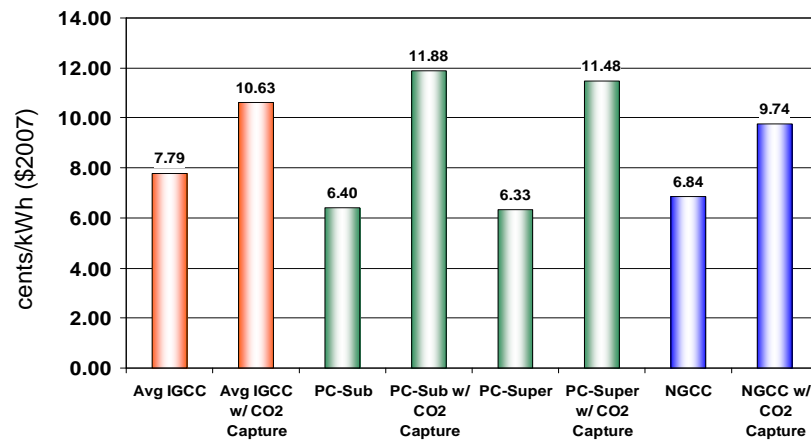
⁹⁹ "The Future of Coal: Options for a Carbon-Constrained World." Massachusetts Institute of Technology. 2007. <<http://web.mit.edu/coal/>>.

Table 12. Pulverized Coal and Natural Gas Combined Cycle Performance Results¹⁰⁰

	Subcritical		Supercritical		NGCC	
CO ₂ Capture	NO	YES	NO	YES	NO	YES
Plant Cost (\$/kWe)						
Base Plant	1,302	1,689	1,345	1,729	554	676
Gas Cleanup (SO _x /NO _x)	246	323	229	302	-	-
CO ₂ Capture	-	792	-	752	-	441
CO ₂ Compression	-	89	-	85	-	52
Total Plant Cost (\$/kWe)	1,549	2,895	1,575	2,870	554	1,172
Capital COE (¢/kWh)	3.41	6.81	3.47	6.75	1.22	2.75
Variable COE (¢/kWh)	2.99	4.64	2.86	4.34	5.62	6.70
CO₂ TS&M COE (¢/kWh)	0.00	0.43	0.00	0.39	0.00	0.29
Total COE (¢/kWh)	6.40	11.88	6.33	11.48	6.84	9.74
Increase in COE (%)	-	85	-	81	-	43
\$/tonne CO₂ Avoided	-	75	-	75	-	91

¹⁰⁰ “Cost and Performance Baseline for Fossil Energy Plants.” Volume 1: Bituminous Coal and Natural Gas to Electricity. PowerPoint presentation based on Final Report. National Energy Technology Laboratory. Department of Energy. 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

Cost of Electricity Comparison



January 2007 Dollars, Coal cost \$1.80/10⁶Btu. Gas cost \$6.75/10⁶Btu



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Revised 5/15/07

FIGURE 7. Cost of Electricity Comparison, Various Coal Technologies¹⁰¹

* PC-Super is the same plant-type as the proposed Desert Rock plant.

Using the Draft EIS estimate of 12.7 million tons of CO₂ emitted per year from the proposed Desert Rock plant, we estimate the following carbon liability costs (Table 13) for the proposed Desert Rock plant, with the cost of carbon capture until 2015 estimated very conservatively:

Table 13. Estimated Carbon Liability Associated with the Desert Rock Power Plant

Year	Cost to Capture CO ₂ *	Annual cost to the Desert Rock plant
2008-2015	\$5 per ton	\$63.5 million
2015-2020	\$23 per ton	\$292.1 million

*note: Costs are for carbon capture only. Carbon sequestration would increase the costs slightly.

In addition, the chart shown below as FIGURE 8 indicates that the cost of providing carbon sequestration technology into coal plants dramatically increases the construction costs:

¹⁰¹ "Cost and Performance Baseline for Fossil Energy Plants." Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. National Energy Technology Laboratory. Department of Energy. 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

Exhibit 4-48 LCOE for PC Cases

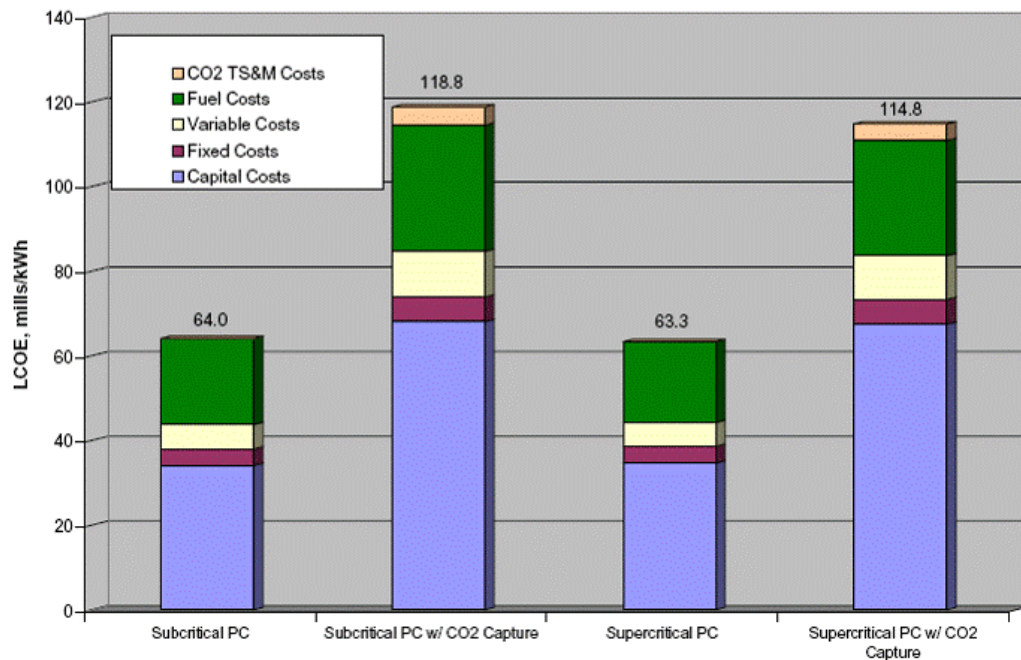


FIGURE 8. Cost of Carbon Capture – Pulverized Coal Plants

Note that all costs associated with coal plant construction increase when carbon capture technology is included—capital costs, fixed costs, variable costs, fuel costs, and CO₂ TS&M (Transport, Storage & Monitoring).

Without carbon capture, not only would the cost of operating the Desert Rock plant rise with the penalties associated with carbon emissions, but the impacts on New Mexico carbon emissions will rise significantly as well (see FIGURE 9). The Desert Rock project would emit 12.7 million tons of CO₂ per year, and if built, would result in a 15% increase in New Mexico's overall emissions of CO₂.¹⁰² Put another way, Desert Rock's projected annual greenhouse gas emissions are approximately equal to the annual greenhouse gas reductions from California's nationally leading utility-funded energy efficiency programs. California is counting on those reductions to achieve its legislatively mandated climate targets. Desert Rock, if built, would nullify the climate impact of that entire effort. The Draft EIS for the proposed Desert Rock plant completely ignores any impact that Desert Rock's emissions would have on the achievability of the state of New Mexico's climate action plan or other climate action plans in the region. Even if the project's backers claim that Navajo Nation sovereignty makes those emissions separate from New Mexico's totals, they would still add to regional and national totals and could logically be counted in estimates for the states that ultimately purchase the power.

¹⁰² Holmes, Sue Major. "Richardson Questions Desert Rock." *The Durango Herald*. 28 July 2007. 1+.

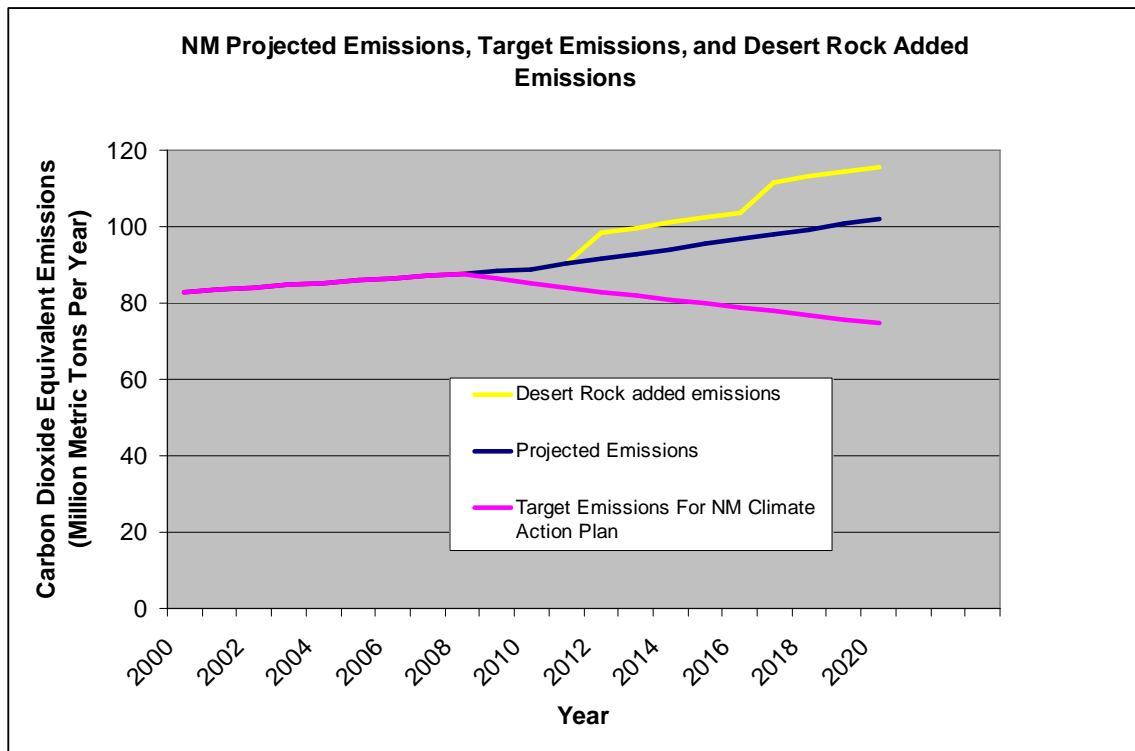


FIGURE 9. Scenario Illustrating the Degree to Which Desert Rock Impairs New Mexico’s Ability to Meet its Climate Action Plan Targets

5.5. Increasing Economic Volatility of Fossil Fuels

The Navajo Nation’s electricity supply comes from the following sources:

- The Navajo Tribal Utility Authority (NTUA) who purchases power from the following:
 - ♦ Tucson Electric Power
 - ♦ Arizona Public Service Company (western portion of reservation)
 - ♦ Public Service Company of New Mexico
 - ♦ Western Area Power Administration
- City of Farmington (provides power to those on the Navajo reservation near the city)
- City of Gallup (provides power to those on the reservation near the city)
- Continental Divide Electric Cooperative (eastern portion of the reservation)
- Jemez Mountain Electric Cooperative (eastern portion of the reservation)
- Rocky Mountain Electric (southeast Utah)

Most, if not all, of these providers and their parent companies offer electricity that is generated mainly from coal-burning facilities and other fossil fuels. Tucson Electric Power

generated 76% of their electricity through remote coal generation in 2006.¹⁰³ Arizona Public Service Company is a part owner in many coal generation facilities.¹⁰⁴ More than 50% of Public Service Company of New Mexico's electricity comes from coal.¹⁰⁵ This service is provided to the 38,000 Navajo homes that have electricity service; but 18,000 Navajo homes on the Navajo Nation still are not electrified.¹⁰⁶

To develop more coal-fired electricity on the Navajo Nation will not help to diversify the energy mix in the region; rather, it will make the Nation less stable and subject to the volatility of fossil fuel prices in the future. In FIGURE 10, below, it is evidently clear that the cost of coal has been on the rise recently, and projections show it continuing to increase, while the cost for renewable energy projects will decrease. Additionally, with such high percentages of coal-based electricity, CO₂ pollution is significantly higher than with a more diversified energy mix which includes renewable energy. This means that higher costs will result from carbon taxes and liability. Some of those costs would be passed on to consumers in the region, while the project's owners and operators would likely absorb the rest.

42% of Navajo families in New Mexico and 39% of Navajo families in Arizona are below the National poverty line, according to the U.S. Census Data from 2000. Current rate increases for electricity are affecting the Navajo Nation, with the NTUA proposing a 19% increase to the average residential customer's bill.¹⁰⁷ NTUA is blaming growth and inflation for this rate hike. Given that the proposed Desert Rock plant would only bring about less fuel diversity and more reliance on coal, long-term coal price contracts can only insulate them from some of these economic impacts – if prices for coal continue to rise, as shown in FIGURE 10 on the next page, the proposed Desert Rock plant's electricity prices will rise as well, making the plant's power less viable in the marketplace or less profitable to sell. These risks are not in the best interest of the people of the Navajo Nation.

¹⁰³ "Annual Report 2006." UniSource Energy Corporation.

<http://www.uns.com/docs/2006_Annual_Report.pdf>.

¹⁰⁴ "Power Plants." Arizona Public Service Company. 7 August 2007.

<http://www.aps.com/general_info/AboutAPS_18.html>.

¹⁰⁵ "2005 Electric Supply Plans." Public Service Company of New Mexico. 6 July 2005.

<http://www.pnmresources.com/fin/docs/2005/elec_supply_plan.pdf>.

¹⁰⁶ <<http://www.ntua.com/aboutus/About%20us%20index.htm>>

¹⁰⁷ "New Mexico Briefs: Navajo Utilities to See Rate Increases." *The Durango Herald*. 24 August 2007. 7B.

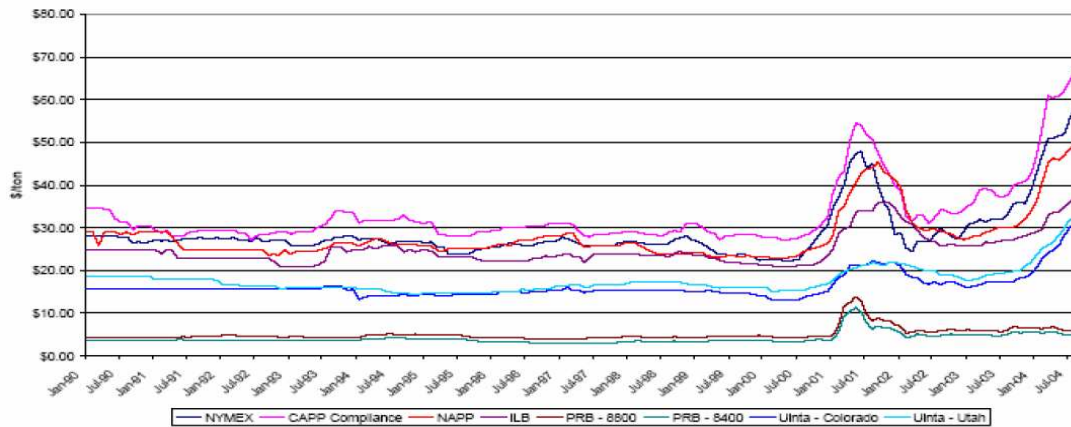


FIGURE 10. U.S. Domestic Coal Price History¹⁰⁸

The Draft EIS for the proposed Desert Rock plant fails to take into account the fact that the Navajo derive their own electricity largely from coal, so the Draft EIS incorrectly claims that building an additional coal plant somehow improves fuel diversity in the region.

¹⁰⁸ Cooper, Christopher and Dr. Benjamin Sovacool. "Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS)." June 2007. Network for New Energy Choices. <http://www.newenergychoices.org/dev/uploads/RPS%20Report_Cooper_Sovacool_FINAL_HILL.pdf>.

6. ALTERNATIVES TO DESERT ROCK

6.1. Alternative Energy & MW Capacity

Diné Natural Resource Protection Act (DNRPA) of 2005 reinforces the idea that the use of Natural Resources is not limited to extractible resources. The notion that sustainability and its practices, be it through solar and wind technology, is in the interest of the tribal government as is codified in Clause “A” of DNRPA:

The Navajo Nation Council finds that the wise and sustainable use of natural resources in Navajo Indian Country traditionally has been, and remains, a matter of paramount governmental interest of the Navajo Nation and a fundamental exercise of Navajo tribal sovereignty.¹⁰⁹

Clause “B” of DNRPA expands the definition of natural resources to include the four elements recognized in Nahasdzaán dóó Yáidilhił Bitsaądeę Beenahaz’áanii--Diné Natural Law (1 N.N.C. § 205),

The Navajo Nation Council finds that the Fundamental Laws of the Diné (Diné Bi Beenahaz’annii), as set forth in the 2002 amendments to the Title 1 of the Navajo Nation Code, Resolution No. CN-60-02, support preserving and protecting the Navajo Nation’s Natural Resources, especially the four sacred elements of life—air, light/fire, water and earth/pollen—for these resources are the foundation of the peoples’ spiritual ceremonies and the Diné life way, and that it is the duty and responsibility of the Diné to protect and preserve the natural world for future generations.¹¹⁰

The Navajo Tribal Council specifically recognizes that the wise and sustainable use of natural resources is needed to ensure the cultural, physical, spiritual survival of the Navajo people and the Diné environment. The Council utilizes the words “duty and responsibility” to mandate such sustainable practices and this section presents the steps to make renewable energy projects viable on the Navajo Nation.

A variety of factors is responsible for the growing popularity of renewable energy resources in the West. Rising consumer demand for cleaner energy has certainly played a major role. Steady declines in production costs for many renewable energy projects on a constant dollars basis have been decisive as well, particularly when the cost of coal plants is moving in the opposite direction. The political will to increasingly hold coal plants responsible for more of the societal and environmental costs of their emissions has made coal plants impossible to build in some locations and imprudent to finance in many others.¹¹¹ Multiple lawsuits have been filed to require older coal plants in Colorado, New Mexico, and Arizona to comply with Clean Air Act requirements, leading to costly retrofits of air pollution control technologies via settlement or court order.

¹⁰⁹ Navajo Nation Code, 18 Section 1301, pg. 797

¹¹⁰ Navajo Nation Code, 18 Section 1301, pg. 798

¹¹¹ Freese, Barbara and Steve Clemmer. “Gambling with Coal: How Future Climate Laws Will Make New Coal Power Plants More Expensive.” Union of Concerned Scientists. September 2006.

Today, Arizona, Colorado, Nevada, and New Mexico have Renewable Portfolio Standards (RPS) in place to take advantage of their abundant wind, solar, and geothermal energy sources. The Arizona Corporate Commission, taking the lead from more aggressive clean energy policies in Nevada and New Mexico, is considering a sustainable energy mandate that would impact power purchases for Arizona Public Service, Salt River Project, and Tucson Electric Power. Western Resource Advocates has outlined a clean and diversified energy plan for the region that limits the amount of coal burning as a fuel source.

Consumers are showing their interest in green energy voluntarily through green tag and green pricing programs offered through utilities. WGA found that nearly 300,000 residential consumers in the West¹¹² participate in these programs, with impressive growth among commercial and industrial customers as well. Green power choices are now offered to customers in every Western state.

Although the present share of national and regional electricity production from renewable energy sources is small, it is growing rapidly (FIGURE 11 and FIGURE 12). There is not a high likelihood of potential customers reversing this trend and shifting their interest from renewable energy towards coal projects. It is becoming a large financial risk to invest in and support coal and other fossil fuel development as the proposal of these projects are increasingly less likely to be approved by policymakers. There is, however, continued growth of potential customers who want to make statements and commitments regarding renewable energy and move away from dependence on coal. A few examples of western commitments and policies, which help to highlight this trend, are located in the “Alternative Energy Economics” section of the report.

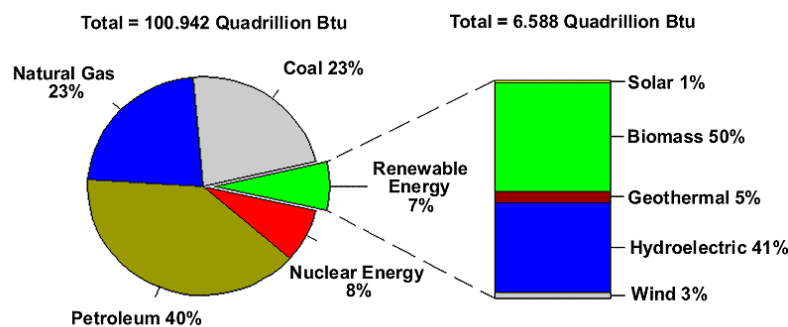


FIGURE 11. Renewable Energy Sources in the National Energy Supply (2005)¹¹³

¹¹² The Western Governors’ Association is made up of the following states and U.S. Pacific Islands: Alaska, American Samoa, Arizona, California, Colorado, Guam, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Northern Mariana Islands, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming.

¹¹³ “The Role of Renewable Energy Consumption in the Nation’s Energy Supply, 2005.” Energy Information Administration. <<http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/highlight1.html>>.

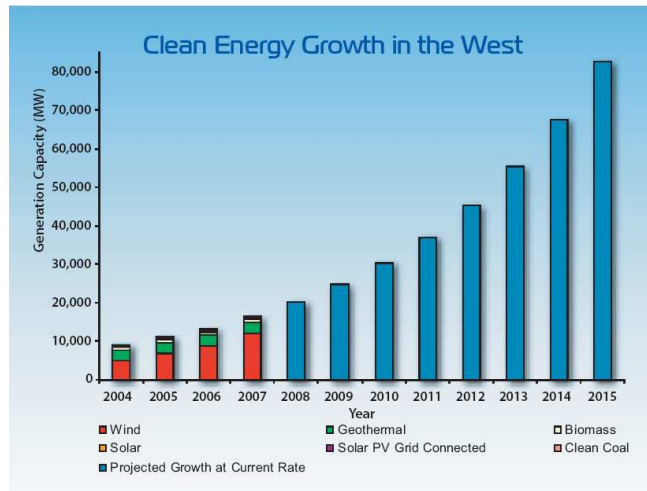


FIGURE 12. Clean Energy Growth in the West¹¹⁴

The Navajo Nation would be best served by economic development projects with a predictable timetable and with as much financial certainty as possible. This is not the case with the proposed Desert Rock plant, whose prospects for securing power purchase contracts are uncertain at best. The proposed Desert Rock plant requires long permitting and construction lead times and financial outlays in increments of more than \$1 billion each time a 750 MW unit is constructed. By contrast, renewable energy projects can be built more rapidly and financed in smaller increments to match the pace and scale of market demand for the power.

In compliance with NEPA, Federal law requires an in-depth analysis and review of reasonable alternatives in any EIS process. The Draft EIS for the proposed Desert Rock plant scarcely investigated alternative energy sources at all. The following section of this report shows how a mix of renewable energy sources and energy efficiency projects would deliver an equivalent or greater amount of energy services as the proposed Desert Rock plant, at a lower total cost to power purchasers, with more economic benefits to the Navajo Nation.

6.2. Wind

Wind, in the Diné language, is called Nílch'í, which is the Wind Spirit. Air, Breath, knowledge, and thought are intertwined within this concept and manifested through the act of tsodizin, prayer and yáti', speech. These intricate connections are part of the Diné ceremonial and religious practices in Diné place and space, exhibited through but not limited to Morning Prayer. Spiritual acts take place in the sacred place, Nahasdzáán dóó yádilhiil, as the Diné do not need tangible infrastructure in which to perform ritual and ceremony. To be in hozhó with the Spirits, however, prayer acts cannot be polluted by toxic particles and chemicals emitted by "doo nal yee dah" as mandated by Diné Natural Resource Protection Act of 2005. Nílch'í generates and sustains all life forms according to Navajo belief.

¹¹⁴ "Clean Energy, a Strong Economy and a Healthy Environment." Western Governors' Association Clean and Diversified Energy Initiative 2005-2007 Progress Report. June 2007. <<http://www.westgov.org/wga/publicat/CDEACReport07.pdf>>.

Over the ears of the corn [Hastséyaltsi]¹¹⁵ laid the other sacred buckskin with its head to the east, and then Ní'ltsi [si], the Wind, entered between the skins. [...] When [Hastséyaltsi] looked the fourth time, he saw that the white ear of corn was changed to a man, and the yellow ear to a woman. It was Ní'ltsi who gave them the breath of life. He entered at the heads and came out at the ends of the fingers and toes, and to this day we see his trail in the tip of every human finger.¹¹⁶ [...] It is the wind that comes out of our mouths now that give us life. When this ceases to blow we die [...] it shows us where the wind blew when our ancestors were created.¹¹⁷

Diné Fundamental Laws mandates that the life force of Nílch'í and practices associated with it are conducted with respected as asserted in Clause F of Nahasdzáán dóó Yádíłhíł Bitsaądeę Beenahaz'áanii--Diné Natural Law (1 N.N.C. § 205);

The rights and freedoms of the people to the use of the sacred elements of life as mentioned above and to the use of land, natural resources sacred sites and other living beings must be accomplished through the proper protocol of respect and offering and these practices must be protected and preserved for they are the foundation of our spiritual ceremonies and the Diné life way [...]

This clause makes it clear that the sustainable use of Nílch'í is doable within the conduct of respect and acknowledgement that Nílch'í is a vital part of Diné religious, spiritual practices and thus Diné culture. The use of wind in sustainable practices does not imply contaminating the air with harmful toxins, rather the natural movement of Nílch'í produces a force compatible and accommodating to modern sustainable living.

Wind energy is adding the most capacity for generating electricity in the U.S., due to reduced costs of wind technologies and environmental concerns related to traditional energy sources (climate change, pollution, health impacts, and quality of life). The current total installed wind capacity in the United States is near 10,000 MW and it is expected to grow by 3,000 MW in 2007.¹¹⁸ The U.S. has quadrupled its wind-power capacity since the year 2000, and worldwide, wind energy has grown by more than 300% since 2000 (from 17,800 MW to 74,300 MW in 2006).¹¹⁹

Wind energy is a clean energy source which the Navajo Nation could utilized in order to move forward on energy development without supporting traditional fossil-fuel based power production. The determining factors behind the potential development of a wind farm include: wind resource availability, proximity to transmission lines/substations, state policy provisions, utility green power programs/customer demand, and federal policy.¹²⁰ While the Navajo reservation does not have the same wind resources that are available to tribes living in the Midwest, they still have wind resources that are feasible to develop, large open spaces

¹¹⁵ "Talking God."

¹¹⁶ Matthews, Washington. *Navajo Legends*. Salt Lake City: University of Utah Press, 1994. 137

¹¹⁷ Ibid. 69

¹¹⁸ American Wind Energy Association (AWEA). "Wind Power Outlook 2007." <http://www.awea.org/pubs/documents/Outlook_2007.pdf>.

¹¹⁹ Johnson, Keith. "Alternative Energy Hurt by a Windmill Shortage." *The Wall Street Journal*. 9 July 2007.

¹²⁰ Flowers, Larry. NREL. "Wind Energy: Technology, Markets, Economics and Stakeholders." 9 December 2002. 8 August 2007. <[http://www.kidwind.org/ppresentations/Flowers.ppt#263,1,Wind Energy: Technology, Markets, Economics and Stakeholders](http://www.kidwind.org/ppresentations/Flowers.ppt#263,1,Wind%20Energy%20Technology%20Markets%20Economics%20and%20Stakeholders)>.

that exist near transmission lines, interest from utilities in the region, and proximity to growing markets in places such as Phoenix and Las Vegas. In addition, the Navajo Nation could use wind development to establish a reputation as leaders in renewable energy sources.

Macro-level wind estimates can be helpful for narrowing down wind development options. New Mexico ranks number 12 in wind resources among all U.S. states.¹²¹ WGA found that New Mexico could deploy the highest amount of future wind-generating capacity of all the Four Corners states, with Arizona close behind (see FIGURE 13). Our report focuses primarily on wind resources on the Navajo Nation lands within Arizona because Northern Arizona University (NAU), who found plentiful Class 3 or better wind resources there, has conducted far more detailed research there.

The Navajo Nation is well positioned geographically to take advantage of wind energy as it has access to sites with quality wind resources as well as access to regional transmission lines. The viability of wind energy projects for the purpose of exporting electricity on the Navajo Nation depends on the quality of the wind resource, the cost of constructing a wind farm on land with high wind potential, and the cost of connecting the wind farm to the electricity grid. (For a map showing the location of the proposed transmission corridor on the Navajo Nation, see FIGURE 14, below).

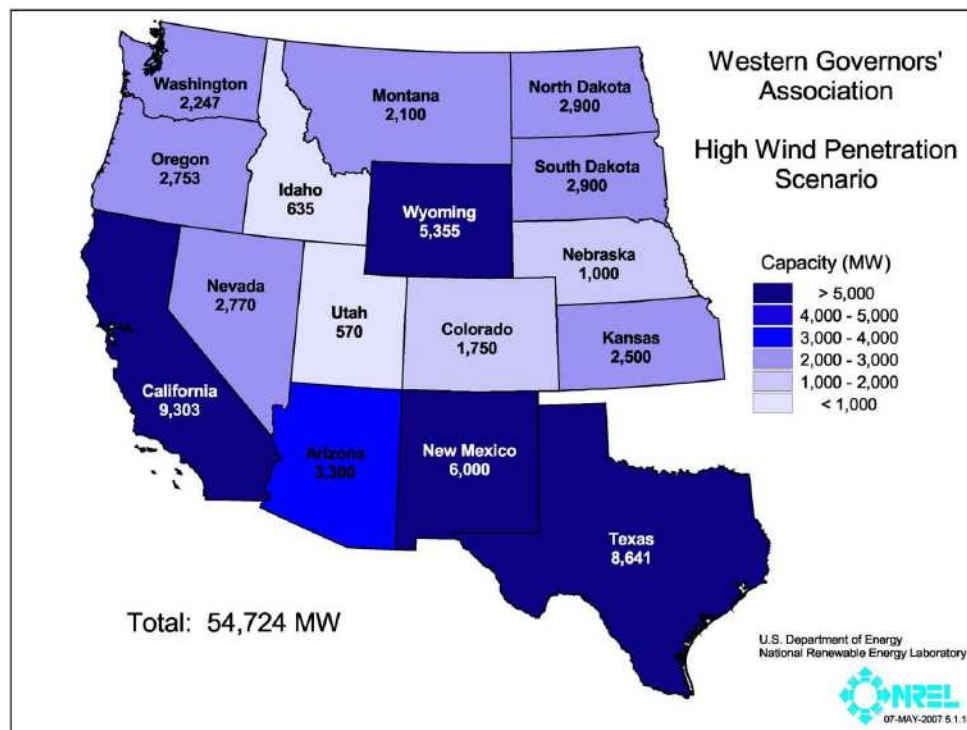


FIGURE 13. Wind-Powered Generating Capacity in the Western States¹²²

¹²¹ <http://www.newenergyeconomy.org/projects_wind.php>.

¹²² Tegen, S., M. Goldberg, and M. Milligan. 2007. Economic Development Impacts from Wind Power in the Western Governors' Association States. U.S. Department of Energy. June 3. Retrieved August 28, 2007.

Other considerations also come into play regarding the seasonality and daily variability of wind power production, and the extent to which those align with peak demand periods in the region. These conditions tend to be relatively favorable in the Southwest, even though absolute wind speeds are higher in the Midwest.¹²³ Wind resources are already under investigation by the Navajo Department of Energy-Tribal Energy Program in a wind project which includes the NTUA, NAU, advisors from Sandia National Laboratories, the National Wind Technology Center, and the Intertribal Council on Utility Policy (COUP). This project is underway and funded to focus on the evaluation of alternative wind sites, resource assessment, environmental screening, interconnection analysis, and consideration of alternative ownership scenarios.

Also, the Nambé Pueblo is teaming with Green Energy Wind, LLC, to explore feasibility of a 300 MW wind farm near Nambé Pueblo in New Mexico.¹²⁴

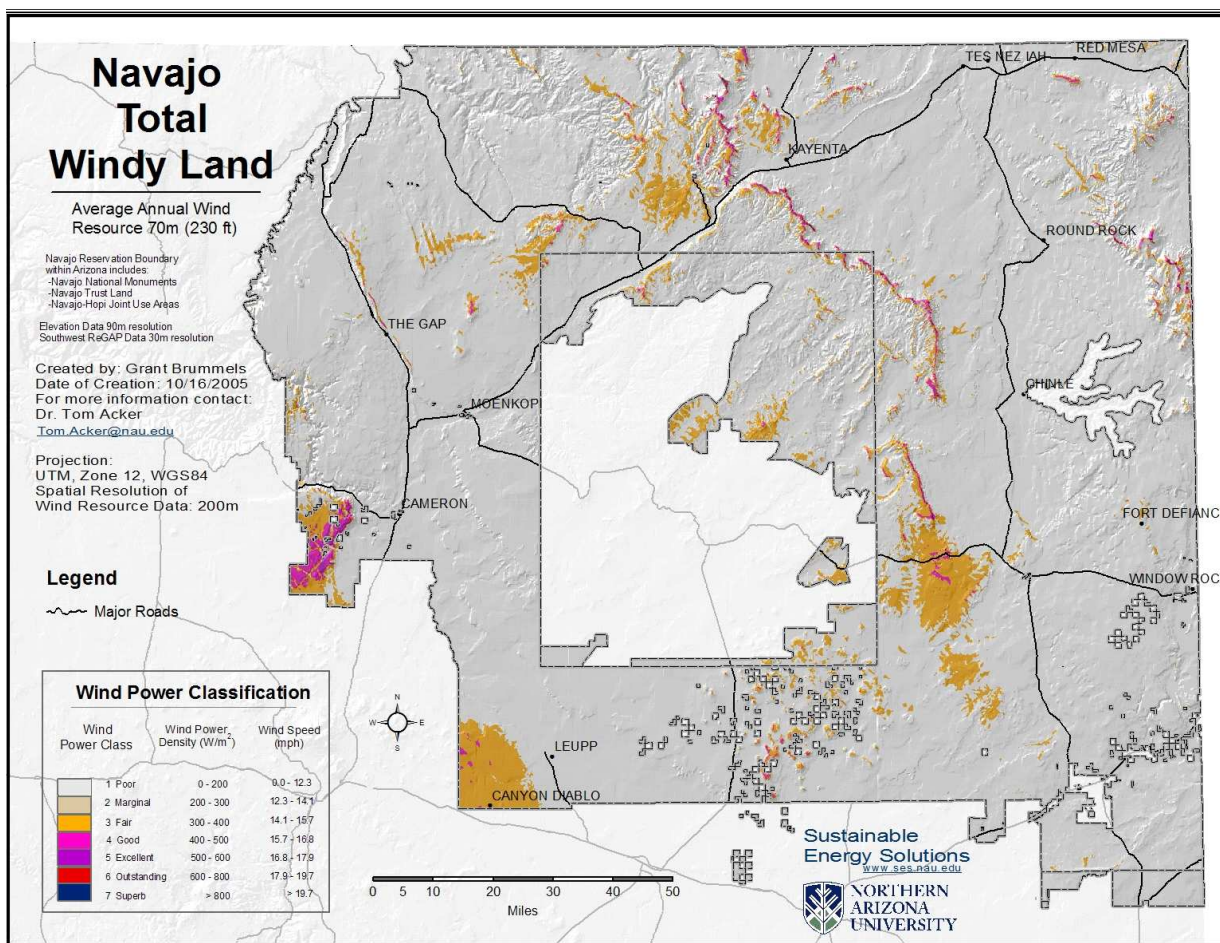


FIGURE 14. Navajo Total Windy Land¹²⁵

<http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/poster_2007_econ_dev_wga.pdf>.

¹²³ Personal communication, Grant Brummels, July 2007.

¹²⁴ *Nambé Pueblo ponders building wind farm*, The Durango Herald, December 21, 2007, Section B, p. 9.

6.2.1. Land Availability: Wind Intensity & Windy Lands

Extensive research on windy lands, utilizing Geographic Information Systems (GIS) has been performed by Sustainable Energy Solutions at NAU, including a report entitled *Navajo Wind Energy Development Exclusions: An Analysis of Land Suitable for Wind Energy Development on the Navajo Nation*. NAU has found potential Navajo Nation wind capacity within Arizona lands alone at a 70-meter hub height to be over 11,000 MW. Of this, 1,215 MW is particularly high-value Class 4 to Class 7 resource wind. This is total wind capacity on windy land that is *also* developable, meaning that the lands are not in parks, wetlands, slopes, canyons, etc.

Our initial analysis indicates that these available wind resources could produce electricity at a lower cost per kWh than the proposed Desert Rock plant, even before the cost of carbon capture technology is included. A modest amount of Class 3 wind can be added into the mix as it would still keep the overall wind resource generating electricity at a lower total cost than the proposed Desert Rock plant.

Another benefit of wind farms is that modern utility-scale wind farms are compatible with rural land uses such as ranching and farming, which are very prevalent on Navajo lands. Many wind projects could be sited in rural areas where wind resources are abundant and the operation of a wind park would be compatible with other types of existing land use. Wind projects are spread out over large areas and they have relatively small footprints. An average wind turbine removes approximately 0.5 - 1.0 acres of land from active production, so this should not be a significant concern when combined with ranching. Combining wind and ranching has been shown to be competitive and lucrative. One example of a working ranch taking advantage of wind resources is the Colorado Green Project:

The Colorado Green Project resides on about 11,000 acres used as a working cattle ranch. Less than 2% of the project's land area is used by the actual footprint of the wind turbines, leaving most of the land available for other purposes, including ranching and grazing – or, as the ranchers tell the story, the spaced used by the wind turbines translates to one less cow.¹²⁶

The Draft EIS for the proposed Desert Rock plant fails to include any serious analysis of the Navajo Nation's wind resource, its economic benefits, or its environmental advantages, and therefore omits consideration of one of the mostly highly promising alternatives to Desert Rock.

¹²⁵ Map From Northern Arizona University, Sustainable Energy Solutions, Grant Brummels, 2005

¹²⁶ "Colorado Green Wind Power Project." *Prowers County Development, Inc.* 7 August 2007.
<http://www.procolorado.org/html/colorado_green.html>.

6.2.2. Examples of Current Viable Wind Projects

Gray Mountain, near Cameron, Arizona

The DOE has estimated that Gray Mountain has a total wind resource potential of up to 800 MW. An estimate to build out to 450 MW over a three-year phased development program of 150 MW per phase is feasible at this time. The wind resource in this location is class 4 and 5, and two 500 kilovolts (kV) transmission lines cross the area, making it an excellent site for wind development.¹²⁷

The Gray Mountain site has between 23,000 and 34,000 acres (35.9 to 53.1 sq. mi.) on which to site wind turbines. Assuming an average of eight turbines per section of land, the number of turbines that could be sited (assuming 1.65 MW turbines) would be 287 turbines, with the potential to site as many as 425 wind turbines.

Building a 450 MW wind project at this site would equate to 272 turbines using 1.65 MW turbines. If larger turbines are used, somewhat fewer turbines can provide the same number of MW.

All of the land at the Gray Mountain site is on the Navajo Reservation and its elevation is about 6,400 feet above sea level and overlooks the Moenkopi Substation about 10 miles away.

Sunshine Wind Park

The proposed Sunshine Wind Park¹²⁸ in eastern Coconino County is one of the most fully developed and market-ready wind projects in Arizona. Approximately 40 state-of-the-art wind turbines will provide 60 MW of generating capacity which is enough electricity to serve the average annual electricity needs to more than 14,000 homes, or the equivalent of 66% of Flagstaff residences.

The wind park is targeted for development in the year 2008-09 timeframe, approximately 35 miles east of Flagstaff near the Meteor Crater exit along the Interstate 40 highway. The turbines will be sited on leased land which is a combination of Hopi private-fee lands and private ranch lands. Sunshine Arizona Wind Energy, LLC, the developer of Sunshine Wind Park, is a partnership of Northern Arizona investors and Foresight Wind Energy, LLC.

Edison Mission Energy (EME)

EME currently has 616 MW of wind projects in operation or under construction. One of their projects, the San Juan Mesa Wind Project, is a 120 MW wind farm located in eastern

¹²⁷ Mills, Andrew D. "Wind Energy in Indian Country: Turning to Wind for the Seventh Generation." Berkeley: University of California. 2006.

¹²⁸ Foresight Wind, San Francisco, CA

central New Mexico, where available wind resources are similar to that on the Navajo Nation.¹²⁹

6.3. Solar Energy

The Sun in Diné culture is Jóhonaa'éeí, the Sun God, and Father to the Twin Brothers born unto Asdzáá Nádlééhi.¹³⁰ The solar rays that extend from the sun are called Sháándíín.¹³¹ In Diné belief, the Sun is conceptualized as the supernatural entity which restores balance after social ills and abuse of freedom and powers wreak havoc in the worlds prior to modernity. The Sun's natural energies equip the Diné with the tools they need to restore balance. According to the Diné creation story;

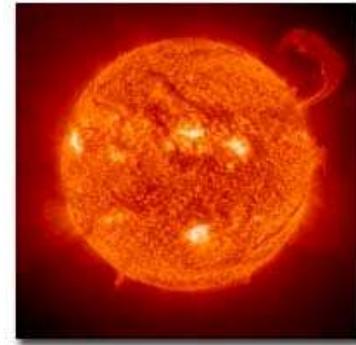


Photo credit: NASA - SOHO Project
Extreme Ultraviolet Imaging Telescope

The Holy People called for the restoration of the laws and righteousness; hence a female holy child was created, and when she grew up she was called White Shell Woman, Yoo'lgai 'Asdzáá. The Holy People instilled White Shell Woman with the revelation of the Holy Spirit's creation and his purposes, the White World livelihood circumstances, the future, and the purposes of her appearance. With the spiritual blessing upon her, she delivered her twin sons. (The White Shell Woman is also acknowledged as Changing Woman, 'Asdzáá Nádlééhi. Every time she meets the old age she does not die, she changes back to her youth.)

When the Twin-Brothers grew up they took a sacred journey to their sacred father, the sun God. From their father brought forth with them the sacred armors and the sacred weaponry fortified with natural energies. They became the Twin-Warriors, Naayée Neizgháí¹³² [sì] dóó Tó Bájíshchíní¹³³, who supernaturally restored the world back to harmony and righteousness.¹³⁴

Naturally occurring solar energy serves not only as atonement for social and economic ills but it is a natural resource codified and protected in Clause "B" of Diné Natural Resource Protection Act of 2005 and Clause "A" of Nahasdzáán dóó Yádíłhíł Bitsáadeę Beenahaz'aanii--Diné Natural Law (1 N.N.C. § 205). Diné teachings show that the Diné have depended and called upon the Sun to provide the energy they need to sustain the environment and traditional economy (vegetation and agriculture). The same principle applies to utilizing solar energy for sustainable energy development without the detriment of health hazards, air pollution, and water depletion.

¹²⁹ Voss, Robert W. Asst. VP Finance, Edison Capital. Email Interview. 24 May 2007.

¹³⁰ Asdzáá Nádlééhi, Changing Woman, is the most revered Navajo Female Deity who created the Navajo clan system. The Hóózhóí Ceremony (Blessing Way Ceremony) was performed on Asdzáá Nádlééhi and this ceremony is the backbone of all Diné Ceremonies.

¹³¹ "Sháá- is interpreted as "shadows" and "-díín" is a long invisible ray that brings light; "Sháándíín" is the natural occurrence when sunrays become evident by the shadows they cast.

¹³² Naayee Nezghani - "Monster Slayer"

¹³³ "Born – For – Water"

¹³⁴ Barber, Henry. *Navajo Common Law Project*. Window Rock, Arizona: Office of the Speaker, Navajo Nation Council, 2002. 8

Solar energy can be converted directly or indirectly into other forms of energy, such as heat and electricity. Solar energy is used for heating water for domestic use, space heating of buildings, drying agricultural products, and generating electrical energy.

The Southwest has solar energy resources that are among the best in the world according to the Solar Energy Industries Association, presenting great opportunities for solar development in the area.¹³⁵ The region's high quality solar resources are evident in the NREL map below (FIGURE 15). These available resources are proximate to existing and proposed transmission lines and they dwarf the amount of energy available from excavating and burning Navajo coal over the coming century.

In 2006, global solar photovoltaic (PV) production rose to 2,521 MW. Grid-based installations were up by 47% in 2006, comprising 2000 MW of production, demonstrating dramatic growth in solar PV capacity. U.S. production rose 31% in 2006, to nearly 202 MW, placing the country in fourth place behind China.¹³⁶ With increasingly better policies around renewable energy projects in the U.S. and a fast-growing world-market, it is likely that the installed PV will grow quickly as prices decrease. In July of 2006, WGA released a report on available solar capacity in the western states, which showed the potential for three different types of solar technology: 4,000 MW of PV, 4,000 MW of concentrating solar power (CSP), and 2,000 MW of solar hot water in the west if the correct policies were enacted.¹³⁷ WGA also found that a handful of states have dominated PV installations to date, but that the potential exists for growth in PV applications in many other western states (see FIGURE 16).

¹³⁵ Morse, Dr. Frederick H. "Central Station Solar Electricity: Concentrating Solar Power." <www.epa.gov/cleanenergy/pdf/morse-dec6.pdf>.

¹³⁶ Sawin, Janet L. "Solar Power Shining Bright." WorldWatch Institute. 2007.

¹³⁷ "US Solar Industry: Year in Review." 2006. Prometheus Institute and SEIA. 7 August 2007. <http://www.seia.org/Year_in_Solar_2006.pdf>.

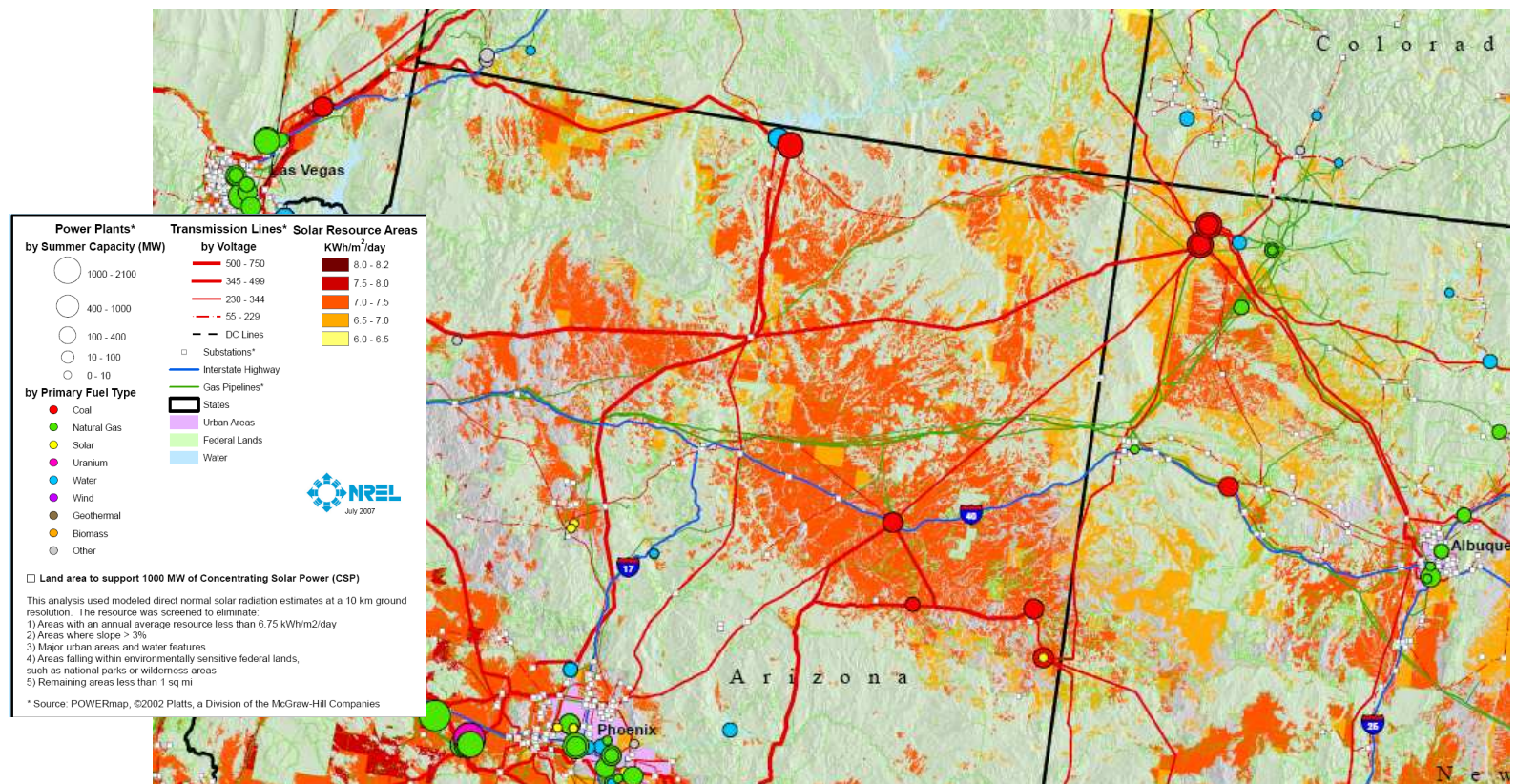
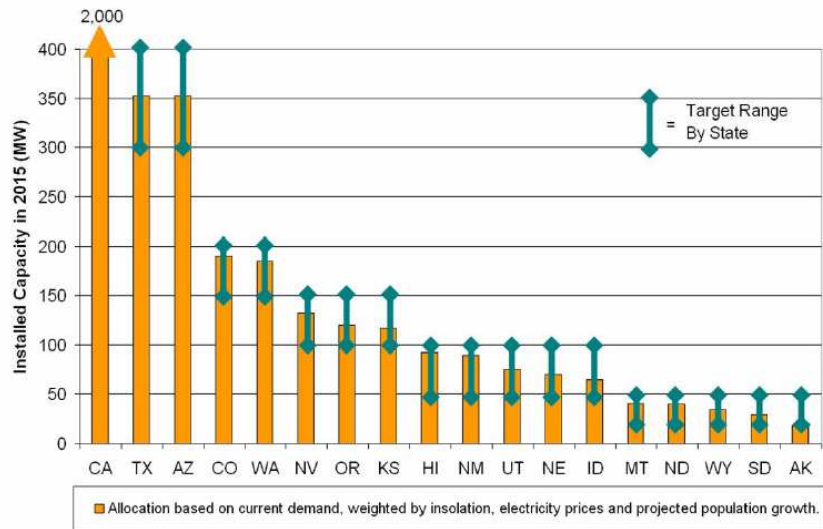


FIGURE 15. Solar Resource Areas of the Southwest¹³⁸

¹³⁸ “Concentrating Solar Power Prospects of the Southwestern United States.” July 2007. Map Courtesy of National Renewable Energy Laboratory (NREL).



Source: NREL

FIGURE 16. Weighted Allocation of Installed Dist. Solar Capacity¹³⁹ in WGA States

(Total=4 GW in 2015)¹⁴¹

FIGURE 17 and FIGURE 18 illustrate the extent to which PV installations are expected in the western states between now and the year 2020. In FIGURE 16, above, California's dominance of the total installed capacity is less a reflection of the quality of its solar resource than its government's early leadership on the issue. The solar resource on the Navajo Nation is just as good or better than it is in most parts of California, yet little progress has been made to capture that opportunity.

¹³⁹ This table depicts the WGA's research regarding solar PV, solar water heating systems, and solar space heating and cooling systems in states throughout the west. It is based on current demand, and weighted by the amount of sunshine, electricity prices, and projected population growth.

¹⁴⁰ The Western Governors' Association is made up of the following states and U.S. Pacific Islands: Alaska, American Samoa, Arizona, California, Colorado, Guam, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Northern Mariana Islands, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming.

¹⁴¹ "Solar Task Force Report." January 2006. Clean and Diversified Energy Initiative. Western Governors' Association. <<http://www.westgov.org/wga/initiatives/cdeac/Solar-full.pdf>>.

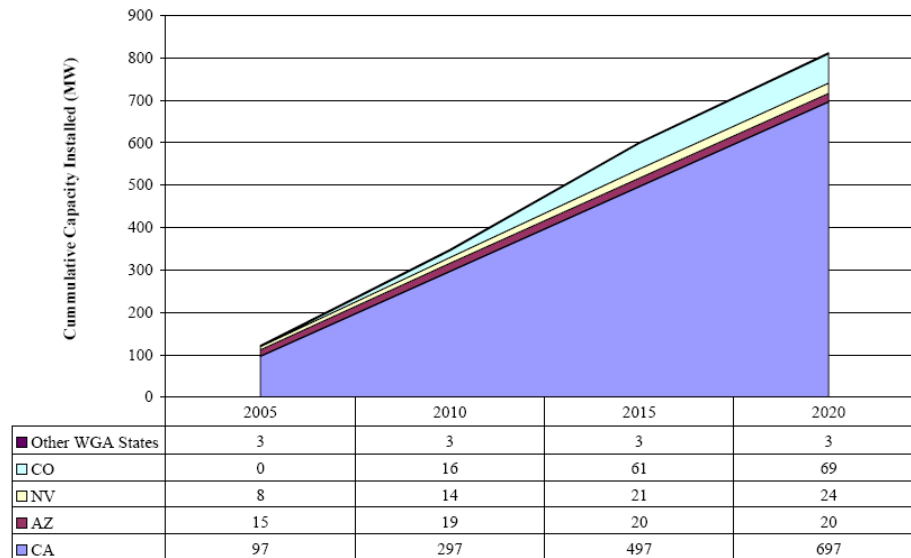


FIGURE 17. Projected PV Installations in the WGA States – Low Baseline Scenario

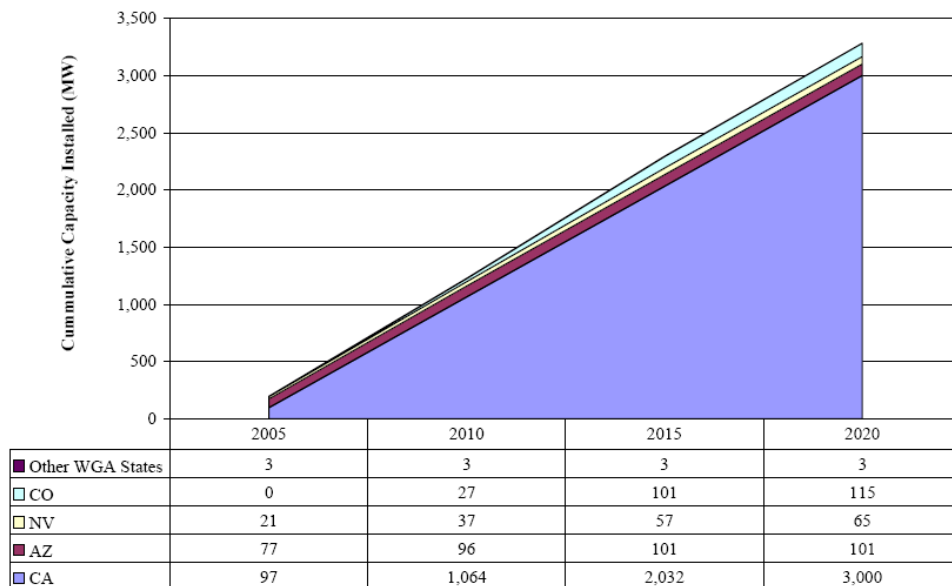


FIGURE 18. Projected PV Installations in the WGA States – High Baseline Scenario

6.3.1. Discussion of Active Non-concentrating Solar Energy Systems

The performance of a photovoltaic array is dependent upon sunlight. Climate conditions (e.g., clouds, fog) have a significant effect on the amount of solar energy received by a PV array and, in turn, its performance. Only sunlight of certain energies will work efficiently to create electricity, and much of these energies are reflected or absorbed by the materials that make up the photovoltaic cells. Because of this, a typical commercial PV cell has an

efficiency of 12%-18%, about one-sixth of the sunlight striking the cell generates electricity. The efficiencies of differing types of photovoltaic cell technologies are as follows:

- Single crystalline photovoltaic is the most efficient and most spectrum specific of the PV panels.
- Polycrystalline PV panels have a good efficiency rating and operate under a broader spectrum of light.
- Amorphous or Thin Film Solar (TFS) PV panels have non-crystalline semiconductors (Copper Indium Diselenide, CuInSe_2 , sometimes incorporating Gallium or Sulfur), an acceptable level of efficiency, and the broadest light spectrum for operation.
- Third wave TFS Technology is classified as an amorphous PV panel, yet brings 7 technological innovations to CIGS (Copper Indium Gallium Diselenide), yielding relatively quick and inexpensive PV panels:
 - ♦ Nano-structured components
 - ♦ Printable semiconductor
 - ♦ Printable electrode
 - ♦ Rapid thermal processing
 - ♦ Low-cost substrate
 - ♦ Roll-to-roll processing
 - ♦ Fast assembly

The modular characteristic of photovoltaic energy allows arrays to be installed quickly and in any size required or allowed. The environmental impact of a photovoltaic system is minimal, requiring no water for system cooling and generating no by-products. Photovoltaic cells, like batteries, generate direct current (dc) which is generally used for small loads (electronic equipment). When dc from photovoltaic cells is used for commercial applications or sold to electric utilities using the electric grid, it must be converted to alternating current (ac) using inverters.

6.3.2. Main Types of Concentrating Solar Power Technologies and Costs

There are three main types of CSP technologies: trough systems, dish/engine systems and power towers.

These technologies are used in CSP plants which vary in their use of different mirror configurations to convert the sun's energy into high-temperature heat. The heat energy that is produced is used to generate electricity in a steam generator. CSP's relatively low cost and ability to deliver power during periods of peak demand—when and where consumers need it—means that CSP can be a major contributor to the nation's future needs for distributed sources of energy. FIGURE 19, below, shows a diagram of a parabolic trough system which

illustrates a working CSP system while also demonstrating how solar collectors could easily be linked with a natural gas plant to firm up the output power during peak demand.

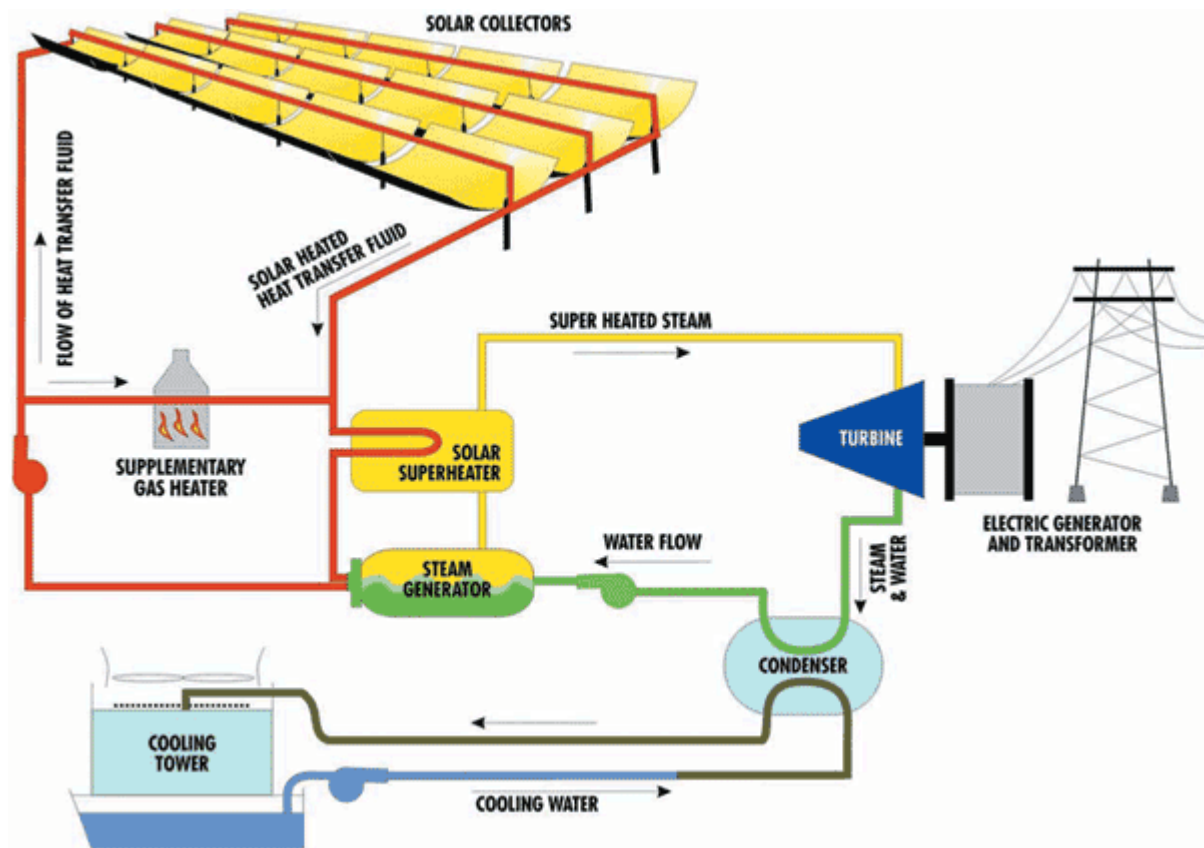


FIGURE 19. Concentrated Solar Plant Diagram ¹⁴²

The development of CSP technology is being recognized as a sustainable solution to energy development around the world as well as in the U.S. CSP plants are under development in Spain, Algeria, and Israel, and early development plans are being made for CSP in South Africa, Mexico, India, Morocco, and Egypt. California has had 354 MW of CSP operating successfully for the last 15 years.¹⁴³ More projects are currently under development in California, and other projects have either been recently completed or almost completed in Arizona and Nevada.¹⁴⁴

CSP plants require only 7.7 square miles of land to generate 1,000 MW, and New Mexico has over 1 million MW of solar capacity which would require only 9,157 square miles of land (See Table 14).¹⁴⁵ The Navajo Nation has excellent solar resources as shown in the solar

¹⁴² Jones, Jackie. *CSP Lifts Off: Nevada Solar One Comes to Life*. Renewable Energy World. Vol. 10 Issue 3. May/June 2007.

¹⁴³ Morse, Dr. Frederick H. "Central Station Solar Electricity: Concentrating Solar Power." www.epa.gov/cleanenergy/pdf/morse-dec6.pdf.

¹⁴⁴ *Concentrating Solar Power Funding Opportunity Announcement*. U.S. Department of Energy, Energy Efficiency and Renewable Energy. 20 August 2007.

¹⁴⁵ Morse, Dr. Frederick H. *Central Station Solar Electricity: Concentrating Solar Power*. www.epa.gov/cleanenergy/pdf/morse-dec6.pdf.

resource map (FIGURE 15), and their lands include 4,775,068 acres¹⁴⁶ (7,451 square miles). Utilizing FIGURE 15, it appears that at least 5% of the Navajo land is considered excellent for solar development, which means the possibility of 48,383 MW of solar generation.

Table 14. Southwest Solar Energy Potential*

State	Solar Capacity (MW)	Land Area (Sq Mi)
AZ	1,652,000	12,790
CA	742,305	5,750
NV	619,410	4,790
NM	1,119,000	9,157
Total	4,132,715	32,487

*The table represents land without major competing uses today. It excludes land with slope >1%, and does not count ecologically sensitive lands. The solar energy resource is greater than or equal to 7.0 kWh/m²/day (includes only excellent and premium resource).

Parabolic Troughs are used in the Luz solar plant, which is the largest solar power facility in the world located in the Mojave Desert at Kramer Junction, California and it operates at a capacity of 354 MW. This facility has operated since the 1980's and accounted for the majority of solar electricity produced by the electric power sector in 2004.¹⁴⁷ In addition, Acciona Energy has recently opened "Nevada Solar One," a 64 MW facility in Nevada, financed by Banco Santander and BBVA of Spain, Caixa Geral de Depositos of Portugal, JP Morgan Capital Corporation, Northern Trust, and Wells Fargo.¹⁴⁸ Florida Power & Light also recently announced plans to build a similar, 300 MW facility¹⁴⁹ as part of a larger commitment by a coalition of utilities and investors to build 2,000 MW of solar thermal projects across the country, largely in California (PG&E has committed to 1,000 MW).¹⁵⁰

¹⁴⁶ "Navajo Lands Arizona." Phoenix Real Estate. <<http://www.arizonan.com/Indianlands/navajo.html>>.

¹⁴⁷ <http://en.wikipedia.org/wiki/Solar_Energy_Generating_Systems>.

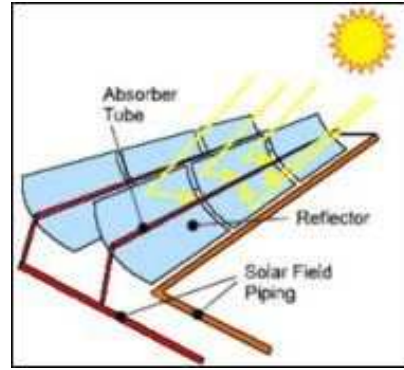
¹⁴⁸ <<http://www.acciona-energia.es/default.asp?x=00020401&z=000105&item=498>>; <http://en.wikipedia.org/wiki/Nevada_Solar_One>.

¹⁴⁹ <http://www.sptimes.com/2007/09/27/State/FPL_unveils_plans_for.shtml>; and *Power Magazine*, August, 2007, p. 13, <<http://www.powermag.com/ExportedSite/Archives/Archives.htm>>.

¹⁵⁰ <<http://www.reuters.com/article/scienceNews/idUSN2720694420070927>>.



Photos Courtesy of Wikipedia



A parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's radiation on a linear receiver located at the focus of the parabola. The collector tracks the sun along one axis from east to west during the day to ensure that the sun is continuously focused on the receiver. Because of its parabolic shape, a trough can focus the sun's radiation at 30 to 100 times its normal intensity (concentration ratio) on a receiver pipe located along the focal line of the trough, achieving operating temperatures at over 400° C.



Nevada Solar One's solar panel farm and close-up details of the installation.¹⁵¹

A large collector field consists of single-axis tracking parabolic trough collectors. The solar field is modular in nature and is composed of many parallel rows of solar collectors aligned on a north-south horizontal axis. A working (heat transfer) fluid is heated as it circulates through the receivers and returns to a series of heat exchangers at a central location where the fluid is used to generate high-pressure superheated steam. The steam is then fed to a conventional steam turbine/generator to produce torque which, in turn, produces electricity. After the working fluid passes through the heat exchangers, the cooled fluid is re-circulated through the solar field. The plant is usually designed to operate at full rated power using solar energy alone, given that there is sufficient solar energy. Most solar fields, however, are usually configured as hybrid solar/fossil plants which have a fossil-fired capability that can be used to supplement the solar output during periods of low solar energy. The Luz plant, for example, is a natural gas hybrid.

Solar Dish and Engine: A solar dish/engine system utilizes concentrating solar collectors that track the sun on two axes, concentrating the energy at the focal point of the dish because it is always pointed at the sun. The solar dish's concentration ratio is much higher than the solar trough, typically over 2,000, with a working fluid temperature over 750° C.

¹⁵¹ <<http://www.nevadapower.com/company/renewables/>>.

The power-generating equipment used with a solar dish can be mounted at the focal point of the dish so that it is well suited for remote operations or, as with a solar trough system, the energy may be collected from a number of installations and converted to electricity at a central point. The engine in a solar dish/engine system converts heat to mechanical power by compressing the working fluid when it is cold, heating the compressed working fluid to cause expansion, and then routing the expanded fluid through a turbine to turn a shaft (torque). The shaft of the engine is coupled to an electric generator to convert the mechanical power to electric power.

LUZ II's Distributed Power Tower (DPT) 550 technology heats water to superheated steam at a temperature of 550 to 565⁰ C. A high efficiency steam turbine converts the superheated steam to electricity, which is sent to a power grid. The DPT 550 technology is more than 40% efficient in thermal to electric conversion. Both 100 MW and 200 MW power plants are currently being designed with this technology.

LUZ II's DPT 1200 technology, currently under development, heats compressed air to a temperature of 1200⁰ C. The heated air then powers a combined gas to steam turbine cycle. After entering and driving a front end gas turbine, residual exhaust heat generates input steam for a back-side steam turbine. Due to the higher temperatures and efficiencies of the combined cycle, the DPT 1200 technology will achieve a thermal to electric conversion efficiency of 50 – 60% - up to 20% higher than the DPT 550 system.

Solar Power Towers or central receivers generate electricity from sunlight by focusing concentrated solar energy on a tower-mounted heat exchanger (receiver). This system uses hundreds to thousands of flat sun-tracking mirrors called heliostats to reflect and concentrate the sun's energy onto the central receiver tower. The energy can be concentrated as much as 1,500 times that of the energy coming in from the sun. Energy losses from thermal-energy transport are minimized as solar energy is being directly transferred by reflection from the heliostats to a single receiver, rather than being moved through a transfer medium to one central location, as with parabolic troughs. Power towers must be large to be economical. This is a promising technology for large-scale grid-connected power plants. Though power towers are in the early stages of development compared with parabolic trough technology, a number of test facilities have been constructed around the world.

LUZ II's DPT technology consists of a number of solar clusters, each of which includes a power tower surrounded 360⁰ by an array of heliostats. The heliostats track the sun and reflect the sunlight onto a receiver, which is located on the top of a power tower. Power towers are linked together by pipelines to a central location where electricity is generated and sent to a power grid. Table 15 provides a cost comparison among the various CSP technologies.

Table 15. Concentrating Solar Power Technology Cost Comparison¹⁵²

TECHNOLOGY COST COMPARISON:

	SEGS 6 (Original Luz parabolic trough design)	Optimum Trough (Improved parabolic trough design)	DPT 550 (LUZ II superheated steam technology)	DPT 1200 (LUZ II air to combined gas- steam turbine technology)
Temperature (C)	370 C	400 C	550 C	1200 C
Solar to Thermal Efficiency	35%	40%	50%	48%
Gross Thermal to Electricity Efficiency	37%	39%	43%	51%
Parasitic Power	14%	12%	5%	3%
Solar to Electrical Efficiency	11%	14%	20%	24%
Solar Field Cost (\$/square meter)	\$280	\$250	\$150	\$150
Relative Cost per kWh	100%	90%	70%	55%

The Draft EIS for the proposed Desert Rock plant is deficient in that it does not present viable examples of PV or solar thermal alternatives to Desert Rock, and therefore misses one of the most viable options for economic development and energy production in the region.

6.4. Natural Gas

Both coal and natural gas are fossil fuels which have each experienced significant spot price fluctuations in recent years, making the economics of power plants based on either fuel somewhat uncertain. Natural gas, however, retains some key advantages that make it worthy of consideration as a supplement to the resource mix on the Navajo Nation. If the Navajo Nation were to pursue a primarily renewable energy-based alternative to Desert Rock, natural gas could augment the project as a peaking or baseline resource to “firm up” the supply during times when solar or wind resources are not available.

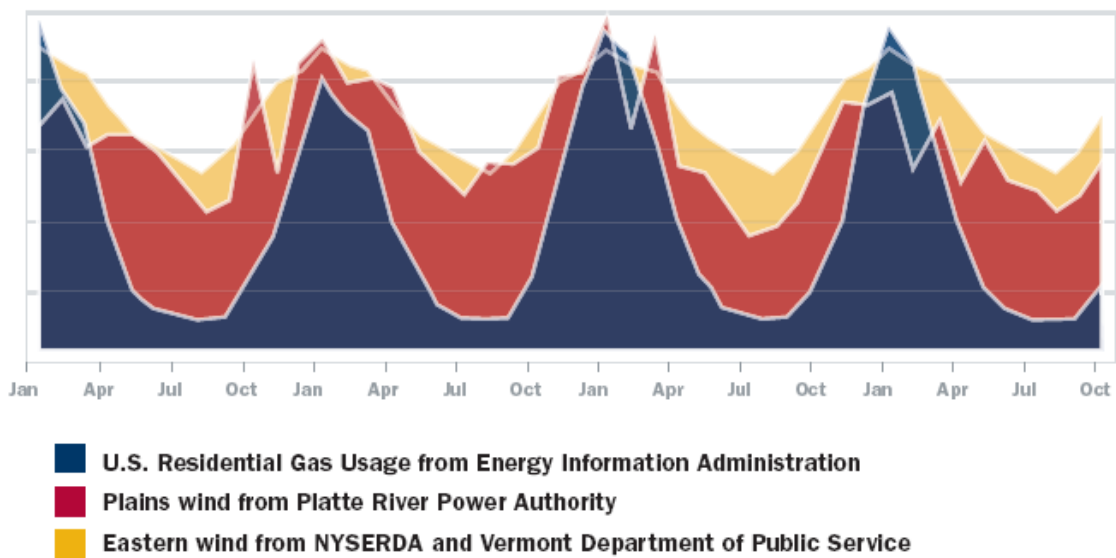
This should not be construed as an argument for developing new natural gas wells in the region, but rather for finding a way to increase the economic development opportunities to the Navajo Nation from gas already being extracted on and near Navajo lands. The vast majority of the natural gas which is currently extracted on or near the reservation is sent via pipeline outside of the region, mostly to California for its use in natural gas-fired power plants. By converting that gas into electricity on the Navajo reservation in a state of the art, highly efficient combined cycle natural gas plant, the Navajo Nation could make direct use of that high value energy form in lieu of purchasing electricity from other projects outside its region. The Navajo Nation could sell that electricity on the open market during peak times at a significant price premium. Such a plant could ramp its electrical output upward and

¹⁵² BrightSource Energy, Inc. *A Company Overview*. PowerPoint Presentation. Provided by Charles Ricker, Senior Vice President, Marketing & Business Development. Email Interview. 7 August 2007.

downward rapidly in response to peak energy demands from customers or to firm up the output of wind and solar resources, increasing the market value of their electricity. For example, FIGURE 20, below, shows how natural gas peak use periods correspond with the times that the wind is blowing hardest seasonally in some parts of the Northeast United States. Similarly, concentrated solar delivers peak output at opposite seasons from wind in the Southwest, making natural gas a promising resource to utilize in backing up the combination of solar and wind year-round. It is also the case that natural gas and CSP plants duplicate a substantial amount of infrastructure, so co-locating them can greatly reduce the cost, land requirements, and environmental impacts of building them both separately.

Wind Energy: A Good Match for Natural Gas

Seasonal peaks in wind power generation correspond to peaks in natural gas use.



Note: This is data has been scaled for display. Individual sites are used to represent the entire region.

FIGURE 20. Wind Energy and Natural Gas Peak Demand¹⁵³

Natural gas burns more cleanly than coal, having virtually no emissions of sulfur oxides, particulate matter or mercury. The capital costs of constructing natural gas plants are far lower than supercritical pulverized coal plants (see FIGURE 21), and the overall costs are only slightly higher. Once the costs of carbon capture are included, the supercritical coal plant would be fully 17% more expensive overall than the natural gas alternative.¹⁵⁴

¹⁵³ "Wind Power Outlook 2005." American Wind Energy Association. 2005. <http://www.awea.org/pubs/documents/Outlook%202005.pdf>.

¹⁵⁴ NETL, *Cost and Performance Baseline for Fossil Energy Plants - Volume 1: Bituminous Coal and Natural Gas to Electricity, Final Report*, DOE/NETL-2007/1281, May 2007, p. 11.

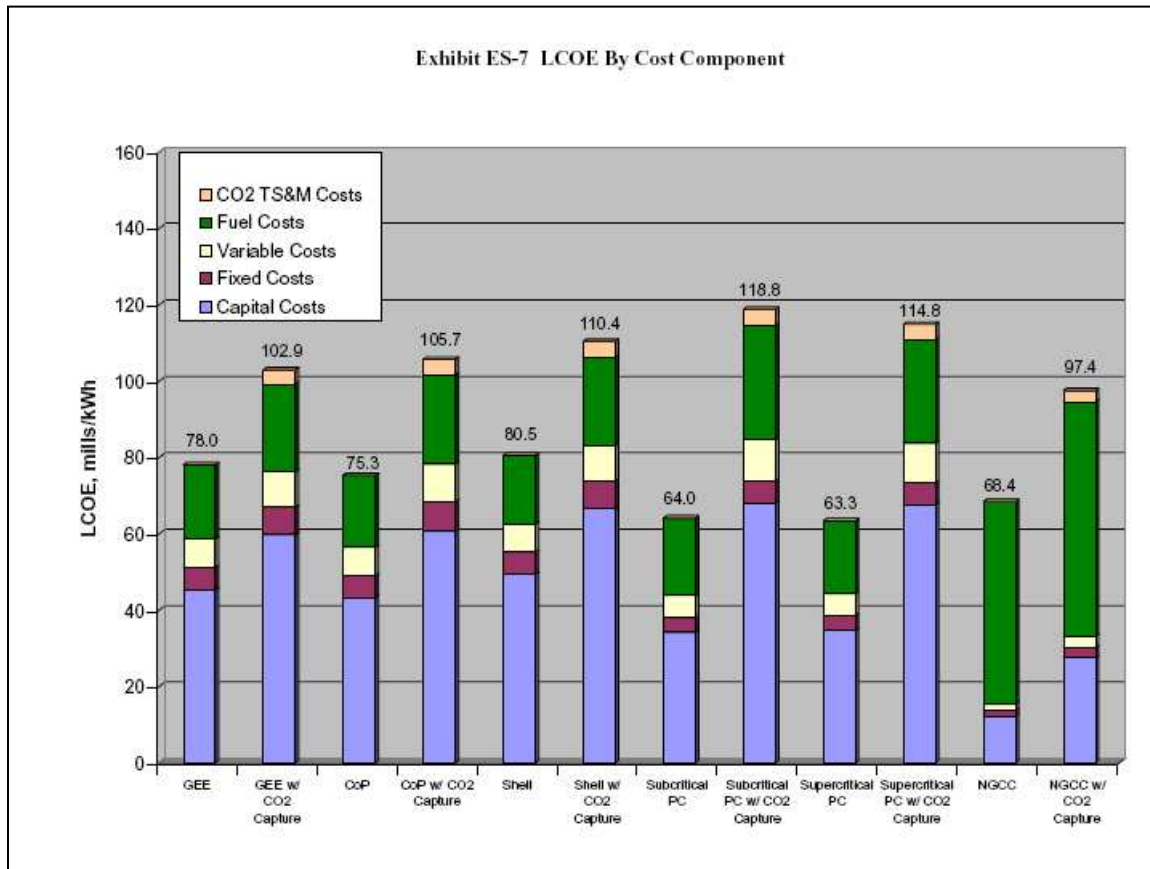


FIGURE 21. Cost and Performance Baseline for Fossil Energy Plants

The CO₂ emissions per unit of electricity produced by natural gas plants are much lower as well, particularly in high efficiency combined cycle plants (which can in turn be fitted to capture CO₂). The best combined cycle designs also have very low NO_x emissions, which was not the case with previous natural gas technologies. As a result, the environmental advantages of a natural gas plant over a coal plant are undeniable, including higher efficiency, lower water use, lower CO₂ emissions, and lower emissions of criteria air pollutants and toxics per unit of electricity produced, as shown in Table 16, below.

Table 16. Summary of NETL's Findings, with and without CO₂ Capture¹⁵⁵

	Coal Integrated Gasification Combined Cycle		Pulverized Coal Boiler		Natural Gas Combined Cycle	
	Average of GEE, CoP, Shell		Supercritical (proposed Desert Rock technology)		Advanced F Class	
CO ₂ Capture	No	Yes	No	Yes	No	Yes
Net Plant HHV Efficiency	39.5%	32.1%	39.1%	27.2%	50.8%	43.7%
Raw Water Usage (gpm)	3,851	4,426	5,441	12,159	2,511	4,681
LCOE (cents/kWh) ¹	7.8	10.6	6.3	11.5	6.8	9.7
CO ₂ Emissions (lb/MWh) ²	1,714	219	1,773	254	797	93
SO ₂ Emissions (lb/MWh) ³	0.09	0.08	0.70	Negligible	Negligible	Negligible
NO _x Emissions (lb/MWh) ³	0.42	0.38	0.58	0.72	0.06	0.07
PM Emissions (lb/MWh) ³	0.05	0.06	0.11	0.13	Negligible	Negligible
Hg Emissions (lb/GWh) ³	0.00414	0.00454	0.00945	0.0118	Negligible	Negligible

¹ Capacity factor is 80% for IGCC cases and 85% for PC and NGCC cases

² Value is based on net output

³ Value is based on gross output

A natural gas power plant on the eastern side of the Navajo Nation could utilize gas from existing local wells (conventional and coal-bed methane), rather than exporting the gas via pipeline to the southwest and California for electricity production there. By adding value locally instead of exporting the raw product, the Navajo Nation could capture a greater share of revenue and enhance their economic opportunity, without nearly as many environmental impacts as the proposed coal plant.

For example, the Groton Generating Station, currently operating at a capacity of 100 MW in Groton, South Dakota, utilizes gasified coal and can produce at full capacity from a cold start within 10 minutes. It operates at a very low heat rate of about 7,500 Btu/kWh, and was built from groundbreaking to producing power in 11 months (August 1, 2005 to July 31, 2006).¹⁵⁶

The Draft EIS for the proposed Desert Rock plant made assessments of natural gas-based alternative opportunities (three paragraphs), but they are deficient for the following reasons:

¹⁵⁵ Adapted from NETL, *Cost and Performance Baseline for Fossil Energy Plants - Volume 1: Bituminous Coal and Natural Gas to Electricity, Final Report*, DOE/NETL-2007/1281, May 2007, p. 4.

¹⁵⁶ Peltier, Robert, PE, *Groton Generating Station*, in *Power*, September, 2007, pp. 30-32.
<<http://www.powermag.com>>.

1. The Draft EIS assumed that the only way to create economic opportunities for the Navajo Nation was to extract and burn coal:

The BIA has determined that the use of natural gas as the fuel for the proposed generating facility would not meet the purpose and need for the project (i.e., the economic development through sale of Navajo Nation coal resources). Therefore the BIA eliminated this alternative from detailed evaluation.¹⁵⁷

In fact, this is not the case. The purpose of the proposed Desert Rock project can at best be described as “economic development through pursuit of energy projects on the Navajo Nation.” A thorough analysis is required to show that a coal-based project is the best way to accomplish such economic development, not simply an assertion by the project’s proponents that defining it a certain way makes it so. This report documents that a mix of renewable energy, locally-available natural gas, and energy efficiency resources would offer a more diverse fuel mix, meet the energy service need at a lower total cost, and provide more economic development opportunities than the proposed Desert Rock coal plant. A credible EIS would conduct a thorough analysis of such a mix and its associated environmental and economic consequences before casually dismissing alternatives as “not meeting the purpose of the project.”

2. The Draft EIS asserts that sites on the Navajo Nation are “generally less attractive for the development of a natural gas-fired plant due to distance from load and high elevations,”¹⁵⁸ without factually demonstrating that either assertion is true. Given that most of the natural gas and coal bed methane resources developed to date on the Navajo Nation are found in the eastern portion of Navajo lands near the proposed site of Desert Rock, it is not clear that they are any farther away from the target markets for the power than a coal-based option would be. Some of those resources would actually be closer. More analysis is needed in the EIS on this point.
3. The Draft EIS asserts that “Navajo coal sold under long-term contract would be expected to cost 70 percent less than natural gas, largely because of reduced price volatility due to the long-term contract.”¹⁵⁹ This is a fallacious argument on a number of grounds. Long-term contracts for both fuels tend to stabilize their prices significantly. Moreover, when the natural gas originates from Navajo-owned sources, any Navajo-owned power plant utilizing it is further insulated from price fluctuations in the spot marketplace, because gas does not need to be purchased on the open market to operate the plant. As shown earlier, fuel costs only represent a fraction of the total cost per kWh of a power plant. In the case of coal, upfront capital costs dominate, so simply comparing the fuel costs of each option masks the real economic differences. Finally, the cost of Desert Rock with CO₂ capture makes it significantly more expensive (and still more polluting) than a natural gas power plant with CO₂ capture. None of these aspects of the issue were acknowledged or addressed by the Draft EIS for the proposed Desert Rock plant.

¹⁵⁷ Draft EIS, May 2007, p. 2-33.

¹⁵⁸ Ibid.

¹⁵⁹ Ibid.

4. The Draft EIS asserts that “the Desert Rock Energy Project and other proposed coal-fired projects currently being permitted in the Southwest would increase fuel diversity by reducing the need for new natural gas resources.”¹⁶⁰ Since coal currently represents 41% of Arizona’s total electricity supply, 78% of Colorado’s, 51% of Nevada’s, 88% of New Mexico’s, 94% of Utah’s, and about 50% of the national total, it strains credibility to claim that building more coal plants improves fuel diversity in the region.¹⁶¹ Any reasonable weighing of the risks of climate change and the likelihood of future greenhouse gas regulations leads to the conclusion that a Navajo energy project would improve fuel diversity by switching to inherently low- or no-carbon fuels, not by building more coal plants. Many of the planned natural gas power plants in the western U.S. will not be built and, even if they do get built, are not large enough to dramatically change the share of power in the region that will continue to be provided by coal. As such, the Draft EIS statements on this point are incorrect and should be revised to reflect a more thorough analysis.

6.5. Energy Efficiency

Energy efficiency offers the combined benefits of meeting energy service needs at a much lower cost than new generation, reducing demand for electricity, and providing permanent jobs in the design, implementation, and evaluation of efficiency measures throughout the Navajo Nation and bordering communities.

Compared with other regions in the U.S., energy efficiency is in its infancy in the Southwest in terms of both investment and impact. Efficiency could play a significant role in meeting future load growth and affect the need for base load resources such as the proposed Desert Rock. WGA has set a reasonable target of reducing energy use by 20% by the year 2020 through efficiency measures. The Southwest Energy Efficiency Project (SWEET) has testified to the attainment of similar efficiency goals for several Southwest utilities. Additional discussion of this option appears below.

6.6. Rural Electrification/Environmental Justice

The Draft EIS for the proposed Desert Rock plant needs to assess the economics of a separate project component to electrify a substantial fraction of the thousands of Navajo homes that currently lack electricity. The mechanism would be a combination of power line extensions from new nearby generation facilities and freestanding solar and wind power systems for off-grid homes. Could a clean energy alternative bring affordable electricity to many Navajo homes that do not currently have it and would not receive it from the proposed Desert Rock project? Would the availability of electricity make it possible for many of those homes to also have water wells and indoor plumbing? Could the Navajo tax system provide financing for rural electrification and water service by taxing renewable energy projects or requiring them to provide service to those currently without it? This would be true environmental justice, but the Draft EIS for the proposed Desert Rock plant is silent on these possible alternatives, except for a brief reference to local utility service on page 3-141 of the Draft EIS.

¹⁶⁰ Draft EIS, May 2007, p. 2-33.

¹⁶¹ U.S. Census Bureau, *Statistical Abstract of the United States: 2004-2005*, p. 583.

According to the NTUA, an estimated 18,000 homes throughout the Navajo Nation are without utility services.¹⁶² As a non-profit enterprise, NTUA receives federal loans to extend electrical power to rural communities. NTUA also provides assistance to tribal agencies and tribal communities to obtain federal grants to address utility needs. The money that NTUA does generate is returned to maintain and upgrade its utility services.

The proponents of large-scale power plants such as Desert Rock often deal with environmental justice by trying to assert that their project will not impact low-income populations negatively. In the case of Desert Rock, they have dealt with it by arguing that the project will not impact health and environment by any significant amount, but more importantly they argue that the project will provide jobs and other economic benefits to the Navajo population. Even by that measure, if alternatives would provide more jobs and economic benefits, they are worthy of analysis in the EIS, whether or not they involve coal.

Desert Rock will concentrate jobs in one small part of the Navajo reservation, provide less diversity in terms of jobs and skill-sets required than a mix of other energy options, and will not have a measurable impact on the overall low-income population of the Navajo Nation.

The Draft EIS misses the point when it comes to environmental justice – justice is not simply about equity with regard to minimizing harm. It is also about equity with respect to maximizing benefit. Other development alternatives, such as those discussed in this report, provide more economic benefits and decentralized opportunities to more people across a wider geographic area of the Navajo Nation, while at the same time minimizing the pollution burden borne by a subset of them that happen to live near to, or downwind of, the site of the coal mine and power plant.

FIGURE 22 illustrates how household income varies by census district within the region. The lowest income areas include Hopi land surrounded by the Navajo Nation, an area near the center of the Navajo Nation clustering along the north/south U.S. Highway 191 corridor, and an area in the southeast corner of the reservation clustering along Interstate 40. Residents of each of these regions would face an onerous commute to reach the proposed Desert Rock site or its coal mine, making those economic opportunities largely out of reach to them.

FIGURE 23 illustrates that the extreme western and northern edges of the Navajo Nation tend to be the least densely populated. This is an approximate measure of the extent to which proposed energy development might conflict with existing land uses or create environmental impacts to large numbers of nearby residents. Fortunately, these same areas overlap closely with many of the regions identified as the most promising wind and solar sites on FIGURE 26. They also in many cases line up with present and proposed electric transmission infrastructure and natural gas pipelines, allowing for synergies such as the CSP/natural gas combination described above. Solar and wind project development in some of these regions could actually *improve* environmental justice rather than hampering it, primarily because those projects provide a diverse array of supplemental economic opportunities to people in the region without greatly disrupting or impeding present land uses such as ranching, farming, and tourism.

By contrast, the nature of the Desert Rock project and its proposed location hamper environmental justice by introducing significant environmental impacts (individually and

¹⁶² <<http://www.ntua.com/aboutus/About%20us%20index.htm>>

cumulatively) near locations of some population density, while providing corresponding economic opportunities far from those in greatest economic need.

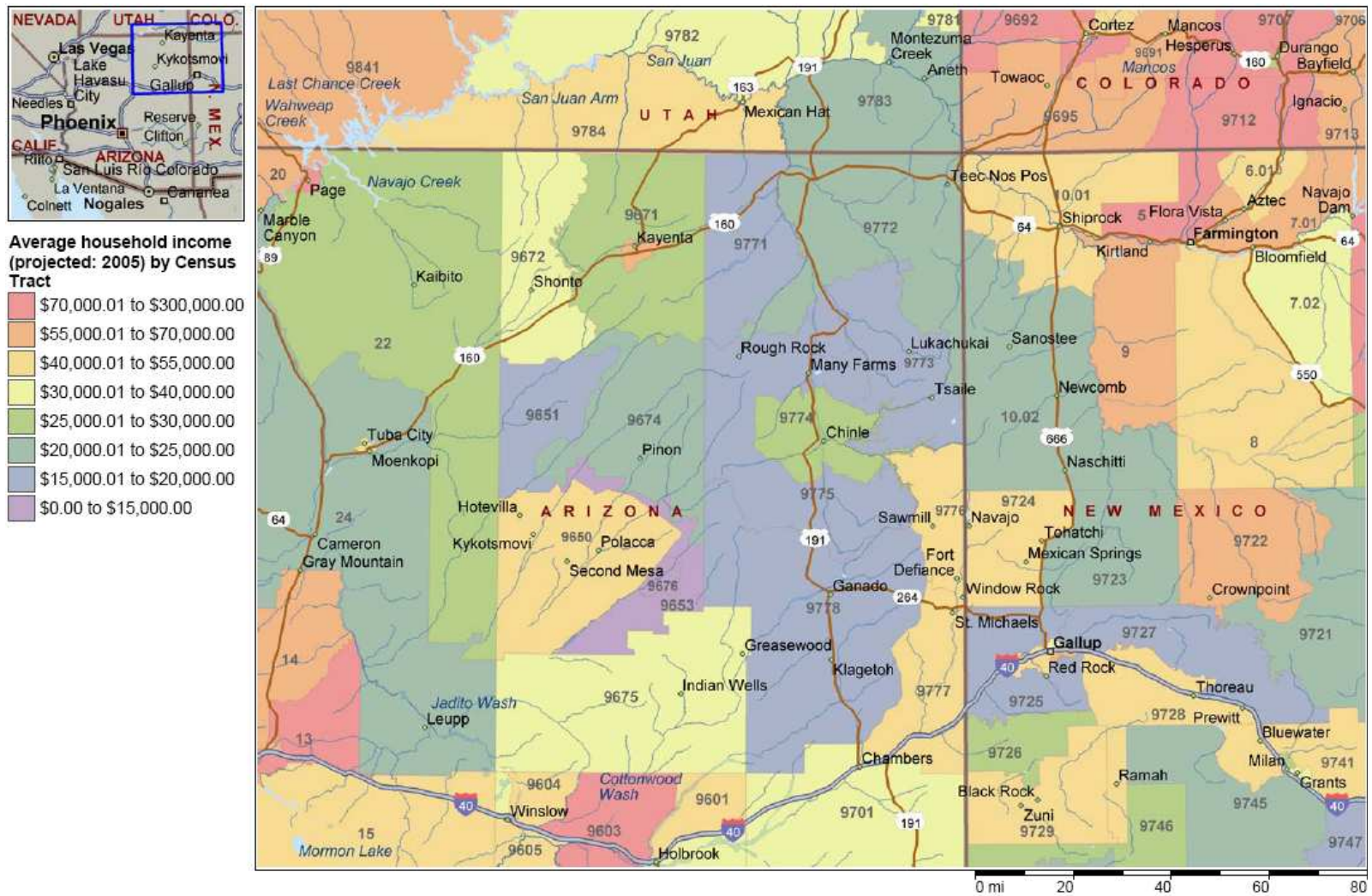


FIGURE 22. Navajo Household Income Map

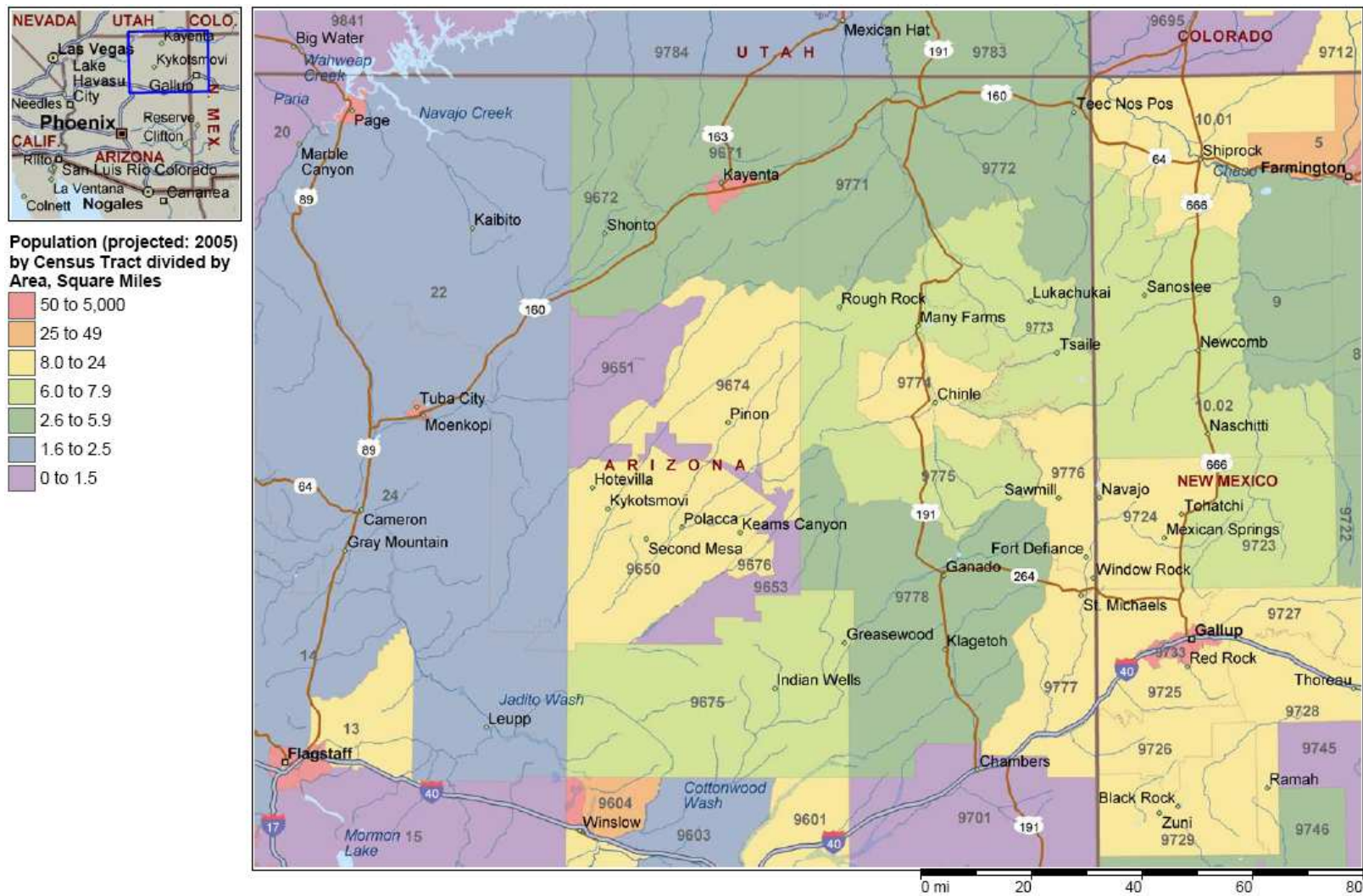


FIGURE 23. Navajo Population Density Map

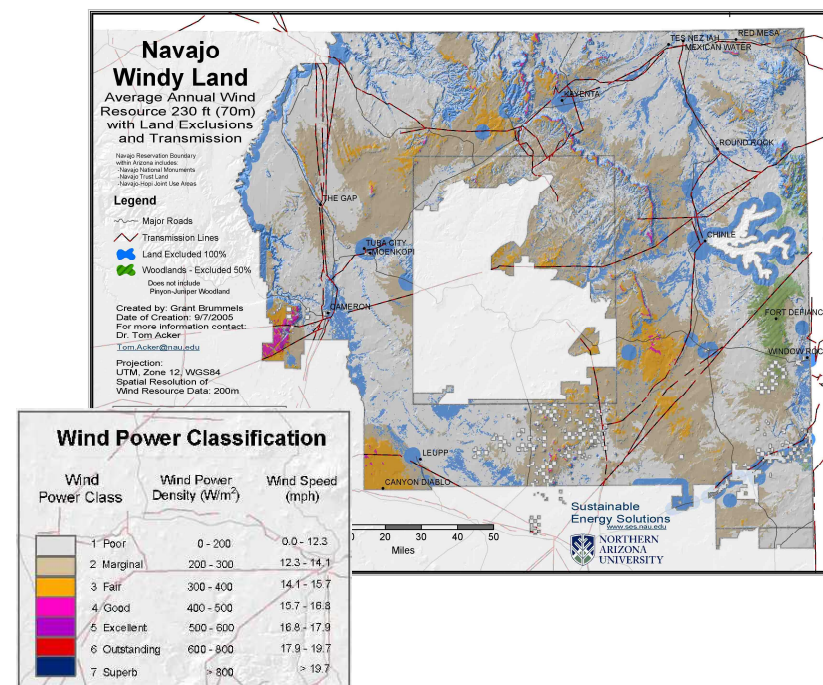
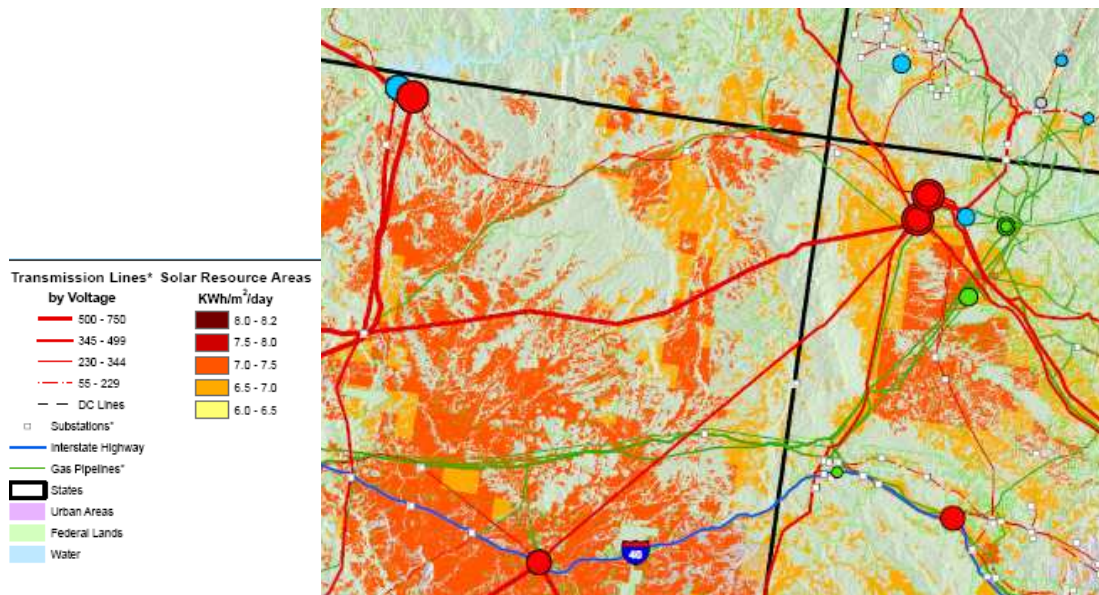
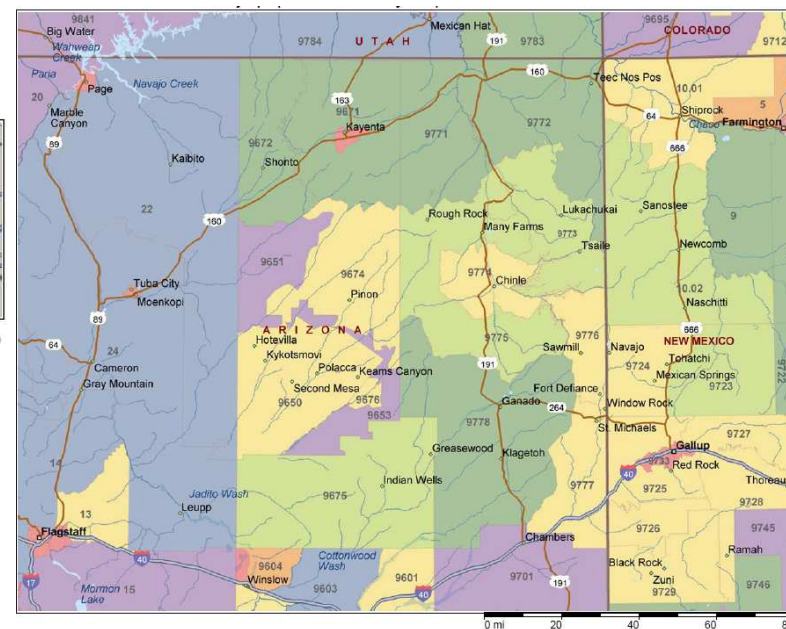
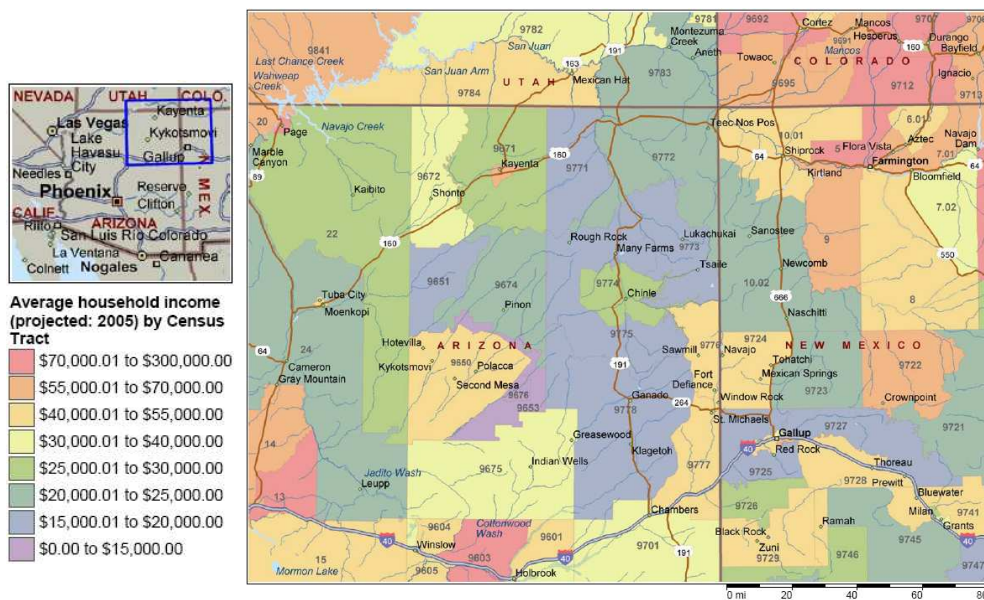


FIGURE 24. Comparison of Solar Resources, Wind Resources, Household Income, and Population Density Maps



7. ALTERNATIVE ENERGY POLICIES AND ECONOMICS

7.1. Navajo Self-Determination

Self-determination is an inherent Diné right to choose sustainable pathways in accordance with the Hózhóójí Life Way, derived from the stories, which manifest the guiding principles of the Diné Fundamental Laws. How the Diné choose to relate (k'é) to their surroundings and how the Diné choose to protect those relations enters into the discourse of tribal sovereignty and sustainable development. Self-determination, aside from western notions of it, is implicit in Diné creation stories;

They came to Yágahoka, the sky-hole, which is in the center of the sky [...] Johonaa'éei pointed down and said: "Where do you belong in the world below? Show me your home." The [Twin] brothers looked down and scanned the land; but they could distinguish nothing; all the land seemed flat [and] the elder brother said: "I do not recognize the land, I know not where our home is." Now Nílch'í (the Wind) prompted the younger brother, and show him which were the sacred mountains [and] the younger brother exclaimed, pointing downwards [saying] "between these mountains is [where] our home is."

"You are right my child, it is thus that the land lies," said Jóhonaa'éei. Then, renewing his promises, he spread a streak of lightning [...]¹⁶³

Lightning is the sacred symbol for land protection and the Navajo Tribal Council and its constituents recognize the rainbow as the sacred symbol of Navajo sovereignty, the latter illustrated on the Navajo Nation flag. The Navajo tribal council thereby recognizes that the extension of sovereignty and land protection is within the traditional practice of sustainability as explicitly stated in Section A of Diné Natural Resource Protection Act;

The Navajo Nation Council finds that the wise and sustainable use of the natural resources in Navajo Indian Country traditionally has been, and remains, a matter of paramount governmental interest of the Navajo Nation and a fundamental exercise of Navajo Tribal sovereignty.¹⁶⁴

Moreover, the extension of sovereignty in sustainable practices is adherence to the Fundamental Laws as noted by respected long-time indigenous activist, Winona LaDuke;

The key to a sustainable society is accountability to natural law. Indigenous or land-based societies (wherever they are found in the world or in history) understand that all life is accountable to natural law. Laws made by nations, states, provinces, cities, are inferior to this supreme law.¹⁶⁵

The Navajo Nation is well-suited, in fact, prepared to shift the current paradigm of coal development to an economy that invokes renewable energy projects within the concepts and

¹⁶³ Matthews, Washington. *Navaho Legends*. Salt Lake City: University of Utah Press, 1994. 111-114.

¹⁶⁴ Navajo Nation Code, 18 Section 1301, pg. 797

¹⁶⁵ LaDuke, Winona. "A Society Based on Conquest Cannot Be Sustained." *Toxic Struggles: The Theory & Practice of Environmental Justice*. Ed. Richard Hofrichter. Salt Lake City: The University of Utah Press, 2002. 99

principles of Alch'í Silá,¹⁶⁶ k'é,¹⁶⁷ Nítsáhákees,¹⁶⁸ Diné Fundamental Laws and elements codified within the Diné Natural Resource Protection Act of 2005.

The Navajo, as well as other Native American tribes, have the ability to make decisions and have responsibility over their own reservations, a shift in the 1970s away from more federal government control. This was formalized in 1975 with the Indian Self-Determination and Education Assistance Act which allowed tribes to receive funding from the BIA for projects that the tribe would then oversee and carry out on their own. Nonetheless, this act allowed tribes to set their own goals rather than following federally imposed goals.

Energy development is related to this in that the Navajo tribe can make decisions about how to manage their natural resources and become owners in energy development projects on their lands, although they must still interact with various federal and state agencies for permitting and regulatory reasons. Tribal control over energy development has allowed them to institute taxes and raise other funds through energy development which have in turn funded local infrastructure development that boosts the local and regional economy. This is particularly true if the tribes can have full or partial ownership in projects on their land.

The Southern Ute, for example, in the Four Corners area of the Southwest, have created their own companies to capitalize on economic opportunities with natural gas, real estate development and residential construction to provide significant economic prosperity and financial security for their people.¹⁶⁹ This has included, especially in recent years, a very determined emphasis on energy efficiency, sustainability, and renewable energy opportunities in new development projects such as Three Springs and the Tierra Group's Built Green Colorado Certified homes.

The Navajo Nation government has thus far embarked on a different path in which Wall Street investors proposed a course of development heavily reliant on coal, retain majority ownership, and reap most of the resulting profits, while committing the Navajo people to the resulting environmental impacts and a fraction of the resulting economic benefits. Desert Rock is not likely to bring economic prosperity to the Navajo Nation for the same reason that building nearby San Juan and Four Corners coal plants did not, because the model of economic development on which each is based is flawed. A decentralized, distributed model of developing and owning multiple, smaller renewable energy projects across the Navajo Nation promises far greater and more sustainable benefits to the Navajo people as a whole – not just the ones that live close enough to Desert Rock to get a job there.

In the document “Wind Energy in Indian Country: Turning to Wind for the Seventh Generation,” Andrew Mills reports that tribal energy projects are “different than other projects in that the tribe has the ability to set laws pertaining to taxation of energy projects, labor preferences, and requirements for preferential treatment of tribal businesses in contracts.” This is true with the Desert Rock project as the Navajo government has

¹⁶⁶ Roughly translated as “They face each other”

¹⁶⁷ Roughly translated to mean “relations.” The k'é concept is the main stalk of the Diné Fundamental Laws.

¹⁶⁸ Roughly translated as “thinking.”

¹⁶⁹ Mills, Andrew D. “Wind Energy in Indian Country: Turning to Wind for the Seventh Generation.” Berkeley: University of California. 2006.

negotiated financial deals with Sithe Global LLC on tax payments, water use, royalties, and lease payments related to the coal facility.¹⁷⁰ According to the Desert Rock website, the Navajo Nation will receive \$50 million annually in various revenues related to the deals they agreed upon with Sithe Global, and the following was the basis for a special tax agreement between Sithe Global and the Navajo government:

Due to the location of the Desert Rock Energy Project on the Navajo Nation, the project is subject to double taxation by Navajo, county and state jurisdictions. Desert Rock wishes to secure a fair tax structure for the project. The chart below shows the comparative taxes should the project be sited in various locations including the Navajo Nation. Issuance of Industrial Revenue Bonds represents San Juan County's part to solve the dual taxation dilemma. Without a modified tax structure to help eliminate the effects of double taxation projects would not be economic and would not be located on the Navajo Nation. The Navajo Nation agreed to a similar tax structure in May 2006. Desert Rock is working with San Juan County officials to secure a tax structure that benefits the project and the county. Desert Rock proposes Payments in Lieu of Taxes (a PILOT) for San Juan County, the Central Consolidated School District and San Juan College and the Industrial Revenue Bonds.¹⁷¹

Proposed Navajo Nation Annual Average Cash Benefits (based on 1500 MW project concept) Annual Revenues to the Navajo Nation	
Navajo Tax (BAT, PIT and Sales)	\$17,000,000
Water Fee	\$5,200,000
Lease	\$100,000
Coal Royalties	\$20,877,000
Coal Taxes	\$8,979,000
Annual Total Revenues (approx.)	\$52,267,000
Twenty-five Year Total	\$1,306,675,000

FIGURE 25. Proposed Navajo Nation Annual Revenue from Desert Rock¹⁷²

¹⁷⁰ "Desert Rock Newsletter #2." September 2006. Sithe Global. 8 August 2007.

<http://www.desertrockenergy.com/documents/newsletters/SitheFactSheet_2.pdf>.

¹⁷¹ "Industrial Revenue Bonds." Desert Rock Energy Project. 7 August 2007.

<<http://www.desertrockenergyproject.com/irb.htm>>.

¹⁷² "Fact Sheet: Desert Rock Energy Project." July 2005. Sithe Global and Diné Power Authority.

<www.sitheglobal.com/news/SitheFactSheet.pdf>.

Given that the Navajo government has the ability to set special tax rates and royalties dependent on the company or development project that they wish to carry out, the Navajo Nation could pursue similar negotiations with proponents of renewable energy development projects, to provide similarly-favorable revenue to the Navajo Nation.

One possibility is that the Navajo government could negotiate with renewable energy companies, as they normally would, to set lease and tax payments for a renewable project, but then also stipulate that job-training and skill-building for a number of Navajo people become a part of the requirements that come with developing a renewable project on their lands. This would include preferential treatment for jobs for tribal members, as tribes have done with past energy projects, but would also increase the amount of skilled workers in the tribe who would have access to higher salaries and jobs on the reservation. It would also help to boost the local economy and keep some revenue within the region. It would be particularly easy for potential Navajo employees to stipulate job training related to solar, as such training is available at San Juan College, located in Farmington, NM which currently has one of the leading solar energy training programs in the country. In addition to the job training stipulation, part of the agreement could include funding for rural electrification to provide electricity to many of the Navajo homes without electricity and that are currently not located near transmission lines. This way, the Navajo people could undertake training to remain on the reservation as they would travel to perform this labor on their own lands, and wire many rural homes without electricity.

Funding options are available to the Navajo Nation in order to develop renewable projects so that the tribe could have more ownership, thereby creating more economic revenue that would stay in the tribe's economy. A further discussion of economic incentives available to the Navajo Nation is included in the Policy Incentives Section of this report.

7.2. Federal Policy Incentives

National polls show that climate change barely registered in the consciousness of mainstream America at the start of the decade, but the situation has changed rapidly in recent years. In 2007,

- A Fox News poll found that 82% of American voters say global warming is real;
- A CBS/*New York Times* poll found that 70% of respondents believe that global warming is an environmental problem that is causing a serious impact now; and
- CNN found that 59% of Americans say that the President and Congress should deal with global warming this year.¹⁷³

The issue is salient enough in the minds of Americans to have become a campaign issue among 2008 presidential candidates. All Democratic presidential candidates, and several Republican candidates, now favor action on climate change.¹⁷⁴

¹⁷³ Public Opinion Strategies. "Arizona: Global Warming and Public Opinion." February 2007. <http://environmentarizona.org/uploads/N3/43/N343PUJd85OeplKFOPe3fQ/Polling_memo_-_AZ_global_warming_memo1.pdf>.

In the U.S. Congress, at least a half dozen climate bills are in the works to deal with climate change, all of which seek to loosen the grip of greenhouse gases on the U.S. economy.¹⁷⁵ Significantly, Representative John Dingell, chair of the House Energy and Commerce Committee, committed to turning out a climate bill in 2007—a huge reversal of position for an influential Congressman who represents the Detroit, Michigan area, the heart of the U.S. auto industry.¹⁷⁶

Although congressional climate change legislation may not receive a presidential signature until 2009, changes on the ground are already underway as companies and state governments have staked out leadership positions on carbon-related issues. One example is the February 2007 agreement by the TXU Corporation to reduce from 11 to three the number of coal-fired power plants it planned to build in Texas, and to scrap plans to expand coal operations in other states.¹⁷⁷ TXU also agreed to endorse the U.S. Climate Action Partnership (USCAP) platform, including the USCAP call for a mandatory federal cap on carbon emissions. While environmental groups pressured TXU, it was also sensitive to a changing political atmosphere that increasingly favors climate action. “We didn’t want to be on the wrong side of history,” noted one of the negotiators of the deal.¹⁷⁸

The political and business developments outlined above suggest that federal legislation regulating greenhouse gas emissions is not a matter of if, but when.

7.2.1. Energy Policy Act of 2005 (EPACT)

The EPACT has provided renewed research interest and potential for renewable energy sources. It incorporates provisions for alternative energy development, including a specific title dedicated to energy on Tribal Lands: Title V: Indian Energy. This Title is known as the Indian Tribal Energy Development and Self-Determination Act of 2005 and it recognizes the increasing importance of energy resources on tribal lands and the promotion of Indian self-determination over these resources.

Further, EPACT calls for the federal electricity load, the largest load in the world, to be provided by a certain percentage of renewable energy, beginning in 2007 and ramping up to 7.5% by fiscal year 2013. Tribal renewable energy projects will be double-credited toward the federal purchase requirement, which means that tribal renewable energy development is extremely valuable to the federal government.¹⁷⁹

7.2.2. Production Tax Credit (PTC)

The PTC is a tax incentive which is granted primarily to owners of wind farms, where every MWh of energy produced in the first ten years of operation entitles the wind farm owner to a tax credit worth \$19, which increases with inflation. There must be a sufficient tax burden

¹⁷⁴ Nutting, Rex. “Political Climate Changing on Global Warming.” *MarketWatch*. 18 May 2007.

¹⁷⁵ “FACTBOX: Climate Bills in US Congress.” MSNBC. 5 July 2007.
<<http://www.msnbc.msn.com/id/19373052/>>.

¹⁷⁶ Watts, William L. “It Comes Down to Dingell.” *Marketwatch*. 18 May 2007.

¹⁷⁷ Wald, Matthew L. “Deal’s Broader Effect on Coal Plants is Uncertain.” *New York Times*. 26 February 2007.

¹⁷⁸ Ibid.

¹⁷⁹ Mills, Andrew D. “Wind Energy in Indian Country: Turning to Wind for the Seventh Generation.” Berkeley: University of California. 2006.

by the owner of the wind farm in order to offset federal income taxes, and if that burden does not exist, then the PTC would go unused because they are non-transferable. The PTC has expired three times in the past decade and has then been renewed.¹⁸⁰

It is uncertain right now as to whether the PTC will be extended beyond the current expiration dates, although most in the industry expect that it will be extended. The Extenders Bill signed by President Bush on December 21, 2006, extended both the wind and solar credits an additional year; the projects must be placed in service by December 31, 2008 to qualify for the credits.¹⁸¹

According to Robert Voss of Edison Capital:

The Section 45 wind production tax credits provide a benefit equal to 2 cents per kilowatt-hour for generating electricity from wind. Solar energy equipment currently qualifies for the 30% investment tax credit. This is a 30% credit of the cost of solar equipment, but only for solar equipment put into service during calendar years 2006 through 2008. The entire credit is claimed in the year the project is placed into service. Solar equipment installed after 2008 will qualify for a 10% investment tax credit.

Until Congress approves the extension there will be very limited ability to develop new wind or solar projects since the development and construction time for such projects is normally at least two years. In the event the credits are extended, then I think that there would be numerous wind and solar alternatives which could be presented to the Navajo Nation. EME is definitely interested in pursuing large-scale wind projects of a scale and scope that could be a viable alternative to the proposed Desert Rock coal-fired plant.

If wind plants generate 5,348,000 MWh per year (number of MWh used in this report's summary data comparison between alternatives and Desert Rock), the \$19/MWh tax credit would result in a tax credit of \$101,612,000.

7.2.3. Investment Tax Credit (ITC)

Similar to the PTC, Congress did extend the ITC until the end of 2008 as well. The ITC has a 30% solar energy investment tax credit for homeowners and businesses. The bill contains the Residential 30% Solar Tax Credit for the purchase of residential solar water heating, photovoltaic equipment, and fuel cell property. It also extended the 30% Business Solar Tax Credit and Fuel Cell Tax Credit for the purchase of fuel cell power plants, solar energy property, and fiber-optic property used to illuminate the inside of a structure. After December 31, 2008, the credit reverts to a permanent 10% level.¹⁸² This credit does apply to CSP solar equipment. Utilizing numbers from an NREL report which looked at the

¹⁸⁰ Mills, Andrew D. "Wind Energy in Indian Country: Turning to Wind for the Seventh Generation." Berkeley: University of California. 2006.

¹⁸¹ Voss, Robert W. Asst. VP Finance, Edison Capital. Email Interview. 24 May 2007.

¹⁸² Green Energy Ohio. "Federal Solar Tax Incentives." <<http://www.greenenergyohio.org/page.cfm?pageID=710>>.

economics of CSP plants in California,¹⁸³ the calculated cost to construct a CSP plant would be around \$220 per MWh. This would mean for 1,320,000 MWh generated per year (number of MWh used in our summary data comparison between alternatives and Desert Rock), a 30% tax credit would result in savings of \$87,120,000, and a 10% tax credit would result in savings of \$29,040,000. The ITC is beneficial for solar developments because their projects are expensive to build, but cheap to operate. On the other hand, the PTC is beneficial for wind projects because it is based on the amount of electricity produced, and wind projects are relatively cheap to build, but more expensive to operate and maintain.

7.2.4. Department of Energy Tribal Energy Program

The Tribal Energy Program, under the DOE's Office of Energy Efficiency and Renewable Energy, provides financial and technical assistance to tribes for feasibility studies regarding renewable energy development. It also offers assistance with strategic planning, energy options analysis, human capacity building, and organizational development. In addition to assisting with technology through programs which loan out anemometers for wind resource monitoring, the program allows for training for tribal members as well. The program has an Energy Efficiency Initiative which offers training for energy auditors and weatherization implementation as well as an educational program where tribal members can take short education courses on renewable energy technology (for example, Southwestern Indian Polytechnic Institute offers renewable energy classes at their New Mexico campus).¹⁸⁴ Congress provides funding for DOE's Tribal Energy Program, and there is currently no grant funding available, although technical/informational assistance is available via their *Guide to Tribal Energy Development* (<http://www1.eere.energy.gov/tribalenergy/guide/>).

Although no grant opportunities are currently open, renewed funding becomes available periodically. With regard to using the Tribal Energy Program as a resource for developing wind energy projects, Andrew Mills highlights the following in his paper:

The Tribal Energy Program offers two types of grants to tribes: a "First steps" grant that helps tribes bridge the gap between a general interest in a project and a commercially viable project and a second grant for feasibility studies of specific projects. For wind energy the "First steps" grant allows tribes to assess their wind resource through installation of wind towers on potential sites in addition to assessing the energy needs of the tribe and the capacity to develop energy projects. If the wind resource is found to be suitable for development and potential markets for the electricity are found, a tribe can then apply for a feasibility study grant. The feasibility grants are sufficient to fund the majority of steps that a wind developer would go through to develop a wind farm including identifying financing, obtaining interconnection agreements with utilities, establishing a market for the wind power, and completing environmental and cultural assessments. If the feasibility study shows that the wind farm can be built, then there are few

¹⁸³ Stoddard, L., J. Abiecunas, and R. O'Connell. "Economic, Energy, and Environmental Benefits of Concentrating Solar Power in California." NREL/SR-550-39291. April 2006. pg. 6-4.

¹⁸⁴ "Renewable Energy Development on Tribal Lands." U.S. Department of Energy, Energy Efficiency and Renewable Energy. October 2006. 7 August 2007. <<http://www.nrel.gov/docs/fy07osti/40509.pdf>>.

steps left between completing the feasibility study and beginning construction of a wind farm.¹⁸⁵

7.3. State Policy Incentives

Some states are already taking policy and legislative action. The standout state in the west is California. In the past five years, the state, under the leadership of Democratic and Republican governors, has taken the following actions on the climate front:

- Effectively banned long-term purchases of electricity produced in coal-fired power plants. California has no such plants of its own; the ruling was aimed at plants in neighboring states from which power might be imported (January and May, 2007).¹⁸⁶
- Mandated that greenhouse gas emissions be curtailed by 25 percent by 2020. (September 2006)¹⁸⁷
- Mandated that utilities in California get 20 percent or more of their electricity from renewable energy sources by 2017, and set a goal of 33 percent by 2020 (2002 and 2005).¹⁸⁸

California's initiatives are important acts of leadership due to the state's political and market power. With more than 35 million residents, California has set the standard on environmental issues for decades and shaped markets for goods and services from automobiles to electricity. It is well assured that the state will also be influential on climate and energy issues. The state of Washington, for example, has now also forbidden the importing of conventional coal-fired electricity.

Indeed, action by other western states is already evident, even though these tend to be politically more conservative. In February 2007, five western governors agreed to work on regional reductions of greenhouse gas emissions¹⁸⁹ and they are in the process of developing a regional carbon cap-and-trade system to achieve their goals. Meanwhile, individual states in the West are taking action on greenhouse gases:

- In New Mexico, Governor Richardson has mandated that global warming emissions be reduced to the year 2000 levels by 2012, and to 10 percent below the year 2000 levels by 2020. And the New Mexico Public Regulation Commission ruled in June

¹⁸⁵ Mills, Andrew D. "Wind Energy in Indian Country: Turning to Wind for the Seventh Generation." Berkeley: University of California. 2006.

¹⁸⁶ California Energy Commission. "New Regulations Restrict Purchase of Electricity from Power Plants that Exceed Greenhouse Gas Emission Limits." Press Release. 23 May 2007.

¹⁸⁷ California Office of the Governor. "Gov. Schwarzenegger Signs Landmark Legislation to Reduce Greenhouse Gas Emissions." Press Release. 26 September 2006.

¹⁸⁸ California Energy Commission. "Renewable Energy Program." 10 July 2007.
<<http://www.energy.ca.gov/renewables/index.html>>.

¹⁸⁹ "Five Western Governors Announce Regional Greenhouse Gas Reduction Agreement." Press Release. 26 February 2007.

2007 that electric utilities must include the cost of carbon emissions when assessing future energy supply alternatives for their customers.¹⁹⁰

- In Nevada, a concurrent resolution is working its way through the state legislature that would establish a legislative commission to study global warming in Nevada, including how the state might reduce its own contributions to climate change.¹⁹¹

Other important state policy or legal outcomes include:

- The Supreme Court recently ruled in the case, *Massachusetts v. EPA*, that CO₂ is a pollutant and that the U.S. EPA does have the statutory authority to regulate it.
- Massachusetts, Oregon, Washington, and New Hampshire have laws in place that limit the maximum greenhouse gas emissions of power plants or require their operators to purchase offsets.
- Oregon's Public Utilities Commission denied in early 2007 a proposal by PacifiCorp to move forward with seeking bids for two more conventional coal plants.

7.3.1. Renewable Portfolio Standards in the Southwest

In addition to the PTC, at least 22 states also have a Renewable Portfolio Standard (RPS) that requires the utilities there to purchase or generate a certain percentage of renewable energy by a target date. Many utilities purchase wind power to make up a large portion of the RPS requirements.¹⁹² At least 17 pieces of federal RPS legislation have been introduced since 1997, and the House of Representatives has already adopted an energy bill that contains one. The power from the Desert Rock coal plant would be unable to comply with such provisions. In the Southwest, the following states have RPS requirements: Colorado, Arizona, New Mexico, and Nevada. RPS creates more incentives for utilities to purchase renewable power in these states, making renewable energy developments on the Navajo Nation a great source for states to meet their RPS goals in the Southwest. See Table 17, below, for the percentage of renewables required and the entity administering the RPS.

¹⁹⁰ New Mexico Public Regulation Commission. "PRC Puts Price on Carbon Emissions." Press Release. 19 June 2007.

¹⁹¹ State of Nevada. Assembly, Assembly Concurrent Resolution No. 24, Committee on Health and Human Services. <<http://www.leg.state.nv.us/74th/Bills/ACR/ACR24.pdf>>.

¹⁹² Mills, Andrew D. "Wind Energy in Indian Country: Turning to Wind for the Seventh Generation." Berkeley: University of California. 2006.

Table 17. Renewable Portfolio Standards in Southwestern States¹⁹³

States	% of Renewables Required	Entity Administering RPS	Target Date
Colorado	20%	Colorado Public Utilities Commission	2020
Arizona	15%	Arizona Corporation Commission	2025
New Mexico	20%	New Mexico Public Regulation Commission	2020
Nevada	20%	Public Utilities Commission of Nevada	2015

7.4. Wind

Wind is an economically viable energy source that is among the lowest cost renewable energy sources. It continues to be more competitive, and in areas which show high wind intensity, with traditional sources. Native American tribes in the Plains region have great potential to take advantage of wind energy development but the Navajo Nation has significant opportunities, given that it is located near large electricity markets,¹⁹⁴ making wind development an excellent opportunity for the Navajo Nation to gain financial advantage and to be at the forefront of renewable energy production.

Wind technology requires only moderate capital and operational costs, low technology risk, and a high potential to create future clean job opportunities for tribal members. In addition, the capital costs are incurred in small increments. As a result, wind could be attractive for tribal business entities.

The cost of electricity from utility-scale wind systems has decreased over the past two decades, due in part to the latest generation of wind turbines for utility-scale farms. Wind farms can provide electricity as low as 4 cents per kWh (more conservative numbers show that average electricity retail price for residents and businesses would be approximately 7.2 cents/kWh).¹⁹⁵ Lifetime levelized cost of electricity (LCOE) estimates for wind from the California Energy Commission and the Virginia Center for Coal and Energy Research range from 2.8 to 3.5 cents/kWh – roughly half the expected cost for Desert Rock. DOE's official cost estimates for wind are lower than Desert Rock's expected cost as well.¹⁹⁶

¹⁹³ "States with Renewable Portfolio Standards." U.S. Department of Energy. 6 August 2007. <http://www.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#chart>.

¹⁹⁴ Mills, Andrew D. "Wind Energy in Indian Country: Turning to Wind for the Seventh Generation." Berkeley: University of California. 2006.

¹⁹⁵ Williams, Dr. Susan K., Dr. Tom Acker, Grant Brummels, and Stuart Wells. "Arizona Wind Energy Assessment." April 2007. Northern Arizona University, Sustainable Energy Solutions. <<http://ses.nau.edu/wind/ArizonaWindEnergyAssessment-April2007.shtml>>.

¹⁹⁶ Cooper, Christopher and Dr. Benjamin Sovacool. "Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS)." June 2007. Network for New Energy Choices. <http://www.newenergychoices.org/dev/uploads/RPS%20Report_Cooper_Sovacool_FINAL_HILL.pdf>.

The economic viability of wind power varies across locations based on operating and social factors—including wind speed and variability, land attributes, turbine size and design, environmental impacts and public policies. These and other factors dictate the benefits and costs associated with a particular project. Benefits will vary from site to site. Direct costs refer to explicit expenditures incurred during production such as materials, labor, maintenance, and lease payments.

Wind energy experts concur that average costs for wind projects are approximately \$1.5 to 2 million per MW. Most likely, estimates based on numbers for Arizona and New Mexico suggest that costs will be about \$1.75 million per MW for wind development.¹⁹⁷ A reasonable size for a wind farm would be 100-200 MW, costing about \$175-350 million to build. Wind farms of this scale are readily fundable and financially viable. Larger scale models for utility-scale farms are also possible but they require being near a high power transmission line such as the Navajo Transmission Project (NTP). NTP is a transmission line originally intended for Desert Rock, currently in the permitting stage for construction, which would allow for a much larger scale wind farm. The line will run along the already existing transmission corridor in FIGURE 26 (next page), which runs near to Red Mesa, Kayenta, Blue Gap, and Cameron, Arizona.

¹⁹⁷ Voss, Robert W. Asst. VP Finance, Edison Capital. Email Interview. May 24, 2007.

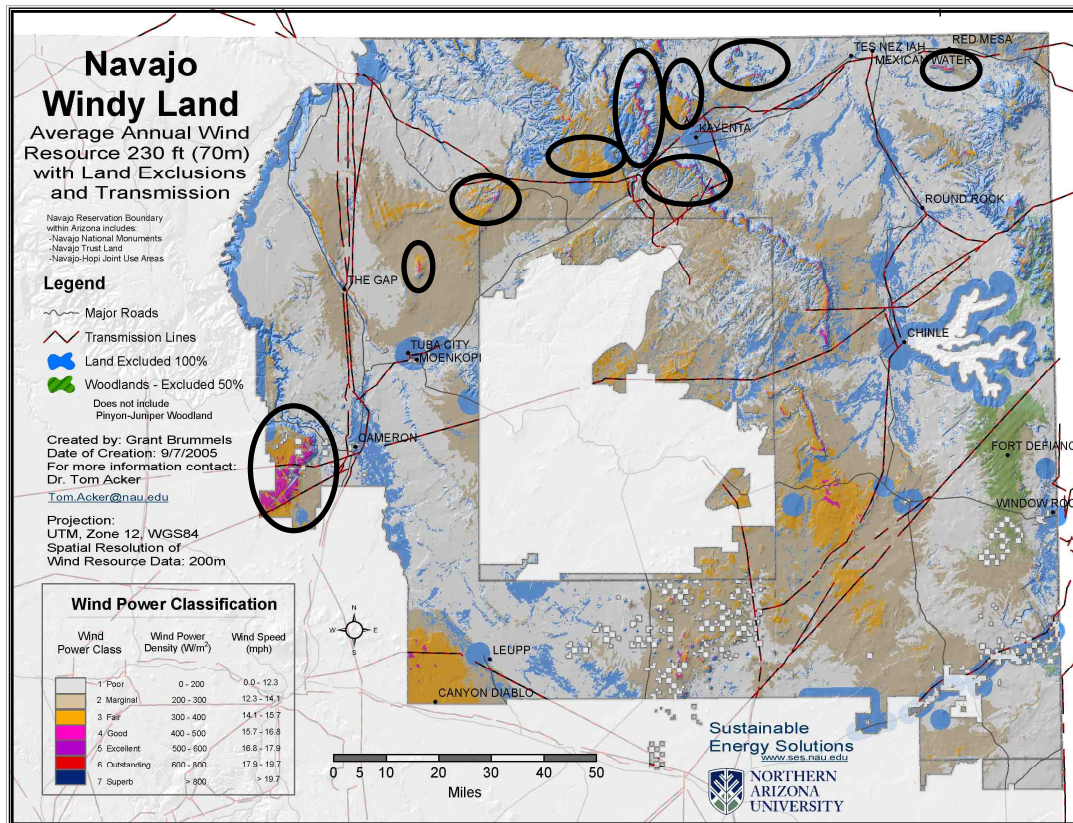


FIGURE 26. Navajo Windy Land, Transmission Lines, & Class 3-7 Wind Resource Areas Near the Transmission Corridor¹⁹⁸
(Circles identify windy areas)

¹⁹⁸ Map From Northern Arizona University, Sustainable Energy Solutions, Grant Brummels, 2005

7.4.1. Economic Benefit Simulations/Predictions

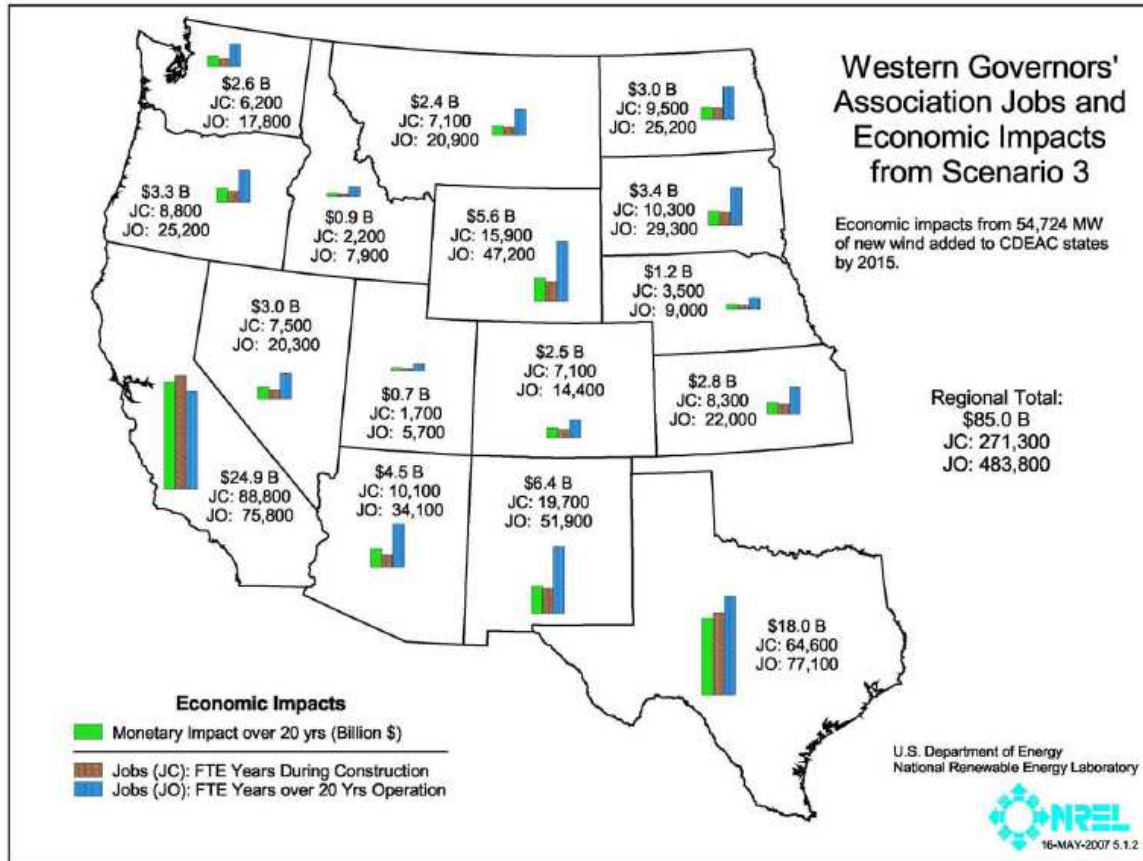


FIGURE 27. Potential Jobs and Monetary Impacts from Wind Power¹⁹⁹

FIGURE 27, above, shows the great potential that wind power has in creating monetary impact and jobs in the western states. Arizona and New Mexico have some of the highest potential for job creation and economic growth related to wind capacity of all the western states. The Draft EIS for Desert Rock fails to analyze these job creation possibilities which would result from the development of alternative technologies--an issue which is very important to economic development in the region and particularly to the Navajo Nation.

In order to analyze wind as a potential source of investment, NREL's Job and Economic Development Impact (JEDI) model in conjunction with the Monte Carlo simulation were used to project numbers for costs, job creation and other economic impacts. JEDI is a recognized, well-researched tool developed at NREL in Colorado and it has been used effectively as a cost-modeling tool. Monte Carlo simulations are an accepted statistical way of modeling probabilistic outcomes to determine likely scenarios.

¹⁹⁹ Tegen, S., M. Goldberg, and M. Milligan. 2007. Economic Development Impacts from Wind Power in the Western Governors' Association States. U.S. Department of Energy, Wind & Hydropower Technologies Program. June 3. Retrieved August 28, 2007.
<http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/poster_2007_econ_dev_wga.pdf>.

One analysis determined the economic impact of constructing a wind energy project in Navajo County utilizing the JEDI model in conjunction with the Monte Carlo simulation. This allowed economic estimates to be generated that are included in Table 18, below, regarding jobs, earnings, and economic output for three different sized wind energy projects, 10.5 MW, 60 MW and 180 MW.

Table 18. Projected Jobs, Earnings, & Output Estimates for Wind Projects

	10.5 MW Project	60 MW Project	180 MW Project
Jobs created during construction	6	32	96
Jobs created during Operation and Maintenance (O&M) phase	3	14	43
Earnings during construction	\$0.15 million	\$0.86 million	\$2.60 million
Earnings during O&M phase	\$0.09 million	\$0.51 million	\$1.51 million
Output (economic activity) during construction	\$0.62 million	\$3.54 million	\$10.67 million
Output during O&M phase annually	\$0.20 million	\$1.15 million	\$3.47 million
Potential Lease Payments Annually	\$0.026 million – \$0.042 million	\$0.15 million - \$0.24 million	\$0.45 million - \$0.72 million

In addition to the direct jobs created by these projects, indirect jobs are created nearly equal to the direct operations and management jobs. Because of the excellent wind resources on Navajo lands and their vicinity to transmission lines, as indicated by the NAU studies and others, it is reasonable to assume that three wind farms generating at a 100-200 MW of capacity range could be constructed as well as two larger 300-400 MW farms. Scaling up the numbers from the JEDI tool above, this would put wind capacity at 900-1400 MW and would create approximately 301 long-term jobs and 672 construction jobs.

The Navajo Nation and its tribal members would benefit not only from job creation related to the construction of wind farms on their lands, but they could also earn revenue from land lease payments and tax payments paid by the wind developers or owners. Wind farm owners would typically lease land, rather than purchasing it, for installing wind turbines and the right of way for roads and supporting infrastructure.

Land lease payments have a significant effect on local economies due to the increase in household income if payments are made to local landowners. According to Northwest Economic Associates (NEA), land lease payments were a significant source of household

income for landowners with turbines.²⁰⁰ Increases in household income reverberate through the economy when households spend the additional income within the local economy. Land lease payments generally range from \$2,500 - 4,000/MWp/year.²⁰¹ In terms of wind turbines, payments can range from \$1,500 to \$6,000 per turbine per year, depending on contracts and the size of the turbines.²⁰² If 900-1400 MW of wind were installed on Navajo lands, the potential lease payments to the Nation would range from \$3.15 million to \$5.04 million per year.

Generally, if property taxes are paid on the wind farms, then they may be higher than the taxes paid from a fossil fuel plant if more total land is occupied across the Navajo Nation. Approximately \$1 million per year is earned in property taxes by a typical 100 MW wind farm; however, this number will vary as it is dependent on contracts and negotiations.²⁰³

7.4.2. Financing Options

Mills argues in his report on wind energy on Navajo lands that the tribe should strive to become more than a landowner, and instead participate as a partner, if possible, in energy development projects or even develop projects on their own if possible.²⁰⁴ There are options available for the Navajo Nation to partner with developers on renewable energy projects—partners such as Edison Mission Energy, of Irvine, CA; Domani Investments of Chicago, IL; and/or Econergy, International Corporation, of Boulder, CO.

EME currently has 616 MW of wind projects in operation or currently under construction. These all qualify for Federal Section 45 wind production tax credits. The projects are located in New Mexico, Iowa, Minnesota, Texas, and Oklahoma. Robert Voss of EME asserts that both financing and various ownership models are possible for the Navajo Nation in developing wind energy projects. These projects would be large in scale and scope and they would be viable alternatives to the proposed Desert Rock coal-fired plant. EME is actively looking for wind investments, but the company is awaiting the outcome of the PTC. They expect to make significant investments in wind projects in the next few years and they expect to enter into joint-use development plans with loans for funding. This could be an excellent opportunity for the Navajo Nation to take a leadership role in renewable energy production. EME has also taken initiative in pre-purchasing wind turbines in anticipation of future projects.²⁰⁵

²⁰⁰ “Assessing the Economic Development Impacts of Wind Power.” Prepared for the National Wind Coordinating Committee by Northwest Economic Associates. 12 February 2003. 8 August 2007. <http://www.nationalwind.org/publications/economic/econ_final_report.pdf>.

²⁰¹ Flowers, Larry. NREL. “Wind Energy: Technology, Markets, Economics and Stakeholders.” 9 December 2002. 8 August 2007. <http://www.kidwind.org/ppresentations/Flowers.ppt#263,1,Wind_Energy:Technology,Markets,EconomicsandStakeholders>.

²⁰² Tegen, Suzanne. “Comparing Statewide Economic Impacts of New Generation from Wind, Coal, and Natural Gas in Arizona, Colorado, and Michigan. Prepared for NREL. August 2005. 7 August 2007. <www.nrel.gov/docs/fy06osti/37720.pdf>.

²⁰³ Flowers, Larry. NREL. “Wind Energy: Technology, Markets, Economics and Stakeholders.” 9 December 2002. 8 August 2007. <http://www.kidwind.org/ppresentations/Flowers.ppt#263,1,Wind_Energy:Technology,Markets,EconomicsandStakeholders>.

²⁰⁴ Mills, Andrew D. “Wind Energy in Indian Country: Turning to Wind for the Seventh Generation.” Berkeley: University of California. 2006.

²⁰⁵ Voss, Robert W. Asst. VP Finance, Edison Capital. Email Interview. 24 May 2007.

William Tokash, the director of Domani Consulting's Chicago Office, has been approached by investors in Colorado looking to invest \$100 million into wind energy in the region.²⁰⁶ These are only a few of the possible interested investors, but whose testimonials prove that there is investment potential for wind projects in the Southwest and on Navajo lands.

7.5. Solar

Average photovoltaic module prices were \$3.85 per watt in late 2006, up from \$3.50 per watt in 2005. However, the U.S.-based Prometheus Institute believes that production costs will continue to fall and that solar technologies will improve, along with a balance in supply and demand, and that this will lead to prices decreasing more than 40% in the next three years (relative to 2006 prices). Such a decline would make solar electricity far more feasible worldwide.²⁰⁷

Particularly promising renewable energy source for the Navajo Nation is CSP technology (also known as solar thermal technology). The project location for the proposed Desert Rock plant provides excellent isolation and warm temperatures, making CSP a more cost-effective utility-scale option than photovoltaics. In addition, many CSP technologies are being developed for storing and utilizing heat after the sun sets, which make it possible to market the generated power as firm thus increasing its value.

NREL, in collaboration with SunLab, is promoting the U.S. DOE's goal to install 1,000 MW of CSP technology in the Southwest by the year 2010. Beyond 2010, the DOE hopes to see 16,000-35,000 MW of new generating capacity by the year 2030. These entities predict that this initiative will make it possible for the cost of CSP generated electricity to decrease to around \$.07/kWh by 2015. The U.S. DOE is partnering with WGA on this initiative to encourage installations in the southwestern states of Arizona, California, Colorado, New Mexico, Nevada, Texas, and Utah given that these states have the best solar resources in the U.S. which will allow solar technologies to:

- Meet growing electricity demand with electricity that has the highest capacity during peak load time
- Reduce load on long distance transmission lines
- Meet their RPS (renewable portfolio standards)
- Diversify their energy supply
- Reduce the demand for and price pressure on natural gas
- Improve and/or maintain air quality
- Create new jobs and economic opportunity²⁰⁸

SolarPaces is also promoting a Concentrating Solar Power Global Market Initiative that aims to deploy 5,000 MW of CSP to bring the cost down to a competitive level by 2015.²⁰⁹ The cost for CSP may not currently be competitive with fossil fuel prices, but the price is already

²⁰⁶ Cook, John. Domani Consulting. Email Interview. 7 August 2007.

²⁰⁷ Sawin, Janet L. "Solar Power Shining Bright." WorldWatch Institute. 2007.

²⁰⁸ National Renewable Energy Laboratory (NREL). "Southwest Concentrating Solar Power 1000-MW Initiative." <http://www.nrel.gov/csp/1000mw_initiative.html>.

²⁰⁹ National Renewable Energy Laboratory (NREL). "Parabolic Trough Power Plant Market." <http://nrel.gov/csp/troughnet/market_economic_assess.html>.

close when the 30% tax credit is included. FIGURE 28, below, shows the real levelized cost for a CSP plant to be around 10.3 cents/kWh with the 30% tax credit. A recent study by Sargent & Lundy shows that CSP plants have a cost reduction potential of 4-6 cents/kWh by the year 2012 due to plant scale up, technology development, and volume production, putting the price near 5 cents/kWh.²¹⁰ Nonetheless, subsequent calculations in this report use the national average cost of solar power as 13.5 cents/kWh (see Table 21, below, p. 83). When considering the cost to implement carbon capture technology and the predicted cost of carbon taxes, the cost of energy for a coal plant like Desert Rock is not as economically advantageous, and the cost of energy may actually be higher.

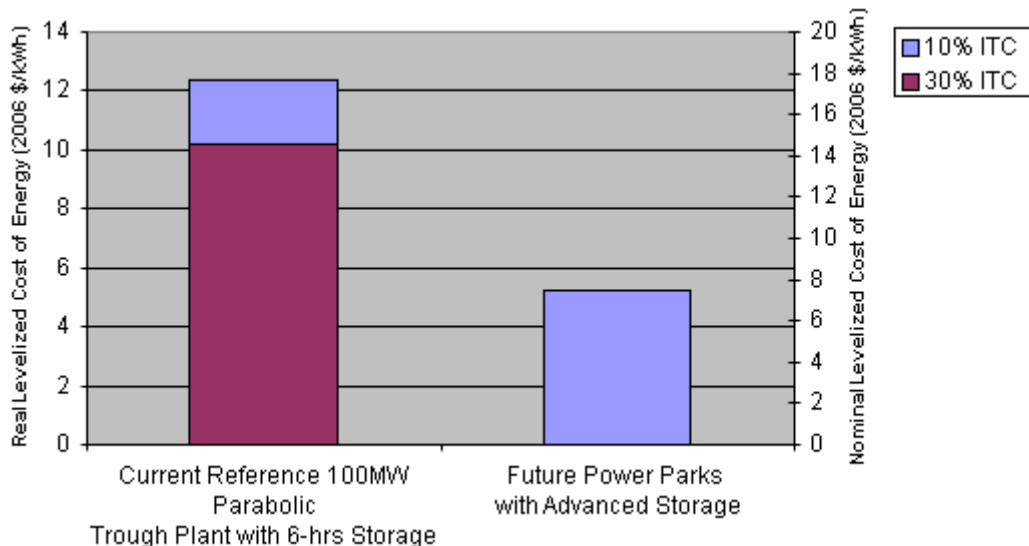


FIGURE 28. Projected Current and Anticipated Future Levelized Costs for Parabolic Trough Systems²¹¹

*NREL confirmed that the left y axis label on its chart should indicate cents/kWh, not \$/kWh

Distributed power towers (DPT) are currently the best-suited solar thermal technology as an alternative to the Desert Rock Project, given their cost effectiveness, modular installation, double axis tracking, and their minimal impact on the topography of the region. The cost per unit of electricity produced from solar is higher than that of wind power, but northern Arizona's solar conditions are generally better, relative to the rest of the county, than their wind conditions. Moreover, the two resources balance each other seasonally and by time of day, yielding a better overall power profile than either by itself. The Draft EIS for the proposed Desert Rock plant should have included a detailed assessment of both resources.

The feasibility of concentrated solar in various places near to the transmission corridor is illustrated in FIGURE 29, below. The proximity in a few cases to existing natural gas pipelines as well would help facilitate the deployment of hybrid designs to sell firm power.

²¹⁰ Morse, Dr. Frederick H. "Central Station Solar Electricity: Concentrating Solar Power." <http://www.epa.gov/cleanenergy/pdf/morse-dec6.pdf>.

²¹¹ "Parabolic Trough Power Plant Market, Economic Assessment and Deployment." National Renewable Energy Laboratory (NREL). 5 April 2007. 20 August 2007. http://www.nrel.gov/csp/troughnet/market_economic_assess.html.

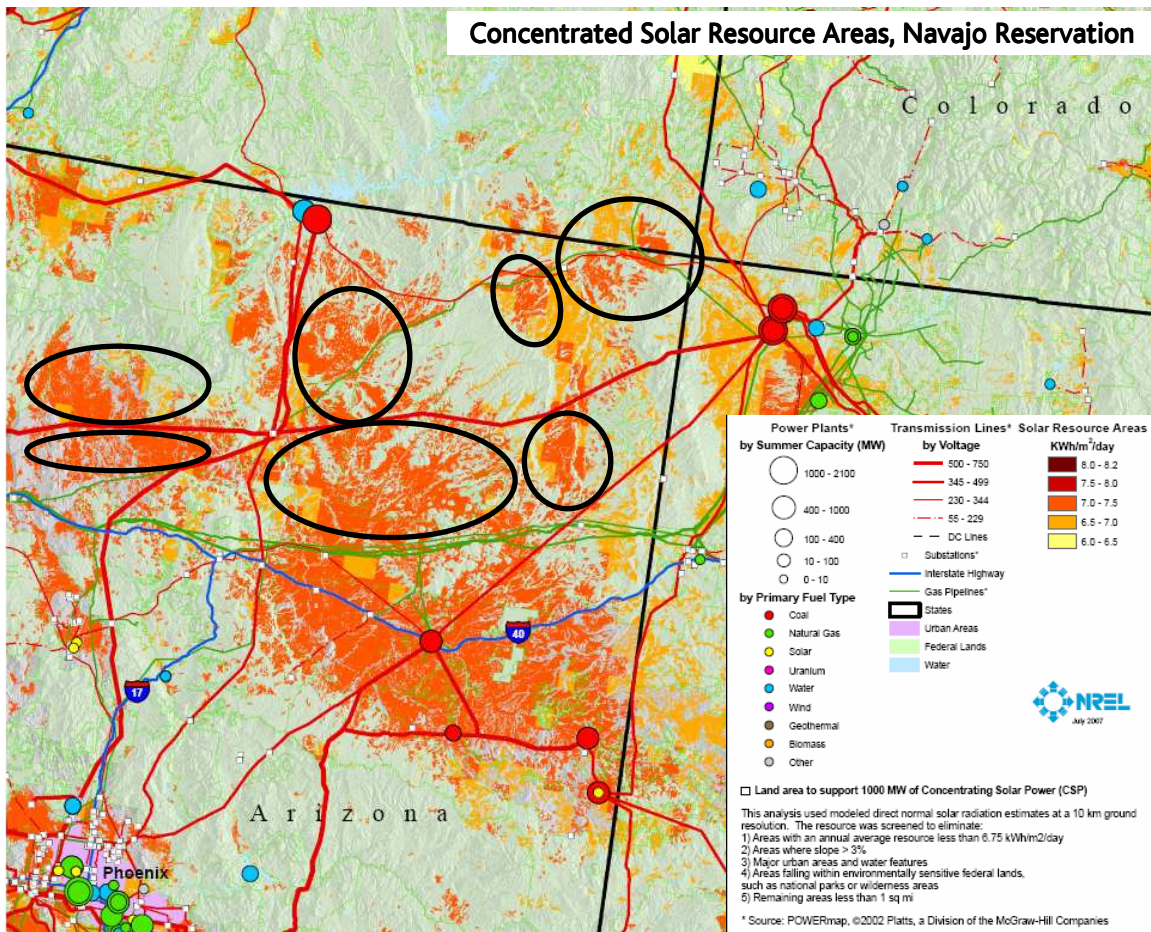


FIGURE 29. Concentrated Solar Resource Areas on the Navajo Nation Near to the Transmission Corridor²¹²

7.5.1. Financing

Bright Source Energy, Inc., based in California is interested in pursuing a concentrated solar tower plant on Navajo Nation lands through a leasing agreement.²¹³

7.6. Energy Efficiency

Whenever projects are being proposed to generate new electricity, it is tempting to consider alternatives only in the context of creating more electricity. However, from utilities' perspective, the option to reduce demand through cost-effective energy efficiency programs is often even more compelling. These demand side management (DSM) programs are already an established part of utilities' resource portfolios throughout the southwestern

²¹² "Concentrating Solar Power Prospects of the Southwestern United States." July 2007. Original Map Courtesy of National Renewable Energy Laboratory (NREL).

²¹³ Ricker, Charles. Senior Vice President, Marketing & Business Development. Bright Source Energy, Inc. Email Interview. 7 August 2007.

United States. Regional investment has grown from only \$29 million per year in 2002 to approximately \$130 million per year in 2007, and it is currently rising about 36% per year.²¹⁴

Table 19. Southwest U.S. Demand Side Management Program Budgets

State	DSM program budget (million \$ per year)					
	2002	2003	2004	2005	2006	2007 (est)
AZ	4	4	4	10	21	32
CO	11	13	21	24	18	24
NV	3	11	11	14	30	36
NM	1	1	1	1	1	4
UT	9	12	16	20	25	33
WY	~0	~0	~0	~0	~0	1
Region	29	42	54	70	95	130

These energy efficiency programs yielded first year energy savings of about 540 GWh/year and peak demand savings of about 240 MW in 2006.²¹⁵ The programs generate *lifetime* energy savings significantly higher given that the majority of the measures being promoted have lifetimes of longer than one year. At a national average cost of approximately \$0.03/lifetime kWh saved, these programs would yield lifetime energy savings of approximately 4,333 GWh.

The target markets for Desert Rock's power are primarily Arizona and Nevada. Nevada in particular is operating under a new law that stimulates significant investment in energy efficiency. Howard Geller, Executive Director of SWEEP, describes that law as follows:

In June 2005, legislation enacted in Nevada added energy savings from DSM programs to the state's Renewable Portfolio Standard.²¹⁶ This innovative policy allows energy savings from utility DSM programs and/or efficiency measures the utilities contract with to supply up to 25% of the requirements under the re-named clean energy portfolio standard. The clean energy standard is equal to 6% of electricity supply in 2005-06 and increases to 9% in 2007-08, 12% in 2009-2010, 15% in 2011-2012, 18% in 2013-14, and 20% in 2015 and thereafter. At least half of

²¹⁴ Howard Geller, *Update on Energy Efficiency Efforts in Western States*, Southwest Energy Efficiency Project (SWEEP), July 17, 2007, p. 5.

²¹⁵ Howard Geller, *Catching Up: Progress with Utility Energy Efficiency Programs in the Southwest*, Southwest Energy Efficiency Project, published in the proceedings of the 2006 ACEEE Summer Study on Energy Efficiency in Buildings, August 2006, p. 11.

²¹⁶ See Assembly Bill 3, adopted by the Nevada legislature on June 7, 2005.

<<http://www.swenergy.org/legislative/2005/nevada/AB%203%20Special%20Session%20Bill.pdf>>.

the energy savings credits must come from electricity savings in the residential sector.²¹⁷

As the programs described above continue to ramp up in budget and energy savings, they have the potential, in Arizona and Nevada alone, to offset 25% or more of the anticipated output of Desert Rock at less than half of the cost per kWh. At current rates of growth, the combined investment by Arizona and Nevada utilities in energy efficiency programs would reach \$92 million in 2008, \$126 million in 2009, \$171 million in 2010, \$233 million in 2011, and \$316 million in 2012. This would yield approximately 1,134 GWh/year of first year electricity savings by 2012 – approximately 11% of the annual output of the Desert Rock power plant at its ultimate capacity of 1,500 MW, or 22% of its initial capacity at 750 MW.

In 2006, WGA examined projected growth in electricity consumption in the 18 WGA states and concluded that adopting best practice energy efficiency programs would eliminate 75% of all expected growth in electricity consumption between 2003 and 2020 (see FIGURE 30). More importantly, it would result in electricity consumption across the region being 20% less in 2020 than in the Reference scenario, eliminating the need for 100 base load coal-fired power plants such as Desert Rock. “Best Practice” utility-funded energy efficiency programs invest at least 2% of electric revenues and are scaled to save at least 3 to 5% of expected 2010 electricity consumption.

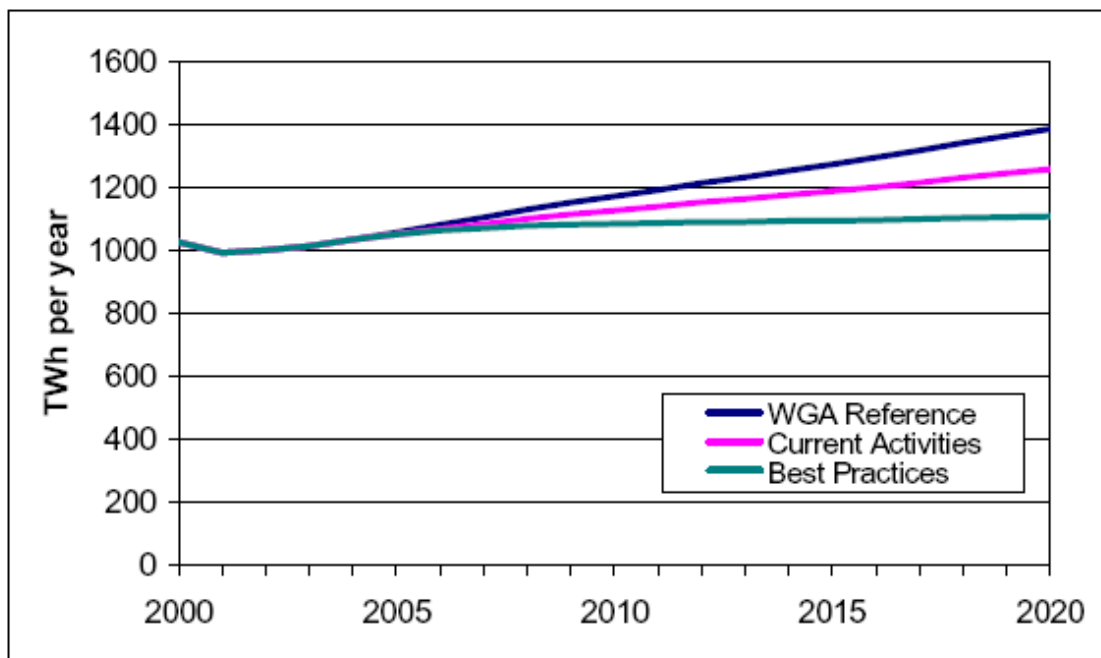


FIGURE 30. WGA Projection – Electricity Demand

²¹⁷ Howard Geller, *Catching Up: Progress with Utility Energy Efficiency Programs in the Southwest*, Southwest Energy Efficiency Project, published in the proceedings of the 2006 ACEEE Summer Study on Energy Efficiency in Buildings, August 2006, p. 6.

WGA summarized the benefits of pursuing that initiative as follows:²¹⁸

Benefits of the Best Practices Scenario

- 20% electricity savings by 2020, relative to the Reference Scenario
- 48,000 MW of avoided power plant construction during 2005-2020
- Small reduction in electricity prices in the latter part of study period
- \$53 billion in net economic benefits for consumers and businesses
- Substantial reduction in power plant CO₂ emissions
- Moderate reduction in power plant NO_x emissions
- Approximately 1.8 trillion gallons of water savings during 2005-2020

These efficiency programs save electricity at the time of day when it is being consumed most heavily and at the locations where the greatest demand occurs, reducing the need for new transmission and distribution lines rather than aggravating it. They reduce emissions of CO₂ and other pollutants rather than increasing them. They reduce customers' energy bills rather than increasing them. These programs reduce water consumption by promoting resource-efficient clothes washers, dishwashers, and other energy and water-saving products, in contrast to new coal plants that increase water consumption in an already arid region. Energy efficiency programs create more jobs per unit of energy delivered than conventional coal-fired power plants. Pressures to accelerate funding for these demand side management programs will continue to rise in future years with rising electricity prices, fuel prices, and greenhouse gas emission reduction targets. They are wholly consistent with the stated public policies of the Southwestern states, more economically attractive than building a new conventional coal plant, and environmentally preferable, yet no mention of them even appears in the Draft EIS for the Desert Rock project or any consideration of alternatives to it.

7.7. Energy Efficiency and Off-Grid Renewable Projects on the Navajo Nation

The Draft EIS is deficient in that it made no mention of energy efficiency programs and rural electrification efforts (on-grid and off-grid) as alternatives to the proposed Desert Rock project. The most direct way to develop the economy of the Navajo Nation and address environmental justice concerns via an energy project is not to provide a small number of high paying jobs to those who happen to live close enough to work in the expanding BHP coal mine or as operators at the power plant. Rather, it is to make direct investments in decentralized renewable energy projects which would provide power to Navajo homes that have no electricity, water, heat, or cooling.

²¹⁸ Western Governors Association Clean and Diversified Energy Initiative, *Energy Efficiency Task Force Report: Executive Summary*, January 2006, p. 8.

Such efforts can include:

- Energy efficiency upgrades of existing Navajo dwellings, including weatherization, improved insulation, better windows and doors, more energy efficient lighting and appliances, and more efficient heating, ventilation and air conditioning (HVAC) and water heating equipment to improve comfort, safety, and health, while reducing energy bills.
- Power line extensions to those who live close enough to the existing grid to justify the cost.
- Photovoltaic, wind turbine, inverter, and battery systems designed and installed by trained Navajo contractors to fulfill the remaining energy needs of off-grid homes most cost-effectively.
- Water wells to bring a regular, affordable supply of drinking water to the large percentage of Navajo homes that currently rely on water trucks to meet their basic needs.

Corporations proposing to pursue construction of wind turbine and solar thermal projects on the Navajo Nation can receive funding for such programs as a condition of development. It is not uncommon for project developers such as Sithe Global to approach tribal governments requesting tax breaks as a condition of moving forward. By the same token, tribal governments are certainly within their rights to insist on funding for training programs and direct installation of residential scale energy efficiency measures and renewable energy equipment in return for those tax breaks, as a condition of contract approval. The Draft EIS for the proposed Desert Rock plant ignores any such possibilities, clinging to the fallacy that the only form of energy project that constitutes “economic development” for the Navajo Nation is to mine coal, burn it, and export the resulting electricity to homes and businesses beyond the borders of the Navajo Nation.

7.8. Job Creation

U.S. jobs created as a result of growth in the renewable energy and energy efficiency fields are estimated to be higher than 450,000. Many of these jobs will be in private industry.²¹⁹ In 2004, researchers at the University of California at Berkeley’s Renewable and Appropriate Energy Laboratory reviewed 13 reports that collectively confirmed that renewable energy technologies would produce 10 times as many jobs in the U.S. than comparable investments in fossil fuels or nuclear.²²⁰ Table 20, below, highlights the breakdown of renewable energy jobs, both direct and indirect, and the revenues created by these jobs as of 2006. These numbers will continue to grow as the renewable energy sectors continue to expand worldwide and in the U.S. each year.

²¹⁹ Bezdek, Roger H. “Renewable Energy: Economic Powerhouse.” *Solar Today*. July/August 2007. 7 August 2007. <http://www.solartoday.org/2007/july_aug07/economic_powerhouse.htm>.

²²⁰ Kammen, D., et. al. (2004). “Putting Renewables to Work: How Many Jobs can the Clean Energy Industry Create?,” *Rael Report*, January. Available at: <<http://rael.berkeley.edu/files/2004/Kammen-Renewable-Jobs-2004.pdf>>. Cited in Cooper, Christopher and Dr. Benjamin Sovacool. “Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS).” Network for New Energy Choices. June 2007.

Table 20. Renewable Energy Jobs in the United States, 2006 ²²¹

Industry Segment	Revenues/Budgets (billions \$)	Direct Jobs	Total Jobs Created (direct plus indirect)
Wind	3.0	16,000	36,800
Photovoltaics	1.0	6,800	15,700
Solar Thermal	0.1	800	1,900
HydroElectric Power	4.0	8,000	19,000
Geothermal	2.0	9,000	21,000
Biomass			
-Ethanol	6.3	67,000	154,000
-Biodiesel	0.3	2,750	6,300
-Biomass Power	17.0	66,000	152,000
Fuel Cells	0.9	4,800	11,100
Hydrogen	0.8	4,000	9,200
Total, Private Industry	35.4	185,150	427,000

Estimated job impacts on the Navajo Nation depend on the mix of renewable resources and energy efficiency options employed, as described below.

²²¹ Bezdek, Roger H. "Renewable Energy: Economic Powerhouse." *Solar Today*. July/August 2007. 7 August 2007. <http://www.solartoday.org/2007/july_aug07/economic_powerhouse.htm>.

8. AN ILLUSTRATIVE SCENARIO

Ecos modeled an Equivalent Energy Scenario to explore what the economic and environmental impacts would be from a mix of resources that produce as much annual electricity as the Desert Rock project. Rather than concentrating energy generation in a single location on Navajo tribal lands, this resource planning proposal considers a balanced mixture of renewable energy (solar and wind), natural gas, and energy efficiency measures. Existing maps from NREL and other organizations indicate substantially greater renewable resource availability on Navajo lands than the amount needed. One recently proposed solar plant on 3,200 acres near Deming, New Mexico, for example, will generate approximately 300 MW of electricity. Other wind projects of similar scale are possible in northern Arizona and New Mexico as well. Each of these resources have different annual average availability, but would be sized to ensure approximate equivalency to the proposed Desert Rock plant at 1500 MW of output and a plant capacity factor of 81.9%. This scenario is illustrative of the sort of alternatives analysis the Draft EIS for the proposed Desert Rock plant should have offered, but did not.

Similarly, the EIS should explore alternatives to utility-funded energy efficiency programs in the target markets of Arizona and Nevada, considering as well the economic development opportunity of improving the energy efficiency of Navajo homes and then installing wind or solar energy systems in those locations too remote to have grid-tied electricity.

The following tables summarize the average cost, relative use of water, comparative costs of carbon output, net jobs, and comparative revenue to the Navajo Nation of burning coal and investing in alternative renewable energy development. The Draft EIS for the proposed Desert Rock plant is deficient in that it did not offer comparable analyses to those shown below, each of which documents that economic development for the Navajo Nation would be better served by investing in alternative renewable energy development rather than mining and burning coal. Table 21, below, illustrates the relative cost/kWh of a mix of alternatives that would deliver equivalent or greater energy services than the proposed Desert Rock plant. As this table demonstrates, the average cost would be less than that of Desert Rock. Other proportions and mixes of clean energy options could be equally viable – our intent is to provide one illustrative alternative scenario rather than to characterize it as the only such alternative.

Table 21. Equivalent Energy Scenario to Desert Rock

Weight	Technology	Capacity (MW) <small>222, 223, 224, 225</small>	Capacity Factor	GWh/yr	Cost/kWh <small>226, 227, 228, 229</small>
100%	Coal	1,500	0.819	10,769	\$ 0.0690
49%	Wind	1,828	0.334	5,348	\$ 0.0661
14%	CSP	753	0.200	1,320	\$ 0.1350
21%	Utility Efficiency			2,310	\$ 0.0300
16%	Natural Gas	753	0.300	1,980	\$ 0.0684
100%	Total Alternatives	3,334		10,958	\$ 0.0669

The MW capacity for wind on the Navajo Nation was determined using Table 22, along with the MW capacity totals separated by wind power class found in Grant Brummels' Northern Arizona University report. All of the available Class 4-7 wind resources were included, as well as around 6% of the Class 3 wind resource. The assumption is that the Class 4-7 wind resources are either already near to a transmission line or their high-energy value would make it feasible to run a transmission line to the site. The 6% of the Class 3 wind resource could then be utilized in combination with the better wind resources on the reservation in order to obtain 1,746 MW of power.

²²² Draft Environmental Impact Statement. Desert Rock Energy Project. May 2007. Executive Summary.

²²³ CSP MW capacity estimates based on communication with Ricker, Charles. Senior Vice President, Marketing & Business Development. Bright Source Energy, Inc. Email Interview. 7 August 2007. The capacity assumes that 2 CSP/natural gas plants would be constructed of around 375 MW, and that even if the sun was not shining, the natural gas could provide 753 MW of capacity.

²²⁴ See previous energy efficiency economics section in the report for further discussion.

²²⁵ The MW capacity for natural gas was included as a backup to the wind and solar resources available to the Navajo. It would firm up the power and would not be utilized as a baseload plant.

²²⁶ Wind cost estimate calculated utilizing levelized cost numbers and capacity factors for wind found in Table 22, and wind resources available to the Navajo Nation by wind class found in Brummels, Grant, Dr. Thomas Acker, and Dr. Susan Williams. "Navajo Wind Energy Development Exclusions: An Analysis of Land Suitable for Wind Energy Development on the Navajo Nation." Northern Arizona University. August 2006. We calculated an average cost for the wind based on 100% use of Class 4-7 wind resources and 5.78% of the Class 3 wind resource.

²²⁷ CSP cost numbers taken from Cooper, Christopher and Dr. Benjamin Sovacool. "Renewing America: The Case for Federal Leadership on a National Renewable Portfolio Standard (RPS)." June 2007. Network for New Energy Choices. Pg. 36. Recent numbers show CSP costs to be closer to 10.3 cents/kWh, as discussed earlier in the solar economics section, but the more conservative estimate of 13.5 cents/kWh is used in this report.

²²⁸ See efficiency economics section of the report for further information on cost savings from efficiency.

²²⁹ Natural gas cost number from "Cost and Performance Baseline for Fossil Energy Plants." Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

Table 22. Wind Levelized Cost of Energy and Capacity Factor by Wind Power Class²³⁰

Wind Power Class	Wind Speed @ 50 m	Capacity Factor	Nominal LCOE
3	6.4-7.0	30.0	.0744
4	7.0-7.5	33.8	.0659
5	7.5-8.0	39.8	.0537
6	8.0-8.8	43.6	.0490
7	8.8-11.1	49.6	.0431

Table 23, below, illustrates the relative use of water by various alternatives to burning coal.

Table 23. Water Use Compared to Desert Rock

Weight	Technology	GWh/yr	Cost/kWh	Water Gal/GWh	Total Water Impact (millions of gallons/year) <small>231, 232, 233, 234</small>
100%	Coal	10,769	\$ 0.0690	136,415	1,469
49%	Wind	5,348	\$ 0.0661	1000	5
12%	CSP	1,320	\$ 0.1350	830,000	1,096
21%	Utility Efficiency	2,310	\$ 0.0300	(400,000)	(924)
18%	Natural Gas	1,980	\$ 0.0684	250,000	495
100%	Total Alternatives	10,958	Avg. Cost/kWh: \$ 0.0669		672

Carbon costs have been dealt with in other sections of this report, however this summary table demonstrates how the Draft EIS for the proposed Desert Rock plant is deficient in

²³⁰ Milligan, Michael, Ph.D. "Tackling Climate Change in the U.S.: Potential Carbon Emissions Reductions from Wind by 2030." National Renewable Energy Laboratory. 2006.
<http://www.ases.org/climatechange/toc/06_wind.pdf>.

²³¹ Desert Rock water usage is shown to be 2,795 gpm, provided in the Draft EIS Statement, from this figure, it is possible to calculate millions of gallons/year at 1,469. May 2007. Executive Summary. ES-4.

²³² Wind and CSP numbers Calculated Utilizing "The Last Straw: Water Use by Power Plants in the Arid West." The Hewlett Foundation. April 2003. p. 13.
<<http://www.westernresourceadvocates.org/media/pdf/WaterBklet-Final2-W.pdf>>.

²³³ Natural gas water usage numbers calculated utilizing combined cycle water usage number found in "How Much Water do Wind Turbines Use Compared with Conventional Power Plants?" American Wind Energy Association. <<http://www.awea.org/faq/water.html>>.

²³⁴ Water savings from efficiency estimated based on millions of gallons saved through the elimination of demand for electricity. Electricity savings in AZ and NV service territories estimated based on net electricity generation by sector obtained from the U.S. EIA Annual Energy Review 2006.

that it does not accurately address the relative costs of carbon compared to various alternatives to burning coal.

Table 24. Carbon Costs of Alternatives Relative to Desert Rock

Equivalent Energy Scenario					
%	Technology	Capacity (MW)	CO2 tons/year ^{235, 236}	Carbon Charges (\$5/ton)	Carbon Charges (\$23/ton)
100%	Coal	1,500	12,700,000	\$63,500,000	\$292,100,000
49%	Wind	1,828	0	0	0
12%	CSP	753	0	0	0
21%	Utility Efficiency		(1,559,250)	-	-
18%	Natural Gas	753	2,194,184	\$10,970,921	\$50,466,239
100%	Total Alternatives	3,334	634,934	\$10,970,921	\$50,466,239

Carbon trading is almost inevitable during the lifetime of the proposed Desert Rock plant, although this analysis does not provide an estimate for the value of future carbon credits from utility efficiency, because those credits would pertain to the service territories where the efficiency improvements would be implemented, not to the Navajo Nation.

One critical component of any sincere economic development program is the number of permanent, stable jobs created. The Draft EIS for the proposed Desert Rock plant is deficient in that it does not accurately assess the number of jobs to be created by investing in alternatives to burning coal.

²³⁵ Coal CO₂ emissions for Desert Rock taken from Draft Environmental Impact Statement. Desert Rock Project. May 2007. 4-19.

²³⁶ Natural Gas carbon dioxide emissions numbers calculated using NGCC plant (w/o carbon capture) carbon dioxide emissions from “Cost and Performance Baseline for Fossil Energy Plants.” Volume 1: Bituminous Coal and Natural Gas to Electricity. Final Report. Department of Energy and National Energy Technology Laboratory. May 2007. <http://www.netl.doe.gov/energy-analyses/pubs/Bituminous%20Baseline_Final%20Report.pdf>.

Table 25. Jobs from Alternatives Compared to Desert Rock

Weight	Technology	Capacity (MW)	Construction Jobs 237, 238, 239, 240	Operations Jobs
100%	Coal	1,500	1000	200
49%	Wind	1,828	975	437
12%	CSP	753	672	67
21%	Utility Efficiency		NA	NA
18%	Natural Gas	753	369	30
100%	Total Alternatives	3,334	2016	534

From the table shown above, it is clear that long-term, stable job opportunities from alternative energy development vastly exceed that provided by fossil fuel development. Jobs related to utility efficiency programs are not included because they would more than likely be located off of the Navajo reservation in fast-growing areas such as Las Vegas, Nevada and Phoenix, Arizona. However, it is worth noting that 200-1000 energy efficiency direct jobs would be created over 4-14 years from the inception year of a utility energy efficiency program.²⁴¹ Although these jobs may be created elsewhere, there is an overall societal benefit created by these jobs if energy efficiency is taken into account as part of the mix of alternative options to Desert Rock. The Draft EIS does not provide a similar analysis.

Desert Rock's Draft EIS cites the increased revenue from the construction of the coal plant.²⁴² As this report has shown, carbon costs and health costs add a significant amount to the cost of the proposed Desert Rock plant, and that these negative cost factors would not be incurred by renewable technologies. Adding the costs of health care and carbon offsets into the numbers given by Desert Rock yields costs, which dwarf the benefits that the Navajo would receive in terms of revenue from the proposed coal plant. The Draft EIS is deficient in that it does not provide a thorough and complete comparison among technologies to include health and carbon costs.

Even without health and carbon costs, a comparison such as the one below can still illustrate why it makes sense to consider wind and other alternatives to Desert Rock in terms of revenue to the Navajo Nation. FIGURE 31 and FIGURE 32 show expenditures for comparably sized coal-fired, gas-fired, and wind-powered generators in Arizona and

²³⁷ Coal job numbers based on the estimated jobs created by the construction and operation of the plant found in Sithe Global Fact Sheet: Desert Rock Energy Project. July 2005.
<<http://www.sitheglobal.com/news/SitheFactSheet.pdf>>.

²³⁸ Wind numbers based on JEDI modeling, see earlier wind economics section for further detail.

²³⁹ CSP job estimate numbers based on communication with Ricker, Charles. Senior Vice President, Marketing & Business Development. Bright Source Energy, Inc. Email Interview. 7 August 2007.

²⁴⁰ Natural Gas job estimates based on numbers in Heavner Brad and Susannah Churchill. "Renewables Work: Job Growth from Renewable Energy Development in California." CALPIRG Charitable Trust. June 2002.
<http://www.environmentcalifornia.org/uploads/ls/w7/lsw7NaRz7gj3rfIQ2OcqsQ/Renewables_Work.pdf>

²⁴¹ ECONorthwest. 2007. "Economic Analysis of Nevada's Future Electricity-Generating Alternatives."

²⁴² Draft EIS. Pp. ES7, ES-15; Sithe Fact Sheet.

Colorado. Wind projects in the past have cost more to construct than coal or gas plants, but they have lower operating costs and consistently provide more jobs per unit of energy delivered. Wind has no fuel cost, and it can provide significantly more revenue from property taxes than either coal or gas projects. An additional benefit from a wind project is that the landholder revenue can be spread out among, and paid directly to, a diverse community of landowners on the Navajo Nation, as opposed to only paying coal royalties to one company or the entity who owns the coal mine.

The availability of natural gas-fired electricity addresses the criticism that wind is not available all the time--a natural gas plant can provide the back up to “firm up” the reliability of wind or solar-generated electricity. Further, utilizing regionally-available natural gas to produce the value-added product of electricity increases the revenue to the Navajo Nation from the regional resource, making natural gas a viable supplemental option to construct near renewable power facilities sited on Navajo lands, with most of the revenue to the Navajo Nation coming from the renewable energy facilities.

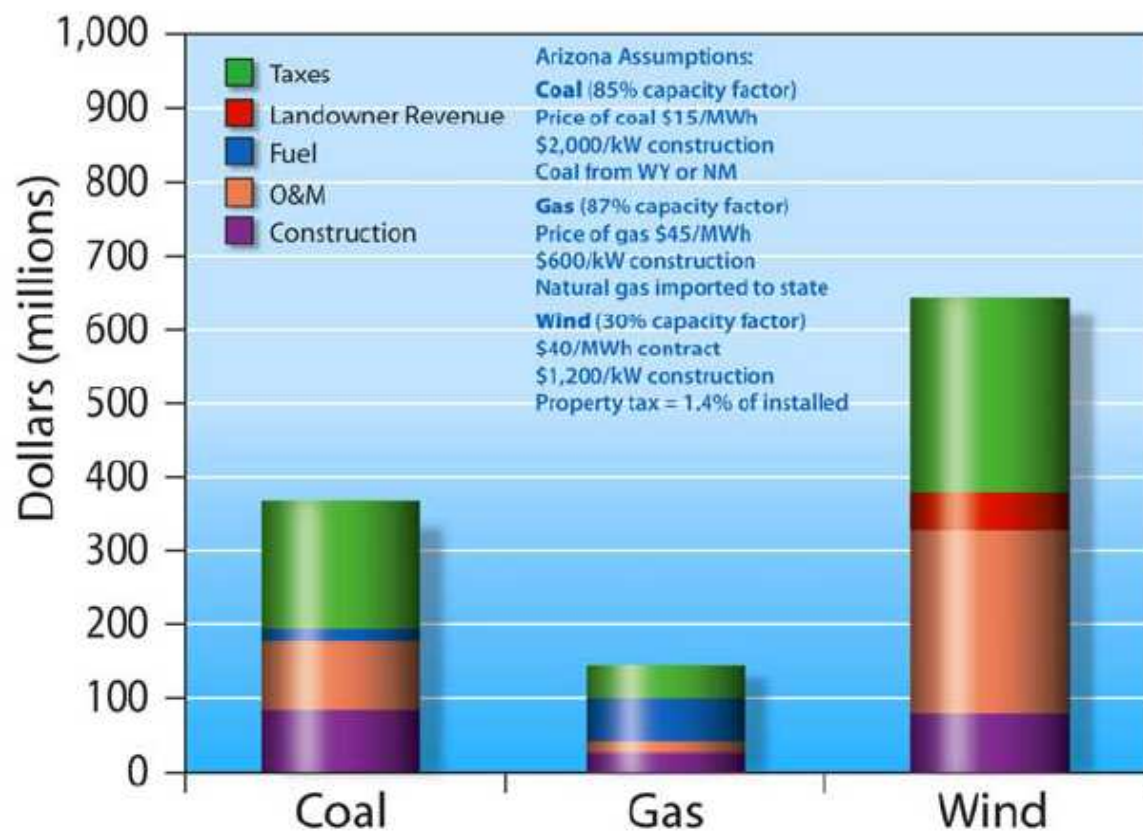


FIGURE 31. Arizona Assumptions - Expenditures for Comparably-Sized Coal-Fired, Gas-Fired, and Wind-Powered Generators²⁴³

²⁴³ Tegen, S. 2006. Comparing Statewide Economic Impacts of New Generation from Wind, Coal, and Natural Gas in Arizona, Colorado, and Michigan. NREL/TP-500-37720. National Renewable Energy Laboratory. May. Retrieved August 28, 2007. <<http://www.nrel.gov/docs/fy06osti/37720.pdf>>.

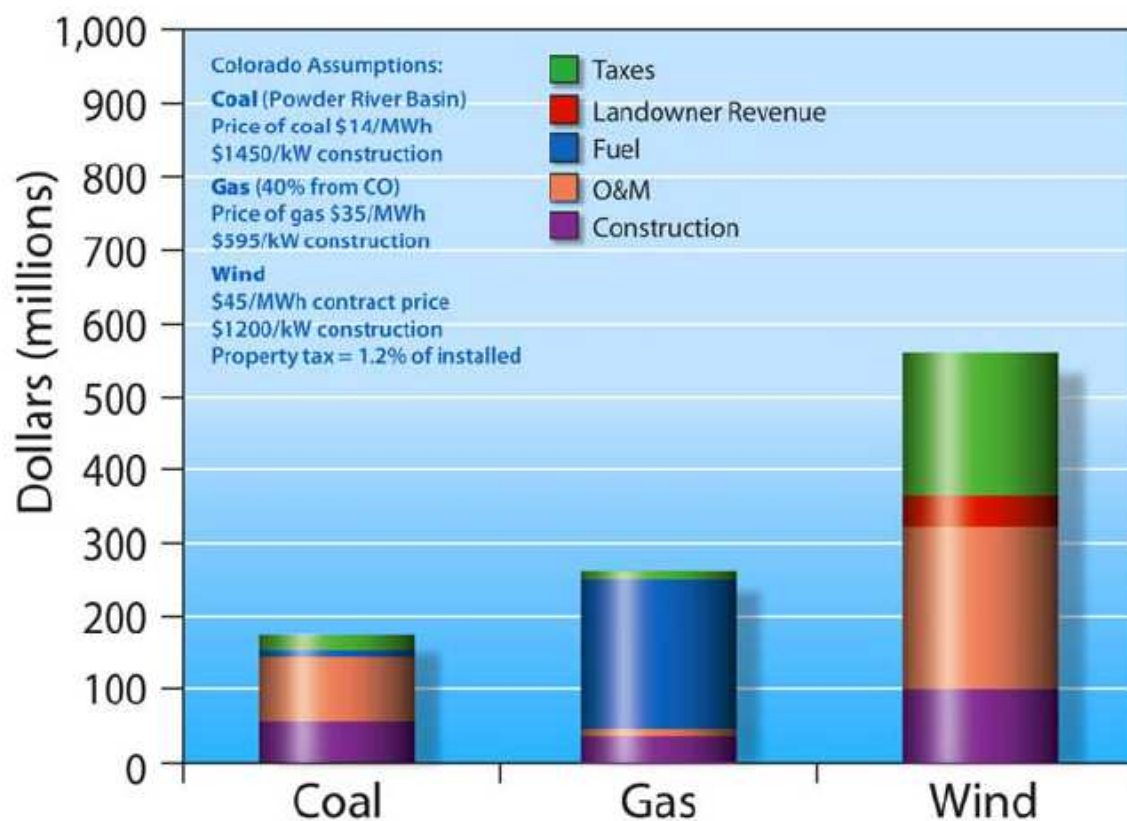


FIGURE 32. Colorado Assumptions - Expenditures for Comparably-Sized Coal-Fired, Gas-Fired, and Wind-Powered Generators ²⁴⁴

²⁴⁴ Tegen, S. 2006. Comparing Statewide Economic Impacts of New Generation from Wind, Coal, and Natural Gas in Arizona, Colorado, and Michigan. NREL/TP-500-37720. National Renewable Energy Laboratory. Retrieved August 28, 2007. <<http://www.nrel.gov/docs/fy06osti/37720.pdf>>.

Table 26. Desert Rock & Alternative Scenario Economic Factors

Economic Factor	Desert Rock	Alternative Scenario
Short Term Construction Jobs ⁱ	1,000	2,016
Long Term Operations & Maintenance Jobs ⁱⁱ	200	534
Coal Taxes & Coal Royalties ⁱⁱⁱ	\$29,900,000/year	\$0/year
Water Fees ^{iv}	\$5,200,000/year	\$5,649,172/year
Negotiated Taxes ^v	\$16,200,000/year	\$19,346,363/year
Sales Taxes During Construction Phase ^{vi}	\$832,000/year	\$1,677,549/year
Sales Taxes During O&M Phase	\$166,400/year	\$444,285
Total Tax Revenue Generated (Construction Phase – annual)	\$832,000/year	\$1,677,549/year
Total Tax Revenue Generated O&M Phase – annual	\$51,466,400/year	\$25,439,821/year
Green Power Premium ^{vii}	\$0/year	\$67-\$133 million/year
Carbon Capture or Offset Costs^{viii}	\$63-\$292 million/year	\$11-\$50 million/year
Fuel Price Volatility ^{ix}	Moderate	Low
TOTAL ECONOMIC BENEFIT Construction Phase – annual	\$832,000/year	\$1,677,549/year
TOTAL ECONOMIC BENEFIT (COST) O&M Phase – annual	Cost: (\$12 to \$240) million/year	Benefit: \$81 - \$108 million/year

ⁱ See previous Table 25 for references.

ⁱⁱ See previous Table 25 for references.

ⁱⁱⁱ Coal royalties and taxes from “Sithe Global Fact Sheet 2005.” <<http://www.sitheglobal.com/news/SitheFactSheet.pdf>>.

^{iv} Desert Rock water usage is shown to be 2,795 gpm, provided in the Draft EIS, further extrapolation from this amount yields 1,469 million gallons/year. May 2007. Executive Summary. ES-4. Water fee figure for coal from “Sithe Global Fact Sheet 2005.” <<http://www.sitheglobal.com/news/SitheFactSheet.pdf>>. A similar calculation was used for renewables, based on Table 23, above.

^v Coal negotiated tax numbers obtained from lease agreement among the Navajo Nation, Dine Power Authority, and Desert Rock Energy Company LLC. The taxes will either be \$16,200,000 per year, or 2.9% of gross revenues, whichever is greater (could be as much as \$23,700,000/year with 90% capacity factor). Alternative Scenario taxes calculated utilizing the 2.9% tax found in the lease document, the total GWh of alternatives per year, and the weighted cost of the alternatives per kWh.

^{vi} Sales Tax on the Navajo Nation is 4%. To calculate how much revenue will stay on the Navajo Nation from jobs created by the different technologies, total jobs were multiplied by \$41,600/year salary, and then this number was divided in half to show that half would stay in the local economy. The resulting total was multiplied by 4%.

^{vii} Calculated assuming a 1-2 cents per kWh price premium for green power, for both green pricing programs and the sale of peak load electricity. Bird, Lori and Blair Swezey. NREL. “Green Power Marketing in the United States: A Status Report (Ninth Edition).” November 2006. NREL/TP-640-40904. <<http://www.nrel.gov/docs/fy07osti/40904.pdf>>.

^{viii} See previous Table 24, carbon costs for references.

^{ix} See carbon costs and fuel price volatility, Sections 5.4 and 5.5, above, for further information.

As indicated previously in this report, according to Sithe Global, the Desert Rock coal plant will produce over \$16 million in tax revenues to the Navajo Nation.²⁴⁵ By comparison, the alternative energy technologies would be likely to provide over \$19 million in comparable taxes. The \$16 million in tax revenue is 2.9% of the total dollars generated from the sale of power from Desert Rock at 6.9 cents/kWh. Given this calculated tax rate assumption, this report applies the same rate to the renewable energy projects in the scenario above as well, to obtain the tax revenue dollars for each of the alternative technologies. The Navajo Nation typically has Possessory Interest Tax, Business Activity Tax, and Sales Tax rates, but these rates were adjusted/reduced during the negotiations and agreement made with Sithe Global for Desert Rock. It is possible that a higher tax rate would be agreed upon for future energy development, creating more revenue for the Navajo Nation.

The balance of the \$50,000,000 proposed by Sithe Global as revenue to the Navajo Nation assumes a combination of taxes on water rights, land leases, and activities related to the coal mine. Because the coal mine was given only cursory analysis in the Draft EIS for the proposed Desert Rock plant by the proponents, this report does not estimate offsetting financial benefits from renewable energy projects relative to the coal royalties and taxes. However, there are many candidates for such offsetting benefits as shown above, including the premiums paid by utilities and their customers for voluntary green power, premium pricing for peak load power, land lease payments, and potential future revenues from carbon offsets accruing to renewable energy production.

It is reasonable to assume that the Navajo Nation could negotiate similar taxes or fees based on land use, sale of electricity, transmission capacity and other aspects of alternative energy scenarios, to exceed the anticipated revenues from full operation of the coal plant. It is also worthy of note that the Draft EIS for the proposed Desert Rock plant does not compare the timing of revenue generation—investments in alternative technologies and natural gas plants begin producing returns within one or two years, whereas the full operation of Desert Rock would take several years longer to begin producing revenues. With annual revenues to the Navajo Nation of \$81 to \$108 million/year from renewable energy projects, this difference in timing is potentially hundreds of millions of dollars. Especially given that the Draft EIS for the proposed Desert Rock plant excludes any subsequent costs of carbon taxes, carbon sequestration, or carbon capture technologies, all of which will dramatically increase costs and proportionately reduce revenues, it is sufficient for this analysis to document that the Navajo Nation can expect to receive greater tax revenue from the construction and operation of alternative energy projects as economic development than they would from selling and burning coal.

²⁴⁵ “Desert Rock Newsletter #2.” September 2006. Sithe Global. 8 August 2007.
<http://www.desertrockenergy.com/documents/newsletters/SitheFactSheet_2.pdf>.

9. PEAK LOAD POWER USE

Given the assumption that the proposed Desert Rock plant's electricity is intended to be sold to Arizona Public Service (APS) or Nevada Power, we examined load profile data for APS to understand how their need for power might vary by season and time of day. FIGURE 33 illustrates typical APS summer (June) and winter (January) peak load curves from the year 2002, plotted from midnight to noon to midnight.²⁴⁶ These curves have a distinctive shape typical of regions with warm, dry climates.

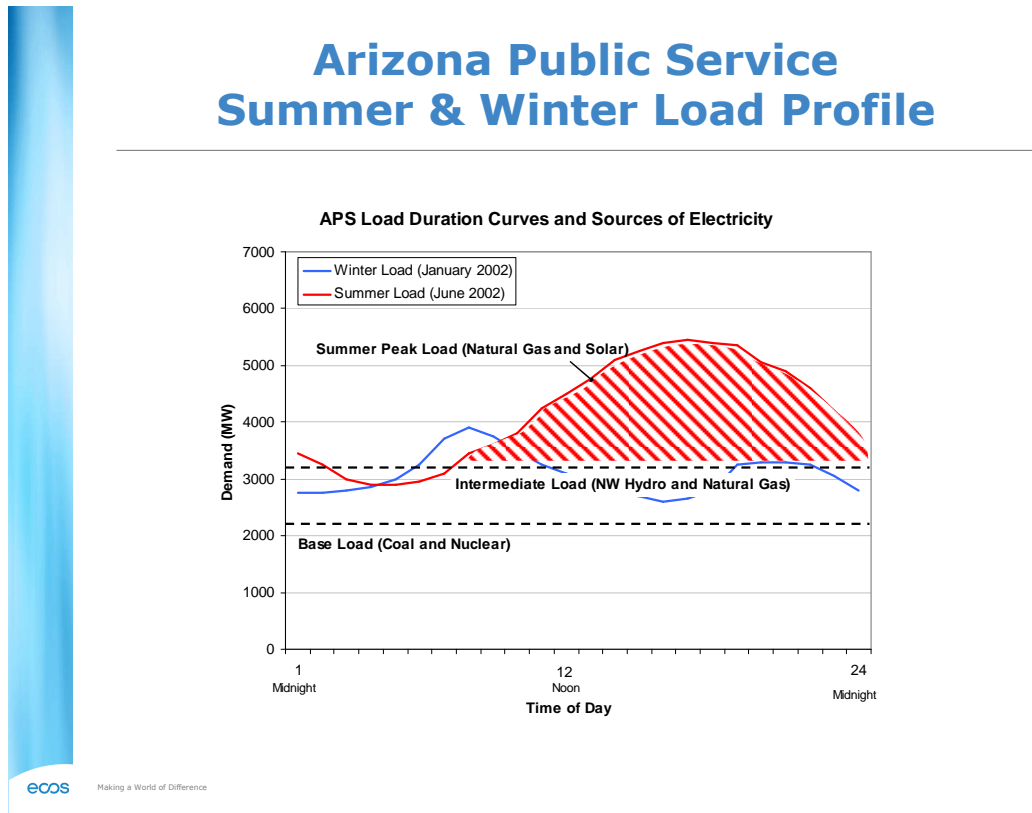


FIGURE 33. Arizona Public Service Load Profile

Summer peaks are substantially higher than winter peaks, and they coincide with the warmest time of day. They represent coincident electrical demand from air conditioners, heat pumps, evaporative coolers, pool pumps, and other seasonal loads. Winter peaks are lower and bi-modal, corresponding to early morning load from electric water heaters, residential appliances, and commercial building start-up, and evening loads from heating, appliances, and residential and commercial lighting systems.

About 3400 MW (54%) of APS' total electrical generating capacity is from natural gas power plants, designed to ramp production upward or downward quickly in response to seasonal and time-dependent variations in demand.²⁴⁷ Peak demand in the APS territory has grown

²⁴⁶ Handout from Demand Side Management workshop at Arizona Corporation Commission, 2/13/04 provided by Jeff Schlegel of Southwest Energy Efficiency Project (SWEET).

²⁴⁷ See <http://www.aps.com/general_info/AboutAPS_18.html>.

by about 400 MW per year in recent years – much faster than its growth in base load demand.²⁴⁸ As a result, the merchant power likely to be most valuable to APS is that which can be reliably delivered during its summer peak. The market value of such power could be \$0.10/kWh or more, depending on resource availability.

FIGURE 34, below, illustrates how a mixture of energy efficiency, wind, solar, and natural gas resources might plausibly meet a portion of that APS growth in peak summer demand. The illustration is conceptual, since Arizona-specific anemometer data would be needed from the Class 3 to 7 wind sites on the Navajo Nation in order to characterize the actual production curves for that region. But what the figure does illustrate is that energy efficiency programs focused on peak summer load could be reasonably expected to shave off about 20% or more of the expected growth in demand.

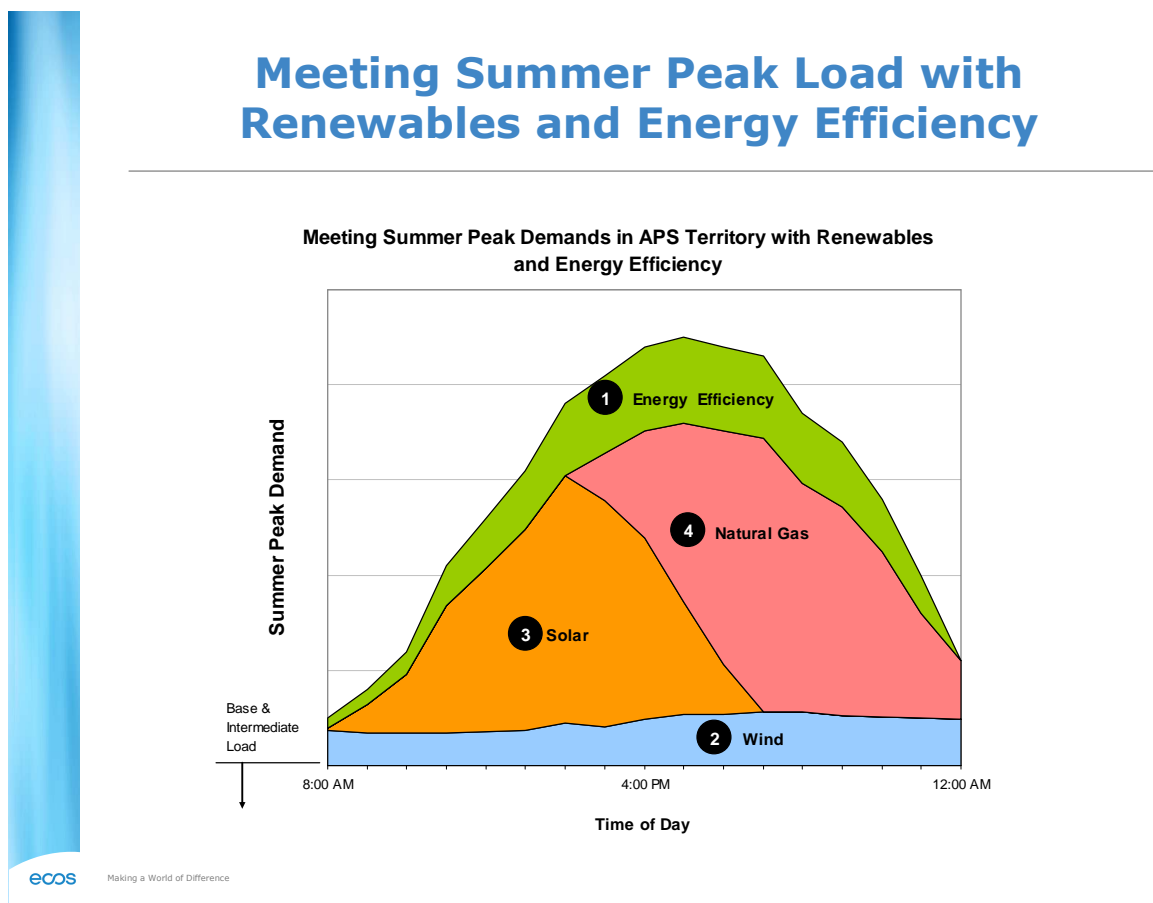


FIGURE 34. Meeting Summer Peak Load

To the extent wind power is available during those times, it would be the second lowest cost peak resource (some individual wind projects' output, depending on location, may more closely align with the winter peak than the summer peak). The output from CSP plants aligns quite closely with the APS summer peak, so it could meet much of the remaining new

²⁴⁸ Personal communication, Jeff Schlegel, SWEEP, Tucson, Arizona, September 24, 2007.

demand, with more plants coming online as needed in increments of 100 MW or more to keep up with system growth.

Finally, existing and new natural gas plants could ramp production upward and downward as needed to follow the remaining load. From an operating cost standpoint, natural gas plants are likely to be the most expensive resource of all, because of high fuel costs, but they are unmatched in their ability to respond to changing load conditions.

A similar analysis could be done for Nevada Power, illustrating the extent to which solar, wind and natural gas resources from the Navajo Nation would closely align with electricity demand in the region. The broader point remains: a mixture of energy efficiency, renewable energy, and natural gas resources could provide the same total energy services output as Desert Rock, at a lower total cost. More importantly, the resulting power would be much more valuable to utility purchasers, because a greater amount of energy would be available at peak load times of the day when electricity prices are higher and demand is greatest.

10. STAKEHOLDER INTERVIEWS

Summary of Interviews of Diné Stakeholders Residing Near Desert Rock

More than any other stakeholders, the citizens of the Navajo Nation will feel the effect of having the Desert Rock coal plant constructed in their homeland. Ecos Consulting, contracted with a native Diné speaker, Sarah Jane White, to conduct interviews with 39 residents and stakeholders from around the Navajo Nation, on topics such as health, the environment, economic development, and preferences for different energy generation technologies.

The general attitude of the local residents interviewed was primarily one of opposition to the proposed power plant, permeated by a fear of reprisals for having spoken out against the intentions of the Navajo Nation government, the Diné Power Authority, and Sithe Global. Very few of those interviewed spoke in favor of Desert Rock, mostly due to the purported economic and job creation benefits that the facility would provide to the Navajos. Because most stakeholders asked that their names not be revealed, only initials and locations have been used to identify stakeholder comments.

Below, we have summarized the comments received into several key discussion topics raised with residents.

Health and Environment

Twelve residents voiced concern about the negative impacts that Desert Rock will have on the health of those who work and live near the power plant and mine site. People are acutely aware of the environmental health problems they already face due to the existing power plants and mine in the region and are directly opposed to further power plant and mine development in the same corner of the reservation. In one instance an elder noted that many of the diseases that are common on the Navajo Nation today were not known 80 years ago: the Diné did not even have words for them.

Twenty-two residents were worried that traditional Navajo grazing lands were going to be destroyed by smoke from the power plant and the dust plumes from the coal drag line. Many of the people interviewed recalled that after the Four Corners power plant was built, all of the vegetation surrounding the plant was destroyed and nothing but weeds grew. They believe that the same thing will happen to the land around the Desert Rock project site if it is built.

Nineteen residents voiced concern over the quality and quantity of water that would be available to those living near the proposed plant and mine. Navajos are aware that conventional coal-fired power plants need significant amounts of water both for steam generation and mining. In a few cases, people discussed how their land was appropriated for mining operations, and soon after the adjacent land dried up; colorful grasslands turned brown and ponds continually shrunk. Navajos are also concerned that there will not be enough water available for future generations, and many are bitter that while coal and oil

companies will receive plenty of water to effectively pollute for industrial purposes, many on the reservation lack both water and electricity. A long time resident of Burnham, NM stated:

“We need the water for ourselves and we are not giving up our water for power plants or any other energy company. Our next generation needs this water; we live in very dry areas and who is going to provide us with water twenty or thirty years from now? The energy company will be gone and live in luxury somewhere, but my children are still going to be here to suffer from the waste that BHP, Navajo Mine, and Sithe Global leave behind.”

Twenty-two people were worried that the mining operation and Desert Rock would destroy the aesthetics of their landscape through strip mining and noise. Some are nervous that the disturbances will seriously disrupt their pastoral lifestyles, be a health hazard, and be a deterrent to increasing tourism. One couple who lives near the Four Corners power plant noted:

“The blasting is so loud that it damages houses, especially those Hogans made out of mud. The dishes rattle and so does everything in the house. My husband gets a headache when blasting goes off, and the earth shakes for a long time. We usually take off and go somewhere when the warning drill goes off. The coal mine and the power plant both are damaging everything around here and we have no business allowing another one.”

Government, Transparency, and Economic Justice

A majority of the Navajo people distrust the tribal leadership and would like to see changes in both the structure and nature of the way business is done in Window Rock. The lack of transparency, expertise, and efficiency at the tribal government level were important factors guiding people’s negative outlook and distrust of the Desert Rock proposal, which many see as collusion between Sithe Global and the Diné Power Authority.

Navajos also seem to be generally pessimistic that the \$50 million in compensation to the Navajo Nation proposed under the Desert Rock project will ever benefit the Diné at large. They are worried that funds from Navajo energy development royalties are not being equally distributed among the 110 chapters across the reservation. They noted that local chapters are chronically low on funding and that while they see money go into Window Rock, they rarely know what happens to it when it gets there. The Navajo Nation has had well over 2,000 oil and gas wells, one coal-fired power plant, and a coal strip mine that has been in operation for 40 years, but in the eastern part of the Navajo Nation, many of the Navajos interviewed insist that no material progress has been made among the Diné as a result. Despite the promises made by the tribal government and Sithe Global that the Desert Rock project will help raise the general material well-being of those on the reservation, the vast majority of those interviewed expect these promises to go unfulfilled.

Economic Development and Job Growth

One of the major benefits touted by the Desert Rock project and the Navajo government is that the construction of a new power plant will bring much-needed jobs to the reservation. Only a handful of Navajos interviewed believe this to be the case. Most believe that well-paying positions at Desert Rock would go to white Americans already employed by Sithe Global and that the Navajos will simply be eligible for less desirable and lower-paying positions, such as laborers. One resident describes the injustice that many Navajos see in how jobs at Desert Rock would be distributed:

“That the Navajos will receive jobs from the Desert Rock Power Plant is not really true. We don’t have many young people with a degree or skills to be employee in a high-tech or administrative position at the mine or the power plant. Maybe only one or two Navajos will be put in a top position to prevent discrimination charges against the plant owners. Even if college graduates apply for these jobs, the companies prefer hiring natives as laborers; the company has its own employees to staff the plant. Only white people work at these plants. Desert Rock is not going to be any different.”

Twenty-seven people who live close to the proposed Desert Rock power plant did offer some starkly different visions for economic development on the reservation that do not involve further fossil fuel energy development and that help to keep money in the reservation by promoting local goods and services. A list of the suggestions appears below. Many of the suggestions both provide jobs and a venue for Navajos to purchase goods without traveling to a “border town” on the edge of the reservation.

Developing places to fish	Golf courses
Campgrounds	Picnic areas
Hiking areas	Horse ranches for trail rides
Ceremonial grounds/dancing grounds	Hotels and motels
Stores for the sale of native arts and crafts	Drive-in and indoor movie theaters
All-native TV and radio stations	All-native print publications
Call centers	Navajo theme parks
Domed sports complex	Clothing factory
Housing development	Adobe brick making
Tire recycling plants for road development	Commercial development (department stores, coffee shops, office supply stores, etc.)
Casinos	Meat markets for locally raised livestock
Agricultural supply stores	General agriculture development and irrigation projects
Wool factory for locally raised wool	Renewable energy development, including wind and solar installations and ethanol refineries and accompanying agricultural development
Ranches	

Renewable Energy

In discussing renewable energy alternatives with residents, we found that a large number of Navajos favored solar and wind development over traditional fossil fuel energy development. They cite several reasons, including the fact that renewable energy technologies are clean alternatives to traditional fossil fuels and that renewables represent “the way of the future.” The thought of renewables seemed to evoke a sense of progress and change. Wind and solar also seemed to be a matter of common sense for the Navajo, who readily pointed out the abundant wind and solar resources on the reservation. As a matter of fact, some of those interviewed were already familiar with using small solar panels to provide electric light to their homes. **Based on these interviews, it is not true that the Navajo “need” economic development from selling coal. Quite the opposite—according to the people living in the area of the proposed plant, they need clean alternatives that provide more local jobs and sustainable decentralized development.**

Detailed Interviews

Excerpted transcripts of Diné stakeholder interviews are included as Appendix A.

11. CONCLUSION

By every measure, the economic development of the Navajo Nation is better served by investing in clean, sustainable technologies. As described in the Draft EIS and the Federal Register announcement, the purpose of the Desert Rock development is to produce economic development for the Navajo Nation. The Draft EIS is deficient in that the narrowly-defined purpose and need statement inappropriately limits the scope of the project to burning coal, so that it does not thoroughly analyze the other alternatives that would produce more sustainable, benign economic development for the Navajo Nation. **Solar, wind, and natural gas energy projects are available, cost-effective, and lucrative for the Navajo Nation.** Yet the Draft EIS discounts them in a few pages. Why does the Draft EIS discount alternatives, when they are clearly documented as superior to mining and burning coal?

By nearly every measure—air, water, biological resources, land use, topography, visual resources, socioeconomic conditions, noise, ground vibrations, public health, environmental justice, and cumulative impacts—the alternatives documented in these comments far exceed the benefits of mining and burning coal.

The BIA and the proponents of the proposed Desert Rock project owe the Navajo Nation a more thorough analysis of what would produce truly sustainable economic development for the Navajo Nation, in accordance with Diné Beehazáanii, Diné Fundamental Laws (Resolution No. CN-69-02) and Nahasdzáán dóó Yáidilhił Bitsaądeę Beenahaz'áanii--Diné Natural Law (1 N.N.C. § 205).

12. Appendix A. STAKEHOLDERS INTERVIEWED

39 Diné stakeholders who live in and around the proposed power plant location, who asked not to be named.

Thomas A. Johns
Senior Vice President Development
Sithe Global

Suzy J. Baldwin
Technical Consultant to Sithe Global & Diné Power Authority

Chris Deschene Clark
Legal Counsel to Diné Power Authority

Harrilene Yazzie
BIA

Jacilyn Snyder
BIA Environmental Protection Specialist

Calvert H. Curley
Congressman Tom Udall's office

Janet T. Wilson
Reporter, Los Angeles Times

Jason John
Hydrologist, Water Management Branch
Department of Water Resources, The Navajo Nation

Frederick H. White
Deputy Division Director
Division of Natural Resource, The Navajo Nation

Renee Parsons
Mayor Pro-Tem, City of Durango, Colorado

JoDee Powers
Business Consultant, Cortez, Colorado

Joelle Riddle
County Commissioner, La Plata County

SYNOPSIS OF STAKEHOLDER INTERVIEWS

Navajo Mine paid me \$2,000 for the numbers of heads of sheep and cattle I owned on the land. This was only a one time pay for my grazing area and the all of the animals I had on my permit.

They never asked me for my permission, they just came and told me to accept their payment and not to build anything on the home site, or construct any more homes on the land. They said the place is going to be demolished very soon to make way for mining.

I didn't know they were planning to bulldoze all of the good grazing land, so I signed my name. I told them to use most of the bad land and not the land where I live, but I guess they didn't write down my statement. They never told me or explained to me about relocation, and they never told me about where I was supposed to go when the drag line came.

I have no say because my father and other folks, back in the early 1960s, signed the land approval. They told me I didn't have a choice but to move. My father and some other men went to Window Rock some years ago and they were told that if they signed the land lease they would get a good home, running water, electricity and good roads. These men, who couldn't speak or write English, put their thumbprints on the piece of paper that the company had cornered us with. I was a young lady and I was with my father the day he put his thumbprint on the document. The lease agreement was for 90 years.

I still remember the day we came home from Window Rock, my father was very happy he was going to get a nice house with different rooms. He died waiting for a good house from Utah International, and to this day we haven't got a nice house out there. They have not brought the power or the water.

Recently, Diné Power Authority approached me to sign and approve Desert Rock power plant. What is going on? They offered me \$3,000 for my signature, but I told them to leave, and not to bother me.

Why should I sign away something so dear to me? Money can not replace what they are going to destroy. They are drilling for water in the area where I live. I am sure they have no intention of offering me any even if I sign my name on their document.

I do not wish to move elsewhere. I live right here, this is my birth place, a place where my father raised us, a place where my father sang his blessing songs, and said his prayers for us and his grandchildren. His livelihood still remains, the places he herded sheep are still alive with memories. My life remains here and on the farm where I also live.

The memories of my ancestors remain here, and the memories of where I grow up lingers everywhere. The medicine gathering place, the red clay spot where we used to get red clay to put on our faces to keep from getting sun burn, and it is also use in ceremonial purpose and all this is going to be gone.

I lost five of my female cows and each of them was with an unborn calf during the winter from drinking contaminated water in the mining area.

The energy corporation creates hopes and dreams they do not keep. We don't need the power plant and we don't need the coal mine to survive; our people survived for many centuries without any power plants and coal mine so why should we need it now?

I had work for myself; I was a weaver, a silversmith, a rancher, and a farmer. My husband and I grow hay, vegetables and fruits. We live off of what we have and we like it to be the same.

What I will say in this interview is I like to live the way it is now. Many years we waited to get power and water from Utah International/ Navajo Mine. We waited too long and we gave up, so now it's time to tell them to move along to somewhere else.

My life will be better if they leave me in peace, and if any one wants to help, help me get rid of them (Navajo Mine, and Sithe/DPA). I will do no other way. They ruined my land and grazing areas. This land was rich with all types of grass and wild desert flowers before the mine came. Now there is nothing but dry grass. The grass and the ponds started to dry up a few years after the coal mine began.

Stakeholder #1
Rancher/farmer

The Navajo Nation president needs to come up with a better plan. Mr. Shirley and the Navajo Nation Council should put aside more lands in Arizona and Utah for farming. Agricultural projects should create many jobs and it is clean. These crops can be sold anywhere in the U.S. and beyond. They need to raise cattle and pigs. Everybody likes steaks and pork chops.

A power plant is not a very smart choice. It is not good for the environment and is bad for people's health. The pay is good, but what if you become sick? Or what if you die then what is money? Let us keep our good health and do away with the power plants. A power plant also takes too much water, the water we could use for agriculture. We need to use our water where it's most needed and make it useful in the right place.

The Navajo Nation needs to create a policy or make it a law, title one needs to be included. The title states "Fundamental Law," the Diné way of life. This can put a good restriction on the energy corporations, so they can't bully their way onto the nation, like they have lived here their entire lives. The policy needs to address the worries of the local people so they won't create wars against their elected officials and the corporation. The government of the Navajo Nation needs to report back to local chapters every month, telling us what's going on in Window Rock.

Where is the money that is being made from the oil and gas? Where is the money that is being made from the local coal mines, and the Four Corners power plant? I am sure it is not being used in the right spots. Look at our reservation in need of everything. Is it the fault of our elected officials or is it us local folks? The Navajo government needs to change and reduce the number of council delegates. There is plenty of money in the government, but it needs someone with the skill and the expertise to keep track of it, and the council needs to cut back on endless spending. This means they need to stop having meetings in Las Vegas, Nevada and Laughlin, Nevada. I think our elected officials take more money out of the reservation than the whole Navajo Nation.

We need to put the money where it is truly needed: wind power fields. We have big open areas where we can put these types of power plants. Solar and wind power can also create many jobs.

Stakeholder #2
Burnham resident

There are well over 300,000 Navajo people either living within the Navajo reservation boundaries or registered as members of the Navajo tribe.

The Diné Power Authority and its partners in the proposed Desert Rock power plant are promising 400 permanent jobs for Navajo people if the power plant becomes a reality. Out of 400 jobs, what percent belongs to the Diné? What percent belongs to corporation staff and non-Navajos? Any way we look at it, we are still going to be licking bones.

Here is my suggestion with what we should do with our money that is being wasted in Window Rock. Millions of dollars are being disposed of for energy corporations, and other useless items. This can be turned around and let's put our funds in the right direction.

Many more jobs would be supplied to the Navajo people with the creation of Navajo-owned and -controlled call centers, clothing manufacturing centers, and vehicle manufacturing facilities.

Instead of our people having to leave the reservation to work away from their homeland, the Navajo reservation government and its people would benefit economically from having Navajo-owned and -operated movie and music studios.

Having movie studios on the reservation, and run by the people of the Navajo reservation would feed a much needed demand. To see more Native American news broadcasters, news reporters, an all-native news station, which would in turn feed the demand for an all-native TV Station. By broadcasting our own news, we can control what our people see. This can eliminate most of the inaccurate reports of Navajo people and their real life. Media focus is a big deal, so why not go for it.

A random list:

1. Both drive-in and walk-in movie theatres
2. Movie Studios
3. Music Studios
4. Magazine companies
5. Call centers
6. Navajo theme parks
7. Narbona Dome-sports complex on the reservation

We need a clean gathering and entertainment place for everything from sports to traditional activities. I am tired of eating dust and dirt in our activity spots.

As a young man, I have dreams within the Diné land, among my people, and one of my dreams had always been building a Narbona Dome, a huge sports complex. I would like to see our Navajo leaders build something like this. I would like to see a complex that houses everything from annual fairs to major sports and concerts in Window Rock. I would like it to be named after a Diné warrior who stood and fought for freedom. This is my dream, and if I was the president of the Navajo Nation, I would seek funds to build such a building. I don't think it hurts to express my dreams, and I would rather see a Narbona Dome than Desert Rock power plant.

Aside from my dreams, all of these options that have been mentioned have been mentally created with the full intention that they be owned and controlled by the Navajo people and not the Navajo government; otherwise the Navajo people will never see the rewards and everything would fail.

I believe my people can and will become wealthy if the government (BIA) and Navajo Nation government would do away with some of their red tape.

If the Diné population in the Navajo Nation prospers economically, then the United States government will prosper. More money for the Navajo peoples means more money for the American society.

Stakeholder #3
Burnham, NM

I advocate for renewable energy such as wind and solar because the Navajo Nation has massive potential for these projects. I currently hear discussions about casinos and, while I am uncertain about casinos as a business venture, I believe that the Navajo Nation must not continue in the spirit of environmental degradation. The Desert Rock project is one large liability and Shirley is digging one big hole into which he will drag the nation. What about renegotiating the current contracts (e.g. Black Mesa, Peabody) that locked us into cheap prices and demand more for what we have? Perhaps compensation for these historical/current injustices could be a type of economic development instead of having Desert Rock.

In order to have clean jobs, we must stay away from dirty capitalist companies that want to pollute us to death. All the jobs that tend to pop up are industrial. Perhaps inviting other types of companies that will do our environment justice would help.

Most of our people live off the land, and use it as part of living on the reservation. This is a personal choice and depends on each family and community that will decide on what to do with their land. Adhering to the respect principle is important in this decision because the nation cannot push development onto a people if they do not want it. People in Burnham do not wish to give up our traditional way of life and that should be respected and protected. We didn't survive as a people without our livestock. I think the Navajo Nation should support and appreciate the lifestyle.

Our Navajo government absolutely needs to change. Our government is an imposed patriarchal system that has no values besides money (our tribal council was established out of energy negotiations). Reform is necessary when, in the case of Desert Rock, the government ignores its people and becomes a dictatorship. We have sovereignty and we need to utilize it by formulating policies to fit our own values. I acknowledge the difficulty of reform, but that does not mean we need to change the entire system; we need to change the aspects that aren't working. Case in point: Suzy Baldwin of DPA is the developer of the Navajo Nation's Energy Policy and she does a poor job with her education degree in Health.

Sithe is obviously utilizing the niches and cracks of our government to get what they want; I think we know where the problems are and we need to act on it. In the process, our government needs to be more transparent; none of this Dick Cheney stuff.

The fifty million dollars may sound good to the ears of our government, yet I believe that it will cause a deficit more than revenue. Taking into account the potential impending carbon taxes, the nation will be liable to repay carbon taxes and we'd end up losing money. Fifty million dollars is pennies for a project that costs four billion. Blackstone's CEO has birthday parties for \$85 million! Fifty million dollars is toilet paper for Sithe and their investors. No benefits whatsoever.

I oppose Desert Rock and don't believe it will assist the people in any way. I say this as a person whose father worked in the Four Corners and San Juan power plants all his life; even he opposes Desert Rock. We will never have the luxurious lifestyle that Sithe/DPA claims that the Navajo people will have with Desert Rock.

I have heard the stories of extremely racist bosses, unfair union selections, suicides committed in the parking lots and laborer workers falling through the steel beams to their deaths. Who pays for the psychological scars and funeral arrangements? Not the power plants. Pollution is already bad enough, and Desert Rock will only add more emissions. Four Corners residents are already in poor health; some are very sick and most of them have died from cancer or respiratory, heart, and kidney disease. Nowhere in the Draft EIS does it say anything about providing health care.

We have many memories on our land; we have cultural sites, traditional burial grounds, our holy offering sites, and historical sites. We need to reform the Navajo Nation Environmental Protection Agency. For example, we need to create an Environmental Justice Department.

Another example is the Draft EIS: why is there no proper risk analysis? If we are arguing for spiritual and cultural aspects that are deeply ingrained in our culture, then that has very much to do with our physical environment. Desert Rock is a violation of religious freedom and the Ecological Risk Assessment needs to analyze and include the spiritual components and medicinal plants that we use.

Native people are unique in that we conceptualize our connections to the earth differently, and we need to incorporate these aspects into our environmental/energy policies. This is the reason for the Diné Fundamental Laws.

These laws govern our attitudes to our surroundings and we need to return back to them. Our Navajo Nation president Joe Shirley needs to return to these laws and teachings. We can't continue to use environmental protocols that are insensitive to our culture; we need to develop protocols that are. Perhaps then we will save the spiritual, cultural, historical aspects that made us Diné people to begin with.

Stakeholder #4
Burnham resident
Community organizer

I oppose another coal-fired power plant. We have already experienced the bad side of Four Corners power plant. We have been there. They lied to the people and all the promises were never fulfilled. Why should we go for another power plant with the same empty promises?

Navajos never get the jobs at the power plants; it's the Anglos who get the jobs. Navajos end up getting hired for the dirty work due to lack of education. Even people with college degrees still only get what are left over.

This company is bringing their own workers. They have experience and the expertise to do the job well. Why would they hire those with no experience? It always happens.

I would rather see a clothing factory or other environmentally friendly jobs instead of the coal power plant.

To my knowledge, a higher education is the only way out for our people. We need to encourage our young people to get a degree of their choice; this is the only way they can make good money. I have a nephew who is going for a Ph.D. in medicine; I think this is the way to do it.

Our elected officials make decisions without the local people's consent on any important issues like the Desert Rock coal-fired power plant. They never get back to let us know what their plans are until they made all the arrangements and agreements with the company, and by then it is too late to change the work. This is what happened with Desert Rock, now it has created a big problem for all of us. We do not benefit from these energy royalties; it stays in the Navajo government and I do not know what happens to the funds.

We have electricity but we still haul water for drinking and for the animals. It is very hard for my mother in the winter time when she has to go outside. She had surgery on both her knees but now her back is giving her a lot of problems. Our chapter officials told us there is no funding for bathroom additions, and to bring water to our house.

Stakeholder #5
Newcomb Chapter
Rancher

I support an alternative for the health, economic purposes and cultural identity of the Navajo people.

Other alternatives for the power plant and coal mines could be in the medical field, engineering, education, etc. The Navajo Nation government needs to provide clean jobs with solar energy power.

I think our Navajo government needs to get more experienced, healthy, trustworthy, and full-hearted officials and representatives. They do not need to sell out our people. I think that fifty million dollars could really make the reservation better, if it actually went to the people.

Most of the chapter officials, representatives, and chairpersons usually keep all that money to themselves. I think that the proposed Desert Rock project is just a waste of time.

I don't believe in killing my people. Being a Christian, we must LOVE our people, and protect what God has provided for us to live with. We should not reject or in anyway misuse what God gave us. We need to protect our cultural sites, traditional burial grounds, our holy offering sites, and historical sites by not contaminating the air, water and land. Desert Rock power plant will pollute our land and put our health at risk. People are sick and it is caused by breathing in toxic pollutants. How else would they be ill?

Stakeholder #6, age 19

Student

The Navajo Nation needs more tourist attractions at this time; we need more shopping centers and bigger stores.

We want to do our shopping without going to Farmington and other boarder towns. Everyone who lives on the reservation depends on services found outside the boarder of the reservation. I think because people have to drive long distances to shop, there are more car accidents.

Not only am I concerned about accidents, but also I want more money staying within our reservation. When I go to Farmington, I see rows of vehicles, like a train, coming from town and just think how much money they spent and how they don't have any money left for the Navajo reservation. Too much money is leaving the Navajo reservation every day. Thousands of dollars every week leave the Navajo Nation to the boarder towns. If we had stores, the money would stay in the reservation and the Navajo government would profit from the taxes.

The power plant might bring some jobs and put some money back into the Navajo government for education, which we need for our students, but at the same time it's kind of risky and isn't bringing as many jobs as we expected. But, it's also the only way to go right now, because we don't have anything to depend on except for the little bit that we have. I really don't have much imagination for economic development.

Right now, we get most of our funding from the U.S. government. The state also gives us support for education, but I really don't know how the local government works. I believe they get their funding the same way as the school.

I guess we can create jobs if we select some well educated, skilled team to brain storm on what kind of jobs would fill the needs of the Navajo people. I am sure this can be done. I think this might be one of the areas we, as a people, can ask the council and our local chapter officials to help.

Stakeholder #7

Former educator/school board

I don't believe there is anyone in the Navajo Nation government who cares enough to come out here and see how we live. The Navajo government is out there in Window Rock and we are here. They don't know us; they just assume we are alright.

The only time we become important is during election time. Once we vote we are forgotten again for another four years. It's just like on the outside, the people vote every four years for senators, representatives, and congressmen, but not everybody gets help when they need it or for being a good supporters. I hear news on TV and my children are good enough to take the time and read me the news paper.

The money from oil and gas, our share stays in Window Rock. Only a little portion goes to 110 chapters, tribal government schools, Senior Citizen Centers, Pre-schools, Boys and Girls Clubs. The funds received at the local chapters are divided in many ways again for public use, such as temporary community jobs, home renovation for low income, chapter scholarship for college students and little other necessities within the chapter community. The help we get from our chapter is once a year only.

From what I knew on how some funds flow within the Navajo Nation, the rest of the funds in Window Rock are hard to keep track of, but I know the elected officials in Window Rock use more money than we do. Let's say the big bucks stay in the capital; peanuts go to the local chapters. Now, most of the community members do not attend chapter meeting but once or twice a year. They don't ask for help so they get no money for their needs, or sometimes the funds run out before they get to ask.

Desert Rock: Joe Shirley said it will bring millions of dollars into the Navajo government. But who is benefiting from it? Joe Shirley and his councils are benefiting, not the people at the chapters. Especially, those that hardly attend chapter meetings will be overlooked just like it has always been. We don't receive anything.

We are better off without the power plants. They are useless to us, and take away all the oil and gas fields, and leave just enough for our needs. Having all these energy corporations are not for the Diné people, it's for the white folks. It's not going to make us rich or get us out of poverty.

The only way to GET and STAY out of poverty is hard work. Self-reliance earns a good living. Don't depend on someone else to bring you bread when you can make it yourself. This is the Diné teaching, and I don't know what kind of Diné we have in Window Rock. They don't know their own teachings.

My husband and I are ranchers, and I'm a weaver and we provide for ourselves. Everything that we built around here is paid for by our hard work. Everyone should do the same and leave Window Rock alone. I still weave and we still herd sheep.

Stakeholder #8

Rancher/weaver

Former Chapter Official/I.H.S. Health Board & private school board member

Other alternatives for economic development besides power plants and coal mines would create more business on the reservation that can compete with prices in town. We need industries that produce products which are needed: feed stores, grocery stores, Starbucks coffee shops, office supplies stores like Office Max, big clothing stores, and shoes stores and everything else our reservation needs. There are many, many other ways we can prosper besides living in haze and daze for too long.

Most of our Diné people live off the land — ranches, farms — and they enjoyed living that way for years, and they will continue to live that way for another century. Unfortunately, our young people do not want to farm or be ranchers anymore, but they eventually or most likely come back to the land when they get older because it is in the Diné people's inner natures to be connected to the land. The land becomes their parent and grandparents. This means our Diné people should be kept as it is and no relocation. The relocation will destroy the lives of our people and our beliefs.

I really think our Navajo government needs a big change. What happened to the votes from the last election where the votes passed to reduce the number of council delegates? It is interesting that no one seems to be aware of the passage of this and no one is saying anything about it. When is it going to be implemented? Did the voters forget? I know the Navajo Nation council delegates did. The biggest problem with our government is from Window Rock to the local chapters,

As for the \$50 million, according to our president Joe Shirley Jr., it will make a big difference in the poverty level on the Navajo Nation. I say NO, because it will end up in the pockets of politicians from Window Rock to the local chapter level.

I was very disappointed that President Joe Shirley signed the agreement with Desert Rock that they do not have to abide by the Navajo Employment Preference Law. As usual, we Navajo's will be left out from jobs, except for the meager labor positions, and the non-Navajos from out of state will get the high-paying positions. Once again, our Navajo people have been sold out by our own government! How do we as a Navajo people expect to progress when our own people in power would rather support non-Navajos? This is true not only for power plants, but at all local levels.

We need to save our cultural traditional prayer sites, as well as our traditional burials grounds from energy corporations in any possible way we can. We can try to get our government to listen, but sadly they only care about what money they can get for themselves, for example the RINGS.

We need to give wind power and solar a try. We never use them or not many homes use it, but we need to start using them. Our Navajo Government needs to look into this and how the Navajo population can receive them. We need to clean the air.

Stakeholder #9
Fruitland Resident

I believe gaming (casinos) on the reservation would benefit us. I notice that other tribes with gambling palaces do very well financially. It seems like even their schools are more up to date, and they have what we Navajos don't have on their reservation. If we can bring a casino it can employ more staff, and this means more jobs for us.

I don't see success in farming. People do live off the land and especially those that farm but I don't see them as being well off. I think farming just makes pocket change and is just a way to get by.

Self-employment is another job that does not make it because they put lots of hours into their work, and after awhile they get tired of it and quit. I don't see that self-employment brings enough pay and self employees have no benefits of any kind.

The Navajo Government is looking at how to make money for the nation. They also keep track of the funds available in the budget so they do what ever they can to bring what ever that will bring in cash.

They also try so hard to provide jobs for people. We are in such a very bad situation at this time and age that, for the Navajo government, anything goes when it comes to job creation. If it means more power plants, then that is what they will do to survive. We are in the worst poverty level in the Navajo nation, and we need not to be choosy about which job is clean and which is dirty.

Young men are out there working far away from their families. They are out there with some of them sleeping in their vehicles just to put food on the table for their family. We need to think about our people's needs and not just a few of us running around complaining about pollution. We cannot get rid of the pollution. We live in it every day and night, and we create pollution everywhere, and it's not only the power plants that cause all the problems.

We need to support our leaders in economic development by accepting power plants and casinos on the reservation.

Stakeholder #10
Chapter official
Tribal Health Consultant
School board

We are not going to use the power out of Desert Rock. Not all the money made from Desert Rock will be used at local chapters; most of it will stay in Window Rock. The majority of the Navajo people will not see or feel the pleasure of a penny from Desert Rock.

There is a major misuse of funds in Window Rock by our elected officials, while 70% of us are self-employed and fend for ourselves. Lots of our tribe doesn't bother to vote, and they don't go to the chapter house any more because of this. Our own president and council delegates are taking us to the cleaners every time. So what is going to happen with the money from Desert Rock? We don't know.

Desert Rock produces power that will go to Las Vegas, Nevada, and Arizona. The towns of Arizona and Nevada will enjoy the power and not the poor Navajo people down here. Here we still crank up generators for electricity, we still burn kerosene lamps, and burn butane for refrigerators to keep food cold. The life here without power is not going to get any different for the next forty years; Desert Rock is not going to change it. It is another empty promise just so they can get it through. Joe Shirley just wants glory and praise for putting a power plant on the reservation.

I don't believe any of our young people will be hired for this power plant. For sure, just a handful will be hired to make it look good.

They (the Navajo Government) need to bring in a training center for our people: a training center for arts and crafts and native teaching. They can hire the elders to do the training and get paid for it. This way we can prosper by learning our own arts and crafts.

After we learn we can sell our arts and craft. There are big markets for real native arts, like silver arts, sand paintings, Navajo natural woven rugs, and natural woven baskets. One basket costs over a hundred dollars, just think what kind of money it will bring if hundreds of women and men work on this craft. A good size natural wool woven rug costs nine grand or more. This is where the government can do small loans to build our own little shops and stores.

The Navajo people have a dream. Navajos are very smart people and they can develop economically only if our government sees our dreams. A lot of us don't like to work for outside industry, we want to work for ourselves.

I am a diabetic; I have metal in my hips and in my ankle; I can't walk very well without a cane, but I am thankful. I still work and I have been working for myself for over 40 years. I am a sand painter all my life and I lived pretty comfortably. I have a car, a house, and a little bit put aside in savings. I go on business travel to places like California, Kansas, Nevada and Arizona to sell my arts, and all of my travels are paid for me by my buyers.

I get up at four or five in the morning, go outside and exercise with my weights, and pray for my good health, my arts, and I thank the creator for living. Many times when I get up early in the morning and go outside to exercise, I can smell the smoke from the power plant. I believe I inhaled plenty of coal power plant smoke while I was out there exercising and praying.

The major problem we have here is we don't have electric power and town water. I have to pay someone to haul my water from 20 miles away. I use a generator to light my home and kerosene lamps for night lights.

Stakeholder #11
Newcomb, NM

We are not really a health care center, we just do health studies and our branch is out of University of Utah.

We collect data; the role of the studies is to see if a person's health changes. We look for any changes now and for later.

We take blood samples and study them for all kinds of diseases. A good way to catch diabetes is through these tests. We also do bone tests and this had never been done before. We test women's bones and the results show if the bones can easily fracture. We test and measure [the difference] between white women and native women to see which one of them are more at risk for bone disease.

Chronic disease is increasing in the region. But so far, not enough studies had been done to tell us exact how many are at risk, meaning NOT enough analysis has been done and so we have no data analyzed to state what needs changed.

The government funds this program and the state of Utah. But they are not going to fund the program any more. Right now we have only two people going out to do community education.

We need this kind of study for our people, so we can detect any types of disease before they get worse. But funding is a big problem. This should be one of our Navajo legislative priorities, some of our oil and gas money should be put to use here. We need funding to keep the place open. We have written letters to Washington DC and no answers so far. We can do lot's of other studies if we can have the funds.

Being a Navajo and hearing all the concerns about the power plant and the health effects from this pollution, I think our Navajo government and big money (rich) energy corporations should put up some money for these studies. Or, our Navajo government should ask for such a study for the people in the Four Corners and for those that live close to the power plants and analyze data on them.

Stakeholder #12
Health Study, Consultant

We are a big Nation and the largest Tribe in the world. We have big lands and it is beautiful enough to bring millions of dollars into our government. The land can work for us without hurting it and in a clean way. We need to use the land in every possible way we can. This means we need to start building tourists attractions:

1. We need to create a good fishing place
2. golf course
3. camp grounds
4. picnic areas
5. Hiking areas
6. Camp grounds
7. Rented horses and donkeys for joy rides
8. Beautiful Ceremonial ground (Pow-Wow, Song and Dance)

to attract outside people to come and enjoy the scenery of the reservation, with comfortable areas like these, where people do not mind paying. This can put some money back in the Nation's pocket. Diné populations like to dance, they dance all summer long, and they dance all winter on the weekends.

We need to make room for private business to come into the reservation, like Wal-Mart and other big stores. We need to open up to small businesses with small loans from the tribe. The Navajo need to open more Arts and Crafts stores. We are the tribe of arts, and we can make money from our own stores. We need Hotels and Motels to welcome travelers from outside the Diné country; this is another way to collect cash for the Tribe.

I don't agree with Casinos being on the reservation. It is like a Pay-Day loan. We are a highly additive tribe/population, and from this perspective a Casino is not the way for us. We should protect our people from something like Casinos.

A wealthy Energy Company comes in and they rip us off. We should also guard ourselves from letting any outside big company people borrow millions of dollars that was supposed to be for our children's education and our elders on low income. Money should go for power and water for their homes instead of wasting it on a big power company like Sithe. Sithe should be supporting DPA and not us [supporting it]. DPA is part of Navajo Nation but it was created to help the nation; not for them to rip us off.

Our leaders don't have enough energy skills to run any huge corporation like Desert Rock. The people who will run this power plant will be the wealthy and well educated non-natives. We are not ready for Desert Rock. Period. We are still going to be here with empty hands and wonder where our money went, a few years down the road.

It's time we need to clean house in Window Rock, to get rid of the old council delegates and vote in new leaders with good plans. We need planners. We need leaders who can stand for their people, leaders who actually see the [best] interest of the people. We need leaders who can sit down and figure out how to create and provide good clean jobs. We are fed up with microwave heated dinners (ready made jobs like Desert Rock) forced on us from our leaders.

Our leaders created too many unnecessary holidays, early leaves and too many trips. We do have few good leaders, but again some still jump on the band wagon. We also need to get rid of too many over-paid Anglo staff in Window Rock, and replace them with some of our very smart, intelligent Navajo young people.

The old Navajo Government staff needs to go, replace them with young workers with updated plans. We need to update our government office, revise and make minor changes in the systems. We need a system that works for us, and not against us.

Stakeholder #13
Private Archaeologist

As part of economic development, we need to create activities for students' summer vacation, open summer jobs so our children do not have to go hunt for jobs in town and cities in the summer. If they get a job in town, it means we have to take them there and get them when they get off work, which is about thirty-forty five (35-45) miles, and seventy to ninety (70-90) miles round trip. We need local a job relations office for students.

The Navajo Nation needs to bring some kind of student programs, like a gym and a hang out sports place, for our young people. This will keep them out of trouble. Navajo elected officials are looking beyond all this, and we are not making any progress. We are a large tribe that keeps growing and the time has come for elected officials to look out for the best interests of our young people. Money should be put in these needs.

There is enough money in our tribal government to make ends meet if they can only use their heads and figure out what is a priority in the nation.

I am thinking education first, and we need reading programs for all ages (parents and children). We need computer training. We do not have this advantage here on the reservation and this is why our students and adults are so far behind in knowledge of any kind. They have a hard time accomplishing a little small task compared to outside populations.

Navajo dollars needs to come back to local chapters, communities, and local schools.

Desert Rock said it will provide all our needs, but fifty (50) million is not enough to cover all of the population on the reservation. At the same time, it might help out with some of these costs I mention. I really do not know what will happen when the cash rolls into Window Rock.

We have had oil and gas fields, coal mines, power plants, uranium mines in the past but we still live in poverty with no where to go. We have our children going on drugs and alcohols instead of living in harmony like we were taught by our parents.

We need good leaderships in Navajo government and local government to save our children's future.

Stakeholder #14

Tribal Business administrator

I like living the way I am right now; there is no noise and no vehicles driving all over the place and it is peaceful around here. I can just open the gate for my sheep and cattle and they graze where ever they want. If the Desert Rock power plant becomes a reality, there are going to be all kinds of distraction, and disturbances all hours of the night. The communities around here and I enjoy the land; this is nice and quiet and we wish to continue living this way.

We don't want anybody coming in and telling us what to do or telling us how to live. We don't want an outside Energy Company to come and dig out the bones of our loved ones, buried around here long ago, and we don't want them to be relocated. Our sacred sites and our offering sites needs to stay where they are.

We can use wind power and solar for power if there is a big need for electricity and the outside population can do the same.

Jobs can be found here at home. If people want to go out and work, they can do so, but their homes are here on the land. For me, I work at home, I am my own boss. I weave and take care of my live stock and it covers my needs.

My children are out working elsewhere, but their homes are here. They come home on weekends and enjoy the land. They have plans to build more homes here.

We need the water for ourselves and we are not giving up our water for power plants or any other energy company. Our next generation needs this water; we live in very dry areas and who is going to provide us with water twenty or thirty years from now? The energy company will be gone and live in luxury some where but my children are still going to be here to suffer from the waste that BHP, Navajo Mine, and Sithe Global leave behind.

We need to vote out the useless council delegates, alone with the president Joe Shirley, and replace them with real people with real plans.

The fifty million [dollars] will never come to this place, not to my house hold, or anywhere on the reservation, to the people that really needs it. The money is going to Window Rock and it is not coming back over here to Burnham, maybe one or two percent. We never know what happens to the funds when they land in Window Rock.

The Desert Rock power plant is not going to hire local people; they are pushing the plant to become a reality to serve themselves. Four hundred jobs are not enough to provide for over two thousand young and able working folks in the Navajo Nation.

Two power plants and one more on the way are too many power plants, and I opposed all of them. We are already badly polluted by all kinds of toxics and who is cleaning it up? Nobody.

We are sick and most of the people around Four Corners power plant and surrounding areas have numerous health problems. We can even smell the smoke from the smoke stacks in certain temperatures or the way the wind blows.

We used to have good rich grass land but now the land is dry. The big ponds that used to hold water all summer, and all winter are dried up. The ponds are gone and so is the grass land. The last few years had been bad.

Stakeholder #15

Burnham resident

Weaver/rancher

A casino is one way we can make some money on the reservation. I see tribes with casinos living very well, so it must be good.

The Navajo government should not forget to put some money up for job training. We need to train our young people in:

1. carpentry
2. pipe fitting
3. welding
4. metal work
5. office clerical work
6. truck driving (commercial drivers license)
7. computers

Job training should provide a stipend so that the students have money to get to class. This way they can go out and look for a job with a certificate of some kind.

The Desert Rock power plant, if it comes through, is willing to provide some funding for education and scholarships for our college-bound students. I hope they bring good jobs at the same time for the Diné.

Stakeholder #16

Educator/teacher for Mesa Elementary school

I understand using wind power is the cheapest way to go. We can go with wind power and solar as an alternative form of energy. Wind power might take a lot of land. It needs hundred of acres of land but it is better than suffering from pollution.

I know burning coal is dirty, and who knows what kind of chemicals come through the smoke? For all we know it could be uranium dust in the coal and when they burn it we breathe it in and we get cancer.

Using gasoline in our vehicles is dangerous too, and I hope someday we can go with Ethanol so we don't have to be afraid every time we fuel up our cars.

I really don't understand the Navajo Nation government and how they work, but I heard people complain about the overpaid council delegates. There are too many delegates on the council just confusing each other. I am only nineteen, so what do I know about the government and their plans?

I would like to work in a medical field since there are huge demands for all kinds of medical positions. Exactly what kind of medical position is not set in stone, I am just working one day at a time.

Right now I am studying to be a nurse and hope to move on after I am done with it, or maybe I'll just remain a nurse.

Stakeholder #17
Window Rock, AZ
Music store sales clerk

We don't need another power plant. The jobs that the power plant developers promise are not for us. Only few Navajo will probably get in to work, but not everyone here.

The power plant is dangerous to our environment. I have compared life of long ago when I was young to life today. The grass used to grow tall, and it rained all the time. After the rain there would be water puddles everywhere for sheep, cows, and horses to drink. The water puddles would stay for a long time. All the small ponds around here would have plenty of water all summer long, and we did not need to haul water.

Another power plant is a disaster and a poison to the grazing land. The land is beautiful, but it is not going to stay beautiful for very long with all of these power plants. The land is going to look exactly like those in Fruitland with piles of rocks. Re-planted land is not the same. Because of what we already experience we don't want another power plant.

From what I learn from my children the pollution from the power plant is very bad and very toxic and it can cause sickness. Some people are sick around here, and I believe it has something to do with the power plants.

I opposed another power plant.

Stakeholder #18
Newcomb, NM
Retired homemaker

Navajo Tribal government can provide jobs on the Navajo Nation only if they loosen some of the tight policies that are currently in place, or if both parties make an agreement to where they can work closely together. It is very hard to put any kind of business on the Navajo Nation; their protocols are so difficult to get through.

Anyone trying to get a business site lease has to be represented by a council delegate from their area. What if the person is not in a good relationship with their council delegate, then what? It's ridiculous how their protocols work. It takes three to ten years or more to get a business site lease. Most of the people would rather go out side where it is easier to roll. They rent or buy a building to use within one year or less.

There are many ways we can create jobs with the right people in place and with the right technique.

There are some dirty jobs, but if there is honest pay, people will do work.

Clean energy is something we all need to start planning for before we destroy the earth. I think we already destroyed most of it, and global warming is upon us.

We can use wind power and solar panels for homes and businesses, schools, and other small offices throughout the Four Corners. Farmington can go wind power and solar panel, and so can Shiprock. We can start this in our area and before long everyone is going to want to use it.

My husband and I took a trip to Texas two years ago. We were driving through the countryside, and I saw these funny looking fans in rows covering the hills as far as my eyes could see. I asked at a gas station what the strange looking fans are. They told me they were wind turbines for the town.

As we went on I saw solar panels on the roofs, and they also use wind power at the same time.

With all the land we have spread out across the reservation, we can go with wind power. I notice it's not part of the Draft EIS, and DPA said it's part of their project. Why isn't it in the Draft EIS report?

We can even go back to the mud hogons and we can make our homes out of adobe. Adobe homes are very cool in the summertime and warm in the wintertime, and I think the Navajo Nation needs to start looking at some of these alternatives to save energy both in the winter and in the summer.

People back in the day used to use outside adobe ovens to cook bread, corn, and turkeys, and I think this would be another way to save energy instead of using gas or electric ovens all the time. We are getting very lazy, and the laziness blinds us from using special techniques to live better.

Adobe making is another job for the people. If people buy hollow cement block for homes today, then I am sure they will buy adobe by the dozens. Hollow cement blocks crack and move after a few years compared to adobe blocks that can stand for hundred of years.

My list of jobs for the Navajo Nation:

1. Ethanol. It only has a little bit of gas, and it's made from vegetable and fruits. We can make this from NAPI crops and sell it. It will be a good way to collect revenue for the Nation. It is like moon shine.
2. We have plenty of rubber tires in our landfills. We can recycle them and use them for roads. We can sell the recycled tires for a profit, and this is a good job for the Diné.
3. Making adobe bricks/blocks for homes can create plenty of jobs, and it will put some money back into the Navajo government.

Stakeholder #19

Educator

Tribal Office Executive Director

We have lived here in the valley for years. We used to live on the hill, but the mining company told us that all the land in that area is going to be a mine. They are still going to mine part of my grazing land. The drag line will go through in front of my house in the next few years.

I am very concerned about the new proposed power plant. We had Four Corners power plant for over forty years and look at the land. The land is dry, and the grass and other needed vegetation are gone. The plants die or they shrink and dry up a few days after it rains. The rain must not be good anymore with the smoke in the air. When you live out here and study everything on the land, it is easy to tell the difference between what is not right or what is changing.

Power plants are not good for health. I worry what our children will be facing when they grow up. Power plants cause sickness. The power plant developers are not going to take care of us when we get sick, so we say no to Desert Rock. They are not paying for our medical cost or for our funerals.

I knew some people who worked for the power plant and the coal mine who died. Some of them died right after they retired from the plant, and some died while they were on the job from heart attacks and strokes. People who work for the mine and power plants do not live long. My brother and my son died working at for Four Corners power plant, and my husband died from working in an uranium mine.

They are drilling for water to use in the plant, and I do not agree with what they are doing. We do not have running water, and they are drilling to waste the water for the plant. It is not right. The San Juan River and underground water is not for sale to corporations. I believe the gods' intention for the water is for the Diné to use it.

Joe Shirley and the council delegates need to listen to the local people. They never warn us of what is taking place; they just tell us to vote and approve whatever they want us to approve so they can say the local folks agreed to the plans. Most of the time people vote under pressure from their council delegate or chapter officials to approve major items like power plants, coal mines, and oil and gas development.

The funds from Window Rock are a big problem. We do not know what happens to the oil and gas, coal, and power plant royalties. Our chapter continues to tell us there are no funds available.

There should be jobs for people if we decide to use wind power and solar. I am sure they will need workers to maintain wind and solar installations to keep them in working order. People say that it is clean and it does not harm the environment. We need to use something that is clean in order to stay healthy. Our government needs to bring in some clean jobs for our children. A wool factory or meat market should be useful out here.

Stakeholder #20
Burnham, NM

I have been involved with energy development for a very long time, and I have been with the Navajo Nation council delegates for over 30 years. During my council delegate career, I helped establish Diné Power Authority (DPA). In the early years of DPA, the staff and the councils planned and worked toward developing everything that has anything to do with energy, which means coal mines, coal power plants, and oil and gas fields, and much more has been discussed over the years. We work hard strategizing on how we can develop and boost the economy on the reservation so that our tribal people can have local jobs. Now the reality of our hard work is here with a new technology (state-of-the-art): a clean power plant is coming to our reservation to help bring jobs and put revenue back in place.

I can understand where the grass roots are coming from. I live on the reservation, and I have cattle and sheep myself. But what can we do for jobs? We can't say NO to every opportunity to have something good. If we keep refusing all opportunity to have a good job, then we are inviting our own poverty and it is not good.

I understand we Diné people have to follow the teachings of our elders. They taught to protect the land, and we have to protect the livestock which is part of our livelihood. The pollution is bad for our health and not good for the land, grass, and the whole environment. I strongly believe our land should be clean, and we need to protect it from harm, but do they listen? No, they do not accept these terms as a priority.

The Navajo EPA singled out a policy to oversee the development of energy in the Navajo Nation. Their jobs are to make sure that these companies follow the protocols and stay within the Navajo EPA and federal emissions standards.

I really don't know what clean jobs are, maybe an industry like housing development or a clothing factory. The high-paying jobs are all in energy corporations.

Some day we might be able to develop wind power for our electricity, and we are already using solar in most areas of the reservation.

My priority at this time is to promote more jobs on the reservation.

Stakeholder #21
Window Rock, AZ

The royalties from the existing coal mines and the power plants does not come to our local areas. It stays in Window Rock and I don't know what the Navajo government uses it for. I have lived here with my husband and children for years, and we still haul water. We have electric power but no running water. We have an underground water tank that we refill every so often from a well drilled by the BIA years ago. The well is about ten to fifteen miles away. We also haul water for livestock.

That the Navajos will receive jobs from the Desert Rock Power Plant is not really true. We don't have many young people with a degree or skills to be employee in a high-tech or administrative position at the mine or the power plant. Maybe only one or two Navajos will be put in a top position to prevent discrimination charges against the plant owners. Even if college graduates apply for these jobs, the companies prefer hiring natives as laborers; the company has its own employees to staff the plant. Only white people work at these plants. Desert Rock is not going to be any different.

Desert Rock will only bring sickness to the people here. My late husband and I have opposed having another power plant in the region. Pollution is bad for the land and the vegetation, and when it rains here, it rains acid. I know because after the rain dries, the grass turns a reddish or whitish color before it dries up. We use our livestock for meat, and they drink contaminated water and eat contaminated grasses, which in turn make us sick.

I would rather live like in the old days. The old days were clean, and we didn't worry about dirty water or breathing in dirty air. I would still like to have electricity and running water and live in a clean environment. Years ago life was better, there was no sickness and I would rather live that life again.

"To protect both land and life and keep the earth in balance" is the way the Diné are supposed to live. Our elders taught us to protect ourselves with prayer, food, and water; to protect the mother earth with a prayer offering of corn pollen; to grind white and yellow corn and bless the sky. This gives us a healthy family in a healthy environment. Our Navajo government elected officials know about this philosophy, but they have been brainwashed and blinded by money. They want money over the lives of their people.

Fifty (50) million dollars will not change my mind about how I feel.

My life will not change, but it would be so good to breathe clean air, look around and see beautiful clear sky like it once was. It would be so good to see clean rain and a rainbow. It would be so good to live in a clean environment, with no pollution to hurt us or make us sick.

If any one wants to help, I would like for them to impeach Joe Shirley, the president of the Navajo Nation. Candidates come in every four years to promise us they will do better, but once they get voted into office they change.

Stakeholder #22
Shiprock, NM

We have large numbers of dropouts, and we have problems with drugs and alcohol on the reservation. A power plant would be a good way to have jobs for the young people.

Many of our young people continue to have babies and yet they don't have a job. Twenty-year old men act like gangsters, and their excuse is that they do not have enough money for gas to go out to find a job.

If the Desert Rock power plant comes through, there will be jobs available close enough for the young people to apply for work — no more excuse for not having gas money to look for work.

This proposed power plant will not only benefit the young people, but it will create jobs for all ages. It's not going to be just the power plant by itself; it will have a kitchen and dining areas where even I can work since I am only 35 years old.

The plant might motivate others to come in with their grocery stores, gas stations, hotels, and even apartments or houses for employees. It is going to bring other development, which local people are dying to have here. This would really help many of our older folks to be able to shop locally.

I do not agreed with some Navajo people who say it is “their land” every time something good is coming on the reservation. People do not allow big companies in and this is the reason why we don't prosper.

I appreciate what the company of Sithe/DPA is doing right now by training and preparing people for jobs. This way everyone will have a choice of what their position is going to be. Where else are we going to get a job as good as Desert Rock?

Stakeholder #23
Shiprock, NM

We need big grocery and clothing stores and laundry mats that compete with in-town prices. We travel many miles to do our shopping and laundry. We do not have water and electric power for washing machines in our homes.

This power will go to Nevada and Arizona. We should be the first to receive electricity connections to our homes, and instead of providing water for power plants, we should have our homes provided with water first before worrying about the power plants. What happened to serving the people first?

We do not need another power plant that will not benefit or provide for us. The power goes out of the reservation, and I ask “What has happened to the sovereignty of our nation?” If we can go without all these luxuries here, then Phoenix and Las Vegas can go without them too. If we can survive without them, they can survive the same way.

The fifty million dollars is not for our grass-roots community; we are just being used to get a new power plant in, and the jobs are not for our young children. Two to four hundred jobs will not employ all those who need jobs.

The Navajo government is using their own people to get their hands on more funds. Our president said his poor people need new homes and jobs, but this is using the people. Of course people can benefit, and people can live well if the funds are actually going to individuals. This way people can build their own houses and provide their children with good education from the money they would receive, but the funds stay in Window Rock. We do not get any of it.

Navajo Nation should use the funds they received from oil and gas and coal power plants to invest in wind power and provide us with solar and wind power to light our homes.

Stakeholder #24
Aneth, Utah

Economic development besides the energy corporations would be manufacturing of solar energy and wind energy related products or components since USA imports all products for the material. Not only manufacturing, but people could also install them.

Definitely, small businesses should be a priority across the reservation. Not just convenient stores but all kinds of businesses. Navajo Nation needs to revamp the business regulations for benefit of small business owners, not just corporation.

Navajo Nation cannot operate businesses because it is a government. It can receive revenues through taxes, fees, or penalties. However, enterprises are the venue for businesses.

Sustainable economy should be a priority, in which, local transactions of dollars should be the focus for the Navajo Nation to deviate from being dependent on petroleum to get around.

I believe that we need to keep the lifestyle associated with the western states, which is pastoral and open land but concentrate economic activities in at single location. This is to be consistent with the concept of smart growth to reduce illicit discharge. Therefore, people can walk to local markets to get their food, receive there mail, or hairstylists.

The farmland and ranches are being bought up in large tracts across the western states. People are no longer producing food locally but import food into their communities from several states and foreign countries.

The practices for growing food locally and producing other goods locally should be a priority. The world supply of oil and gas is dwindling. We can no longer think of it as an endless supply but we need to change our habits and behaviors that were based on mobility.

On the other hand, our government is too big and hefty. An example, all water departments need to be incorporated into one shop. Create an office to deal with energy for purposes of US Energy Policy Acts and Indian Energy Policy Acts.

The project reviews process need to be revamped. Standards need to be set in place for building codes, local ordinances and others.

The Navajo Nation government must reevaluate its position on its contribution to the global warming gases should it become an owner of the Desert Rock power plant. How much responsibility is the Navajo Nation government willing to accept for addressing the global warming gases?

Definitely, replace the employees who are not polite to visitors in every tribal office. Ordinary people are smart too so they should be treated with respect and politeness. Ultimately, the Navajo people need to realize that it takes one to be cordial to have a successful business if a pleasant customer services would be ever consider essential.

I also like to mention on how the Navajo Nation estimates provided by the Navajo Nation government for poverty are unrealistic. I refuse to accept the numbers cited by numerous offices as an indicator of poverty. I am convinced that the majority of the people are living

well. I see nice looking vehicles being driven by people across the Navajo Nation. I see a lot of nicely built homes; some are even two stories, across the reservations. People are getting their homes financed by banks and corporation so I think the economy is doing well. However, the people living in Monument Valley area on the Utah portion of the reservation do have homes that reflect substandard living conditions.

There are plenty of advertisements for job opening in newspapers or even through word of mouth for employment on the reservation. People are having a hard time filling vacant positions.

Fifty (50) million dollars is insufficient to feed the pork (Navajo Nation). The tribal budget is enormous and will not reduce in size. It will probably only cover about a quarter of the annual budget. The Navajo Nation government short changed themselves by accepting the minute tax dollars from a major corporation.

As for proposed Desert Rock, I believe that the current proposed site is not the appropriate place for Desert Rock due to all practical purposes. The transmission lines were not even factored in. My grievances were considered. In one case, it was cited that the visibility for mesa Verde and Chaco Canyon took a priority for the air quality. I believe that thorough assessments were not made.

The project will not help the people as an entire tribe. Like any projects initiated by the tribe. Only few people benefited; workers and Window Rock politicians. The people would have to compete with the Navajo Nation government for any benefit (dollars) from the project. Specifically, only the politicians, union workers, and businesses will benefit. Ordinary person would not be given a job with out signing up for union membership. The local public school district will benefit only if the schools make the direct requests for assistance in the future.

I had been questioned a lot for the last couple of years on what needs to be done to save most or all of the cultural, burials and offering places since I work with Navajo Nation EPA.

With respect to Desert Rock, I inquired about the cultural aspect for the NEPA and I was told that ethnographic study was in progress. However, speaking with the local resident, they were not interviewed with respect to cultural or traditional practices. Therefore, I feel that the cultural study for the Navajo Environmental Protection Act (NEPA) was not properly done. My speculation is that data banks were consulted for the Historic Preservation Department chose to review data.

I was baffled by a cultural study that was conducted over a three year period for a road construction in Cove and Red Valley, AZ. The report was published in 1999. So, why could they conduct such studies for the proposed site? If the previous studies conducted for the purposed of BHP coal mine lease, then were those data included in the current draft Environmental Impact Studies for proposed Desert Rock power plant?

I do not have an answer for saving the cultural and historical sites; any building that is over fifty (50) years is protected.

The nationwide trend is definitely not in favor of the Native Americans and environment. Almost daily, I would read about court cases not going in favor of the Native Americans or environment. I think that same attitude has worked its way into the Navajo nation government in 2003. Through activism and education, the messages were carried far and beyond the Navajo land. Developers realize that ordinary Navajo people pay attention to developments and will use regulations and rules to protect their values, life style, and environment. So, a new name is cast on the ordinary Navajo people as “Grassroots.” The day we burn the last drop of petroleum, we, humans are doomed since enormous amounts of materials for our conveniences are derived from petroleum and that time is not far away. Then, the fittest who survive will resume the life styles of our ancestors from one hundred years ago. The US Energy Policy Act of 2005 and its components yield disaster for the environment and Native Americans across the country.

Stakeholder #25

Declined to state location

There should be more emphasis on small business ownership. The tribe needs to cut down the red tape for people wanting to establish a small business on the reservation. Today they are only catering to big corporations instead of assisting our own local people.

Our people are often required to fill out tons of paperwork and most often the people from the Navajo nation business development offices are not helpful. This needs to change in order to stimulate the economic development.

Economic Development Dept. should be looking for businesses who want to relocate to foreign countries. We have many large vacant buildings across the reservation that could be utilized to house these jobs. Call Centers can hire at least 500 to 2000 people to fill these positions. What they will be doing is taking phone calls from across the country and around the world to process paperwork for credit card companies and etc...

They can also target computer companies by providing technical and customer care assistance. Today, when we call a credit card company or for assistance with internet provider we often end up calling foreign countries. I am sure many people feel the way I do when they call these call centers, it is hard to understand these people because they have an accent which sometimes make both parties upset. Navajo people can fill this service demand. We can keep those jobs within the United States and not lose them to foreign countries.

Chapter houses should be given the freedom to start businesses instead of relying on Window Rock to take care of them. They can open and operate a business like stores and diners and funds generated from these could be used to support the local government. It would allow people to gain experience without leaving their communities.

Our Navajo Nation President and the Council Delegates need to be the ones going out soliciting for these jobs rather than expecting the energy company knocking on their doors.

Our Navajo children should be taught how to run a business in high school so it could produce many entrepreneurs. We have many intelligent children out here; we just need to tap into their minds.

When one is looking to start a business off the reservation, not much is required and it should be the same on the reservation rather than shipping it to nearby border towns. Every community on the reservation needs to be converted to a town type of government and charge taxes. They need to be shaped after modern day towns and cities.

Fifty million is not going to reach far, as it is, most of the current money is spent on operating the government. They need to reduce government in order to become more effective. Note every household will use some of that fifty million because they do not qualify. It seems like the government promotes one to remain poor.

Proposed Desert Rock is not a clean coal power plant. Local residents will be the ones to endure the pollution while the owners living in other states will be getting rich off of our natural resources. They will not be the ones paying for our health care. We are just making

other non-Navajos rich while things will be the same here, no one will be profiting. Our tribal government is sacrificing us for others and that is not right.

We have cultural offering sites, burials, and historical sites and we do not want them to be disturbed or bulldozed. It is not fair that non-Natives consider this part of our lives as separate like they do. Being a Navajo all of these are part of our daily lives. We do not set aside one day for church like the non-natives do. We have prayers with everything that we do because we want our lives to be in a state of Hozho (spiritually anointed). How would they feel if we bulldozed their church, cemeteries, and historical sites such as those in and around the Washington, DC area? They would not like it, that is how we feel when they come into our land and when they try to take over.

We can use what ever it takes for power and not just rely on electricity from coal power plants. We can use solar and wind power which our Navajo government can have on their next agenda council session.

Solar and wind power can save our environment from serious damage, this will reduce Global warming, and save our water and definitely save our lives.

At last we should have our fundamental laws include in the Draft EIS. Our way of life and our way of protecting our environment should be a part of their studies. It's about time Uncle Sam needs to realize there are people out here with different aspects, and live differently from white folks. No where in the Draft EIS does it relate to our fundamental laws.

Stakeholder #26
Librarian

I am a veteran and a retired government (BIA) employee, and I like ranching. I live where there are high-power lines running across the land. My relatives all live under or near these power lines, and it really bothers me. I read about the high voltage power lines causing cancer. I always wonder after I lost my wife a year ago from heart failure, I lost my son at thirty years of age to cancer, and I had an open heart surgery three years ago. I believe the power lines have something to do with our health problems. Maybe, and maybe not but we need to look into all of these rising health defects.

We are not the only household dealing with bad health, but there are folks really, really sick and some have lost their loved ones. We believe it is the power plants and their pollution. Long ago when I was growing up and in my teens, there were no words for someone dying from this kind of disease. People were healthy and I saw with my own eyes how our elders had herd sheep, and they worked like young people. They were not complaining about ailing. They died of old age, but now we lose our elders to disease and it is shameful to lose people this way. Health is very important, and it should be put as a priority by the Navajo Nation Energy Dept. (Diné Power Authority), and the tribal government office of NNEPA. I heard EPA of New Mexico was given some petitions years back, but they never followed through. This should be revisited to see what happened to those documents. We need to get on their cases, and they must do their jobs, or what is the use of having these offices? They are supposed to look out for the well being of the people.

As for economic development, I do not see it happening soon — maybe another twenty years from now when all these young people going to college decide to run for offices in Window Rock. They should come up with new ideas and create real economics. Right now we just talk about it with no real action.

I used a solar system for my home, and it provides good power to light my house, but when clouds settle in the power goes down, and maybe they can come up with a new idea on how to work these powers at night and in cloudy days. It's not very dependable but it is clean and safe for homes. I have no idea how wind power works, but I would like to give it a try since I live where wind is not a problem. Even our tree branches breaks when it blows, and our roofs never stay on long enough to actually wear off. We might as well make the best of the winds to light our homes. I will go for anything that is clean and environmentally friendly.

Water is our main source of life in America, and the whole world depends on water. We are useless, and everything in life is useless, without water. We need to protect our ground water in the Navajo Nation and have outside folks do the same. If we all cry out over San Juan River as our only source of water for the future, it might make a difference. We already learned a lesson from knowing the DPA, and their drillers can not find good water in the ground after drilling and drilling. Now they want to go after the river.

Stakeholder #27

Veteran/Retired BIA employee

I am not an expert on energy in coal, oil and gas, but I believe we need to start somewhere with sustainable solar and wind power as an economic development. We have plenty of sunlight and wind to create our own power.

Jobs should be taught at home. We need to start with young people, we need to teach them about businesses and teach them to use sustainable energy. It's not happening right now. Instead of teaching our young people to depend on coal and other energy development, we can teach our young and all ages about other energy alternatives.

We can summarize training in business and clean energy and how we can continue to keep our land and air clean by using all this clean energy.

The most important items on my daily agenda are to teach young children and families on how to count and make the best of their nickel and dimes. I am talking about "conservation lessons" for our people.

People nowadays do not realize just how much they waste a day. We waste food, water, land, money, and a million other things we should not take for granted.

I believe in saving the Earth, and saving the water starts with us. We need to cut back on our spending and buying. We buy useless energy-wasting items like video games, televisions, and radios for each room, electric tooth brushes, hair dryers, curling irons. There are so many useless items that put us all as American people in a bind, and we do not even know it. We do not even need a vehicle with four wheel drive or big trucks. Why do we buy them just to pollute the air?

Economic development is the word coming from our government offices. The real value of money is not the answer for Diné; it is the well being that is valued here on the reservation. I feel good when I get up in the morning, and I do not worry about what the world is screaming about. I know some of our people live in rural areas and they live stress free.

To put all of this in a context: the word **poverty level** does not exist on the reservation, but if you look outside and you see families living in a mud Hogan or house, they are considered poor, and if families use kerosene lamps in the cities or towns, they are considered poor. But here it is our way of life, and we match in the way we live. We do not suffer poverty here, we just live in our amazing and naturally rich lands, which is our way of life. Who created the word poverty for us anyway? In the United States we have food baskets full of food, but we are malnourished worse than Africa. We do not know how to eat right, and we waste what other countries do not have. Bottom line: we do not need Desert Rock power plant and all the other power plants and oil and gas wells. We have to take care of Mother Earth and we have to protect and save the water

Stakeholders #28 & 29
Flagstaff, AZ
& Window Rock, AZ
Black Mesa Water Coalition

People are out there opposing another power plant, and we are here thinking, “Should we go support the plant or should we help oppose it and help the ‘Doo Dah Desert Rock’ supporters?”

On the other hand we need jobs. My husband works construction all over the place and it gets pretty tiring. After studying about what happens to the local people from the current power plant, we decided to support those opposed to the plant.

We live in Carson, NM but we are here in the Navajo Mine area (4). My husband is working on road construction in the San Juan area, and we are both here helping the Dixons with their ranch. They live next to the coal strip mine but they still don’t have electricity or running water. We haul 250 gallons of water a day from Fruitland. We have concerns about what kind of water we drink. Does this water meet the health standard, or is it only good for livestock?

Our health is important. We have to protect it from harm and this means we opposed another power plant.

We also need to preserve our water, both the San Juan River and the ground water. We need something in the future when there is no more water available to us.

The grass is very dry. The land does not look the same as it did years ago ever since BHP power plant came into this area. I have come out and visited the Dixon for years. The blasting is so loud that it damages houses, especially those Hogans made out of mud. The dishes rattle and so does everything in the house. My husband gets a headache when blasting goes off, and the earth shake for a long time. We usually take off and go somewhere when the warning drill goes off. The coal mine and the power plant both are damaging everything around here and we have no business allowing another one.

The Navajo Nation funds are being used in Window Rock and in the local chapters. Like most of us who do not attend chapter meetings, we receive nothing of the funds. We are self-sufficient. We ask for nothing from the chapter fund. They have too much red tape, and I want no part in dealing with it.

I am not going to see any of the money made from the new proposed plant if it comes through. Nobody is going to benefit from it. Maybe just a handful of people might get help with the money made from Desert Rock, but of course they have to fight for it.

We need running water and power out here and maybe this is the time to start using wind power and solar. I support clean energy and a clean environment.

Stakeholder #30

Weaver and rancher

For economic development we need solar and wind power, we need electronics and auto parts assembly line jobs where everyone is able to get a job.

We need the water for now and the future. NAPI are extending the farming areas and they need water. Water for power plants is a waste and useless to us because we do not benefit from power plants and coal mines. They have been here over forty years and we are not rich; we do not have the new houses they promised. We have no running water or electric power. Instead my mother only received a small solar panel from Navajo Mine twenty years ago, which worked for a year but it's been broken ever since.

All of our grazing land is already destroyed, and our animals have been killed by drinking contaminated water from the mine. They did not bother to help pay for the veterinarian fee.

This whole area and far beyond is so polluted. We tried asking for health and environmental studies and we are being ignored. You can see the ground is black from coal and ash, and this is where our poor animals are eating. We live in this dump and our government does not see it. The U.S. government does not see it or they pretend they do not know the big problem.

We need to reduce our council delegates and bring in some people who can at least care about what is going on around here in the grass-roots communities.

Our chapter officials are making wish lists of computers and other minor needs for their chapter use only. They are asking for all these goods from DPA/Sithe Global when people in their community are dying, and some are at risk with cancers and organ failures. We need leaders that can work with us and for us.

Stakeholder #31

Declined to state location

It is so difficult to start anything on the reservation. Even just a small permit for a small farm can create all kind of commotion with tons of paper work and yet at the end we get turned down. I think this is why the leaders would rather go with what is easy like power plants, coal mines, and oil and gas because they are easier to deal with, and the U.S. government has already approved them.

I think we should ask all these energy corporations to start building us good homes loaded with everything from running water to electricity. They might as well start dishing out some money for our needs for destroying our beautiful land and contaminating our ground water.

Instead of asking our own government for assistance, we need to start asking the rich energy companies to provide us with our needs. We might as well since they have no shame in taking everything from us.

Why should we ask for less like solar or wind power when there are high-voltage power lines hanging over our heads making us miserable. We might as well use them. We need the real thing: electricity.

My brother and I do not like working for others. We like being our own bosses. This way we work the way we want and it also allows us to work around our other schedules. What we really want is to own a store or small shop, but it is hard with BIA in the way. We work and do business out of our homes. My brother and I work together. My brother is in music and I and my wife are in clothing.

I think we need to impeach our Navajo president. He spends more money on himself traveling around the world while there are needs at the local levels. We need major changes starting from legislative administration, to business development.

I like living the way I am, and I like my job and will do no other.

Stakeholder #32

Private businessman

I want my life the way it is without relocation and the energy company.

I have sheep and cows. I have raised sheep and cattle all my life. They are my income and I enjoy taking care of them. But I have to sell them as soon as they told me to leave here. I probably have to go live with one of my children in town. They told me they will build me a house somewhere, but I do not know where they are building it. I have to leave and I am not living here as soon as they come to mine this land.

My father was a leader, and other older leaders long ago approved the land to be mine, so I can not do anything about it. Nobody can do anything but just let them mine.

I lived a good life here with my late husband. After he passed away I lived with my children, and I worked hard until I got sick with diabetes. The doctor told me my kidney is failing and that I have to go on kidney-dialysis. My daughter takes care of everything, and she and I have to sell all the sheep and our cows when we move.

Navajo Mine pays me \$1,000 a year which I share with my children. The mine company also helps us with water for live stock, and they grade our road.

I believe we are better off with big solar. We use a small solar panel but it helps. We use butane to keep our food cold and use the same for cooking. We do not have electricity. The electricity goes somewhere else.

I always tell my children to take care of the land and the grazing areas. This land has been good to us for many years. I tell my children water is sacred and it should be protected. We do not have a well, so we haul our water from Fruitland. We used to have a good well for livestock but it never got fixed after it collapsed years ago.

I do not approve of the newly proposed power plant. It is going to ruin the land and water, and there will be wires everywhere. People are sick and the children should not be exposed to something very toxic like this pollution. The other power plant made some people very sick and maybe caused some of my problems and all the sickness I have.

Stakeholder #33

Rancher and homemaker

We need to focus on outside money. The way to invite outside money would be to establish a good tourist attraction on the reservation. Agriculture is another way to bring in outside money. We can create jobs in many ways like:

1. Tourist attractions: we have Monument Valley, Grand Canyon, and we have lots of places we can turn into money making scenes.
2. Arts and crafts: people love arts and the Navajo Nation can make money off the arts made on the reservation by natives.
3. Casinos: we definitely need casinos to make money and it will provide jobs.
4. Agriculture: we can even make our own farms and raise crops like they did in the old days. More agriculture would provide good jobs because large farming areas like NAPI need trained engineers, office clerks, business administrators, supervisors, managers, as well as truck drivers and field workers. These kinds of jobs can go year around.
5. Housing construction and road constructions provides healthy jobs.
6. Solar power and wind power

The jobs we create have to be clean in order for the Navajo people to stay healthy and prosper. Our people need to get back on the right track as for health, because too many people are going down with bad health such as heart attacks, respiratory disease, kidney failure, and pancreas failure. This is not the way to live in harmony. Something has to change.

Power plants probably play a major role in health defects, but we also need to start eating right and do plenty of exercise.

Water is something we need to fight for. Just like I mention the needs for our Navajo people to grow, we need water. We need water for recreation areas, agriculture, construction of any kind, and even casinos. We should not gave it away so generously to outside energy corporations. There is no money in selling our water.

Environmental damage is bad for our outside folks to come and see our replanted lands with piles of rocks and rolling hills with no attraction. This is a big disappointment to our friends coming from far away to see Navajo land.

Stakeholder #34

Private business man

I live in the mining areas, and believe me there is no benefit in mining or the power plant. I worked for the Navajo Mine for twenty four years. I live right in the mining areas and I have been relocated to a short distance away so they can mine my grazing areas where I had my cows. They destroyed my home and everything I built.

They promised me electricity and running water if I moved, but they never followed through with their promises.

I lost my wife to cancer some time back, and I had open heart surgery two years ago. One of my daughters works for Four Corners power plant and she had open heart surgery at such a young age. The whole outfit of running power plants and open pit coal mines does add up to good health.

The promises of 400 jobs from Sithe and DPA are not enough jobs, and it is worthless for us Diné people.

Fifty million dollars for the Navajo Nation is good for the government, but not for us living down here.

We are better off farming and ranching. These types of jobs are suitable for those who love to farm and ranch. This can provide good jobs and good benefit for the Navajo government at the same time.

Let the young people go out and work in towns, and let them live in the cities. This way they can learn both Diné way of life and the English style type of life. When they come back to the land they will know what to do. They need to learn about the outside world.

We need local stores like Dillards and other good stores. We need a good restaurants and not fast food joints. Fast food places are not good for us and we need to limit them from coming onto the reservation.

We need to protect the environment first, and then plan environmentally friendly economic development. Clean jobs and a clean environment makes for healthy populations.

Stakeholder #35
Burnham, NM

Agriculture in the Navajo Nation is 90% livestock. There are 200,000 irrigated farms right now, but agriculture is no priority on the list any more. Long ago it was the first in line. I say it provides income and it provides a healthy diet. We can use modern day technology for crop raising. We need to expand and this can provide plenty of jobs.

We have buyers outside the U.S. and hopefully more buyers would come from other countries.

Agriculture can make safe energy. We can make ethanol alcohol, combine it with gasoline, and it can be made into diesel fuel. Willie Nelson's bus runs on ethanol, so why can't we do it?

We can do with our nation's produce and products, but there is also the BIA getting in the way of a good thing being developed, which makes Navajo Nation development very hard and slow. Their red tape is always in the way of progress on the Navajo Nation, which is why not very many people start businesses. This goes for Navajo Nation-owned businesses like NAPI.

Solar is the best way we can go because we do not have as much wind out here as in California, but we have plenty of sunshine to use solar.

We should not sell our water to the power plants. We need this water to keep our agriculture going and we need more acres of land. We need more water.

Coal surface mining does so much damage to the land that we cannot even plant on it. Once the land is disturbed and refilled, it is no good. We need to start with something better than coal mines and power plants. Pollution is not good for our health and it is not good for our crops. Dirty smoke not only harms health but also contaminates water and plants.

The Navajo Nation president and the councils need to start pushing for more land and water. We need to extend the farming areas and this demands plenty of water. They also need to provide some funds in these areas.

Stakeholder #36

Navajo Nation Dept. of Agriculture

We all know that running our own businesses on Navajo land is restricted by countless red tape from the BIA, and this keeps a lot of good business men from succeeding. This is due to the fact that the U.S. government owns the land; the land does not belong to us by federal law. We only own the grazing rights on the land.

Allotment lands are different. Those people living on allotment lands own the land, and whatever that is underneath the ground is theirs. They can become successful if they build businesses on their lands because they can sell it or trade it if they want.

We are a sovereign nation. If we want to equal outside businesses, we have to become a state, which means we will benefit from more taxes. We can educate our people to shop local in order for our money to stay local. This means we do away with the reservation.

Or the Navajo Nation can withdraw many acres of land just for businesses. We can sell this portion to large business and small business owners. We can make Navajo business owner a first priority; secondly the non-native can buy it and use it for business. This means we get the Trust out of it from BIA. Withdraw the Trust and use the land for businesses. The BIA will not like it at all if we decide to go this route, but if that is what the people and the council and the president wants to do it can be done.

It will cause a chaos in the communities, and especially the BIA will not go for it. Again, if I happen to introduce this type of idea to the councils and the local people, many people will not like it, and many people will go for it because they want to prosper, but there is a big risk. First one is “What if a non-native is married to a Navajo, and it so happens they get a divorce: which gets the business and the land?” If non-natives get to own the business with the land, the native party will come out empty-handed where in the first place she/he was a priority list by law. This can become a big problem to the rest of the Navajos trying to get in to own the land for business. Where do we stand with this? I do not know.

To have something like this, we would be able to have all kinds of economic developments. We can have our own butcher house, sell and buy our own meat instead of going out to boarder towns to buy meat supplies. We can open up ranches. Navajos are born ranchers and these can be good healthy jobs for our people. I believe the people’s outcry against Desert Rock is a worthy fight, because down the road should we happen to become a state or withdraw land for businesses, we will need the water, plenty of water, especially for ranches and farms.

Right now business owners have no interest to start a business here on the reservation because they want to own the land and the business. As it is right now they cannot buy the land, but they can lease it or rent it. Whatever they build in the land returns to the Navajo government after they are done with it, and this is why outside entities are hesitant to come onto the reservation to start a business.

As for electric power, we need to invest money in the windmill and solar businesses. We have lots of sunshine out here we can use instead of relying on coal energy. No matter what they say about clean coal, no coal is clean and especially when you burn it.

Because the coal-burning power plants are dangerous to our health and to our environment, we need to stop investing in these companies. Our government needs to look out for its people.

The water which I mention in my comments; we need to use the water for ourselves. We do not want to end up with empty hands after we gave away all the water to the energy companies. I am speaking years down the road when our grandchildren become adults and should they decide to do away with the bureau and establish something better than what we have now.

I believe this is a start. We are introducing a construction to build a four-story building next to administration #2, and it is big enough to hold many conference rooms. This means we will spend our money in the Navajo Nation and we will profit from this when we rent them out to anyone who wants to use these conference rooms. People can have their business meetings here and they will no longer have to drive out of the reservation to cities to have their meetings or conferences. This also means no more Las Vegas.

The council Chamber will be inside this building, most all business offices will be in this building. A cafeteria and small shops are going to be downstairs. This means we need to start looking at another hotel and motels in Window Rock.

Stakeholder #37
Navajo Nation Council Delegate
Sanostee, NM

I am an electrician and I worked on plenty of power plants in California and Arizona, but when one hit home I decided against it. Power plants are dirty, but the pay is good, yet I opposed Desert Rock. We are already dealing with two coal-fired power plants in the San Juan basin, and my mother, brother and nieces are asthmatic and many people are sick with diabetes. I believe all this newly arrived disease comes from breathing in chemicals from the power plants which slowly kills the inside organs.

I just wish the Navajo Nation president and the council delegates could find something else in place of the power plants, coal mines, and oil fields. Our reservation is getting to be a dump yard for energy companies.

We will be helping our president Joe Shirley and his council delegates digging graves for our future. We have to put a stop to this crazy genocide on Navajo land. We need help to put a stop to all this mess. We are going to be without good drinking water and the air quality is going to get dirtier.

I do not know much about the Navajo Nation funds because I do not use them, and I am not much of a politician. All I know is my grandparents asked for help from the chapter for years and they never got help with a new house or even just a repair. My mother still lives in a two-room house and I do not see her pocketing the money from the Navajo tribal funds. She faithfully attends chapter meetings like it's a holy place.

To me most of our Navajo elected officials like Joe Shirley got so brainwashed following English style/type of policy that they forgot who they really are. They cannot rush the people to a different society or make them live a different social life when they are already set in their ways. Most of our people do not care to go any other way like western life style. We cannot force them to be different or live different. They like the way they live, and let them enjoy life as they see fit just like my mother. She enjoys her life living the way she is.

I once ask my mother if she would like to have a big house to live in. Her answer was "What am I going to do with a big house? I enjoy my little house, big things and world riches do not interest me. I just want to live comfortably, meaning bills are paid on time and not worry about when the next pay will come."

The Navajo Nation needs to create a policy/law to protect cultural and historical sites. Right now there is no law that requires back pay for energy companies destroying old historical sites.

The Navajo Nation needs to create a policy that fits the grass-roots way of life to protect the herders from relocation.

Let us all go solar and wind power for our new generation. New creations are needed and let us do away with old-fashioned, smoky coal power plants.

Stakeholder #38
Union journeyman electrician

Suggestion:

I was asked to make comments on economic development, and what should be best for Navajo people, and what kinds of energy we should use, but I am saying first things first. I am saying economic/jobs can come last.

Health studies are needed:

I strongly suggest we get a good health studies program here in the Four Corners area, especially in the areas where power plants are sitting and around the coal strip mines. The data from the studies can tell us if we are wrong or right. We been asking for health studies and nothing has happened. I personally collected petitions asking the EPA of NM to do the study. Instead they came back with world or state-wide studies they had done saying here are the studies. We will not accept the world, or the whole state-wide studies.

Health and relocation:

No one cares about a job when they are sick; there is contamination in the air making people ill. First people have to be healthy, and in good shape to make decisions for themselves and for their future.

How can we make a good life and prosper if we are always looking over our shoulders to see when we are being kicked off our land, and lose everything that we had worked for all our lives. My people (grandmas and grandpas) are mentally, and physically sick from constantly being reminded to move and make way for the coal mine and the newly proposed power plant. They are depressed and depression causes illness.

Jobs:

We were told to go to school and get an education, climb the ladder and reach the goal. We are working hard to reach that goal, and our Navajo leaders are reaching out to the Energy Corporation to create jobs for us.

We need to get rid of the Bureau of Indian Affairs (BIA), and make a strong stand against an Energy Corporation from stepping over our sovereignty (Rainbow circle) so we can prosper with a good business position. Most of our young Navajo people have experience in business and they can own their own businesses. We do not need the BIA to dictate to us, we young folks are doing very well making decisions for ourselves. Navajo government need to do away with some of these old traditional settings first before we can really position ourselves for economic development. As it is now we get cornered in every direction. This is why our leaders can only depend on outside Energy Companies for revenue.

Alternative energy:

We can do very well with solar, most people use them and they also use wind power. At the homes I have been to on the reservation and in towns, people used certain materials for heat in the winter and cooling in the summer. I understand this wind power and solar can provide good jobs, like laborers to office-work, and I am sure they need engineers and surveyors.

Navajo government:

I do not know too much about Navajo government, but I think they need a lot of work to make our sovereign nation a good place to live. Reconstruction is needed in many areas, and revisitation old documents to make changes. They need to work with what works for the people both young and old. I believe we all can use Fundamental Laws to regain and sustain our cultural and traditional way of life. They need to put our culture in the language, and use it.

Religions Rights:

Water is our way of worshipping, we pray and bless ourselves with water everyday, we drink and pray with water at our meal table, and in the early morning light. My grand mother taught us to pray this way and we still do. Water is life of the earth itself, and water is life to every living thing on the face of this Mother Earth.

We need the water for the people and not for the power plants. Energy Corporations are violating our rights to religious freedom by their ignored behavior and by continually destroying our offering, ceremonial sites, and by drilling for water in the areas where healing medicines grow. They call our sacred land a “waste land”, a land should never be called such a name in our traditional way.

Human Rights and The Draft EIS:

They also violated this traditional teaching by not making it a part of the Draft EIS. We are not in the 1800’s anymore, years of abuse have changed us and we are younger and educated, and we know enough to say we have rights as American Indians (Diné).

Stakeholder #39, Sanostee
Nurse
Student

Glossary²⁴⁹

Alternating current	An electrical current whose magnitude and direction vary cyclically, as opposed to direct current, whose direction remains constant. Current generated by a steam turbine is alternating, because the steam turbine spins a magnet inside a coil of wire, causing the current to flow in alternating directions. The usual waveform of an AC power circuit is a sine wave, as this results in the most efficient transmission of energy. However in certain applications different waveforms are used, such as triangular or square waves. Used generically, ac refers to the form in which electricity is delivered to businesses and residences. However, audio and radio signals carried on electrical wire can also be examples of alternating current.
Anthropogenic	Effects, processes, objects, or materials derived from human activities, as opposed to those occurring in natural environments without human influences.
Capital costs	Costs incurred on the purchase of land, buildings, construction and equipment to be used in the establishment of the proposed coal plant.
Carbon cap and trade	A central authority (usually a government or international body) sets a limit or cap on the amount of a pollutant that can be emitted. Companies or other groups are issued emission permits and are required to hold an equivalent number of allowances (or credits) which represent the right to emit a specific amount. The total amount of allowances and credits cannot exceed the cap, limiting total emissions to that level. Companies that need to increase their emissions must buy credits from those who pollute less. The transfer of allowances is referred to as a trade. In effect, the buyer is paying a charge for polluting, while the seller is being rewarded for having reduced emissions by more than was needed. Thus, in theory, those that can easily reduce emissions most cheaply will do so, achieving the pollution reduction at the lowest possible cost to society. (Montgomery, W.D. "Markets in Licenses and Efficient Pollution Control Programs." <i>Journal of Economic Theory</i> 5 (Dec 1972):395-418)
Carbon capture	The physical process of capturing carbon dioxide emissions after combustion of a fossil fuel. Sometimes referred to as carbon capture and storage (CCS).
Carbon credits	A way to create a market for reducing greenhouse emissions by giving a monetary value to the cost of polluting the air. The value of a carbon credit is determined by a "trading scheme," usually established under a "cap and trade" program set up by a government. Each unit of energy savings or non-carbon energy supply, usually measured in tons of CO ₂ equivalent, can be traded on a carbon exchange such as the Chicago Climate Exchange or the European Climate Exchange. Those producing non-carbon energy sources can sell their credits to other entities to offset greenhouse gas pollution.
Carbon sequestration	The long-term storage of carbon in the terrestrial biosphere, underground, or the oceans instead of the atmosphere.

²⁴⁹ Definitions provided by Ecos Consulting and excerpted from Wikipedia (www.wikipedia.org) and other sources.

Carbon taxes	A tax on energy sources in proportion to their resulting emissions of carbon dioxide.
Coal-bed methane	A form of natural gas extracted from underground coal seams. In recent decades it has become an important source of energy in United States, Canada, and other countries. Also called coalbed gas, the term refers to methane adsorbed into the solid matrix of the coal. It is often saturated with water.
Conventional coal plant	An electrical generating plant in which coal is burned to produce electricity, without additional technology designed to pulverize or gasify the coal, and without new carbon-capture or carbon-sequestration technology
Conventional gas well	In general, organic sediments buried at depths of 1,000 m to 6,000 m (at temperatures of 60 °C to 150 °C) generate oil, while sediments buried deeper and at higher temperatures generate natural gas. The deeper the source, the "drier" the gas (that is, the smaller the proportion of condensates in the gas). Because both oil and natural gas are lighter than water, they tend to rise from their sources until they either seep to the surface or are trapped by a non-permeable layer of rock. They can be extracted from the trap by drilling. A "conventional" gas well operates by drilling into a gas deposit, and extracting the gas without any advanced controls for limiting releases of methane and other gases.
Direct current	Direct current (dc or " <i>continuous current</i> ") is the unidirectional flow of electric charge. Direct current is produced by such sources as batteries, thermocouples, solar cells, and commutator-type electric machines of the dynamo type. Direct current may flow in a conductor such as a wire, but can also flow through semiconductors, insulators, or even through a vacuum as in electron or ion beams. In direct current, the electric charges flow in the same direction, distinguishing it from alternating current (ac).
Draft Environmental Impact Statement	According to the National Environmental Policy Act (NEPA), whenever the US government takes a "major Federal action significantly affecting the quality of the human environment," it must first consider the environmental impact in a document called an "Environmental Impact Statement" (EIS). Before publishing a formal EIS, proponents of a project must produce and publicize a DRAFT EIS--a tentative version of the final EIS, and must allow the public and other interested parties to comment on the Draft EIS.
Emissions caps	Limits placed on the amount of pollution permitted to be released from a known source.
Energy load	Consumer demand for electricity
Environmental Impact Statement	According to the National Environmental Policy Act (NEPA) whenever the US Federal Government takes a "major Federal action significantly affecting the quality of the human environment," it must first consider the environmental impact in a document called an "Environmental Impact Statement" (EIS).
Fixed costs	Expenses that do not change in proportion to the activity of a business, within the relevant period or scale of production. For example, a retailer must pay rent and utility bills irrespective of sales.
Fuel costs	The cost of coal, natural gas, or other fuel used for generating heat or other energy services.

Geothermal	From the Greek words "geo," meaning earth, and "therme," meaning heat. Geothermal energy is generated by heat from beneath the Earth's surface.
Green tag and green pricing	see "Renewable Energy Certificate"
Greenhouse gases	Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and other man-made gases. Greenhouse gases come from natural sources and human activity. Though carbon dioxide is the most commonly emitted greenhouse gas, methane and other greenhouse gases have a greater climate impact per molecule than carbon dioxide.
Integrated Gasification Combined Cycle (IGCC)	IGCC technology is designed to combine a chemical gasification process with traditional combustion turbine-based processes to generate electricity at comparatively high rates of efficiency and low emissions levels.
Merchant coal plant	A "merchant" coal plant sells electricity wholesale, typically to utilities, as distinct from utility-owned plants, which supply energy to their owners without having to offer it for sale on the open market.
National Environmental Policy Act	A United States environmental law that was signed into law on January 1, 1970 by President Richard Nixon. (Although enacted on January 1, 1970, its "short title" is "National Environmental Policy Act of 1969."). The focus of the law was the establishment of a U.S. national policy promoting the enhancement of the environment, but its most significant effect was to establish the requirement for environmental impact statements (EISs) for major U.S. federal government actions.
Photovoltaic	A semiconductor-based technology for converting sunlight directly into electricity.
Renewable Energy Certificate (REC)	Renewable Energy Certificates (RECs), also known as Green tags, Renewable Energy Credits, or Tradable Renewable Certificates (TRCs), are tradable environmental commodities that represent proof that a unit of electricity was generated from an eligible renewable energy resource. These certificates can be sold and traded and the owner of the REC can claim to have purchased renewable energy. While traditional carbon emissions trading programs promote low-carbon technologies by increasing the cost of emitting carbon, RECs can incentivize carbon-neutral renewable energy by providing a production subsidy to electricity generated from renewable sources. In jurisdictions that have a REC program, a green energy provider (such as a wind farm) is typically credited with one REC for every 1,000 kWh or 1 MWh of electricity it produces (for reference, an average residential customer consumes about 800 kWh in a month). A certifying agency gives each REC a unique identification number to make sure it does not get double-counted. The green energy is then fed into the electrical grid (by mandate), and the accompanying REC can then be sold on the open market.

Supercritical coal plant	Above the critical point for water of 705 °F (374 °C) and 3,212 psia (22.1 MPa), there is no phase transition from water to steam, but only a gradual decrease in density. Boiling does not occur and it is not possible to remove impurities via steam separation. In this case a new type of design is required for plants wishing to take advantage of increased thermodynamic efficiency available at the higher temperatures. These plants, also called once-through plants because boiler water does not circulate multiple times, require additional water purification steps to ensure that any impurities picked up during the cycle will be removed. This takes the form of high pressure ion exchange units called condensate polishers between the steam condenser and the feedwater heaters. Subcritical fossil fuel power plants can achieve 36–38% efficiency. Supercritical designs have efficiencies in the low to mid 40% range, with new "ultra critical" designs using pressures of 4,400 psia (30 MPa) and dual stage reheat reaching about 48% efficiency.
Supercritical pulverized	In some supercritical coal plants, the coal is pulverized before entering the furnace, resulting in quicker, more efficient combustion.
Thin Film Solar (TFS)	"Amorphous" or "Thin Film Solar" (TFS) PV panels have non-crystalline semiconductors (Copper Indium Diselenide, CuInSe_2 , sometimes incorporating Gallium or Sulfur), an acceptable level of efficiency, and the broadest light spectrum for operation. The cells are can be produced on flexible film, like mylar, are 100 times thinner and are potentially lighter than today's silicon cells. Because they require less semiconductor material than other solar cells, many thin film solar cells can be made for less money, but also typically produce less power per unit area.
Variable costs	Expenses that change in relation to the activity of a business such as sales or production volume.