

**Joint Legislative Study
Committee on Gas-Fired
Electrical Generating
Plants**

Final Report

December 15, 1999

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Arizona Legislature
Joint Legislative Study Committee
on Gas-Fired Electrical Generating Plants



Final Report

Submitted to the President of the Senate and Speaker of the House
December 15, 1999

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Committee Members:

Representative Joe Hart (chair)
Representative Herschella Horton
Representative Jerry Overton

Fred Carpenter
Preston Holland
Fred Kreiss
Sandie Smith

STATE DOCUMENTS

Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith

Cheryl Murray-Leba (DOR)
Steve Rossi (DWR)
Karen Smith (ADEQ)

Joint Legislative Study Committee on Gas-Fired Electrical Generating Plants – Final Report

Enabling Legislation: Laws 1999, Chapter 188, (SB 1150) established the Joint Legislative Study Committee on Gas-Fired Electrical Generating Plants. This legislation was passed to study the impact that gas-fired electrical generating plants have on the use of water, air quality and on economic development. The legislation required the Committee to submit a report with recommendations to the President of the Senate and the Speaker of the House. The Committee is repealed after December 31, 1999. A copy of the enabling legislation can be found in Appendix A of this report.

Committee Membership Committee's membership included both Legislators and appointed public and private sector members representing a diverse range of interests. The membership of the Committee was as follows:

Committee Members

Representative Joe Hart (chair)
Representative Herschella Horton
Representative Jerry Overton

Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith

Fred Carpenter
Preston Holland
Fred Kreiss
Sandie Smith

Cheryl Murray-Leba (DOR)
Steve Rossi (DWR)
Karen Smith (ADEQ)

Committee's Report: The Committee conducted three public hearings to gather testimony regarding the impacts new gas-fired generating plants will have on the Arizona environment, water usage and economic development. The first hearing included testimony from the Department of Environmental Quality and the Department of Water Resources regarding the current permitting requirements for power plants. The Department of Revenue also provided information regarding the valuation methodology used to assess power plants for property tax purposes.

The second hearing focused mainly on testimony from the Arizona Corporation Commission relating to the regulations currently in place for the siting of power plants. Arizona Power Service Company (APS) also provided a presentation regarding the differences between a water cooled plant versus a air-cooled plant.

The third committee hearing included a presentation by the Salt River Project (SRP) regarding the need to build more power plants closer to the load centers. SRP emphasized that under HB 2663 (the bill deregulating SRP), SRP has an obligation as the provider of last resort to their distribution customers. At the third hearing, Representative Hart and Representative Horton also proposed a list of recommendations for the Committee to discuss. The agendas and minutes for all of the hearings are provided in Appendix B of this Report.

While the Committee discussed some recommendations at the third committee hearing, no recommendations were voted on or adopted by the Committee. At the end of the third hearing, the Committee planned to meet one last time to adopt final

recommendations. However, because of scheduling conflicts and the due date of this report, the Committee was unable to convene for the last hearing. Therefore, this report contains the recommendations that Representative Hart and Representative Horton proposed at the last meeting and comments and other recommendations that members of the Committee submitted to staff on or before December 15, 1999.

Again, it is important to emphasize that the Committee did not adopt any recommendations but only discussed or submitted the recommendations below.

Recommendations Submitted by Representative Hart:

Findings:

The opening of Arizona's retail electric markets and the markets in surrounding states, is already changing Arizona's electric utility system with new generating plants locating in Arizona. While electric competition may result in improved efficiency and reduced prices for electric services, it is important to recognize the other broad policy implementations electric competition creates. Among these implications are quality of life issues, environmental issues, natural resource issues, water issues and economic development issues. Careful consideration of these issues is necessary as new power plants are sited in Arizona.

Recommendations:

1. The Power Plant and Transmission Line Siting Committee should continue to have regulatory oversight over the siting of new generation plants as currently prescribed in statute (Title 40, Chapter 2, Article 6.2).
2. Consideration of water usage should be a factor considered before the Committee issues a certificate of environmental compatibility. Currently, this is a requirement for

active management areas (see §40-360.13 for current law requirement) but is not a requirement for non-active management areas.

3. New power plants should be required to provide information to the Siting Committee regarding the amount of water that will be used to generate power that will be sold outside of Arizona before the Committee issues a certificate of environmental compatibility.
4. New power plants should not be given preferential tax treatment over existing plants.

Recommendations Submitted by Representative Horton:

1. Require anyone who proposes to build a gas-fired electric generating plant to maximize the re-use of water supplies through strategies such as the following:
 - a) Use of effluent as the primary water source for the production of electricity;
 - b) Recycling water as often as possible;
 - c) Using recharge techniques for waste water to the extent allowable in keeping with existing groundwater protection standards.
2. Require ADEQ to closely monitor any air quality impacts associated with gas-fired electric generating plants.
3. Recommend that any potential impact on revenue, taxation or economic development be structured in a manner to be fair and equitable to all jurisdictions involved.

Recommendations submitted by Fred Kriest:

Comment regarding Representative Hart's fourth recommendation: Taxation of power plants is an ongoing issue that is currently being studied; and, should continue to be studied in detail, by the State Department of Revenue. The Committee heard a presentation by SRP regarding the *differences* between one of their proposed plants being built under an "obligation to serve" and the so called "merchant power plants." Using this logic, it would not seem consistent or fair for this Committee to issue a recommendation stating that *all* new power plants should not be given any preferential tax treatment over existing plants prior to additional study. In any event, such recommendations should be based on a comprehensive review of a number of relevant factors and not made in a vacuum. The Committee spent very little time deliberating taxation of power plants.

Any tax changes should be part of a comprehensive tax package addressing total revenue requirements and, as such, must consider a number of relevant factors. Such changes should also ensure that comparable electrical generation facilities are treated fairly and equitably in order to *promote, rather than impede*, the transition to electric competition in our state.

Recommendation: Due to the changes occurring as a result of electric deregulation in the state of Arizona, taxation of new power plants is an issue that should be studied in detail by the appropriate agency and or legislative committee.

Recommendations submitted by the Department of Water Resources:

Based on a request by Representative Hart, the Department of Water Resources (DWR) has developed options for consideration by the Committee to help the Committee to

refine the process for siting gas-fired electrical generating plants. Our understanding is that a primary objective of the Committee is to ensure that new power plants do not create adverse impacts to groundwater conditions, whether a plant is located inside or outside of an active management area (AMA). DWR supports this objective and would be able, on a case-by case basis, to prepare advisory information for consideration by the Power Plant Siting Committee.

The applicant could forward proposals, documentation, and reports to DWR for review and comment related to three areas: conservation practices, water availability, and well impacts. DWR would review the information provided by the applicant for each of these proposals, using the criteria specified below, and forward comments to the Siting Committee. In some instances, within AMAs, the plant is already subject to some of these criteria. The information provided by DWR would be advisory only. The italicized comments indicate current practice.

1. **Conservation Practices:** Whether the plant is likely to meet the requirement of 15 cycles of concentration specified in the Management Plan, or an acceptable alternative as provided in the Management Plan. *Plants within an AMA are already subject to this requirement.*
2. **Regional Water Availability:** Whether the supply required for the plant would satisfy requirements for the physical, legal and continuous availability of water from any source for the economic life of the plant. *Requirements similar to these are included in the Assured and Adequate Water Supply Rules, which apply to new subdivisions within AMAs. The AWS rules do not apply to power plants with their own water rights.*

3. **Well Impact:** Whether the withdrawal of groundwater is likely to result in unreasonably increasing damage to surrounding land or other water users. *Inside AMAs, if a new non-exempt well is to be drilled, or a replacement well is to be drilled in a new location, current law requires that the proponent acquire a permit which involves a well impact analysis. Replacement wells inside AMAs and all wells outside of AMA's require only a "notice of intent to drill" from the applicant, and do not necessitate a well impact analysis.*

List of Appendixes

Appendix A: Laws 1999, Chapter 188 (SB 1150)

Appendix B: Committee Agendas and Meeting Minutes

Appendix C: Information submitted to the Committee by Verde Resources, Lone Pine, California

Appendix D: Information submitted to the Committee by the Arizona Corporation Commission

Appendix E: Information and testimony submitted to the Committee by Arizona state agencies during the public hearings.

Appendix A:

Laws 1999, Chapter 188 (S.B. 1150)

State of Arizona
Senate
Forty-fourth
Legislature
First Regular
Session
1999

SENATE BILL 1150

AN ACT

ESTABLISHING A STUDY COMMITTEE ON GAS-FIRED ELECTRICAL GENERATING PLANTS.

Be it enacted by the Legislature of the State of Arizona:

Section 1. Joint legislative study committee on gas-fired electrical generating plants; report

A. The joint legislative study committee on gas-fired electrical generating plants is established consisting of the following members:

1. Three members of the house of representatives who are appointed by the speaker of the house of representatives, not more than two of whom are members of the majority party.

2. Three members of the senate who are appointed by the president of the senate, not more than two of whom are members of the majority party.

3. The director of the department of water resources or the director's designee.

4. The director of the department of environmental quality or the director's designee.

5. The director of the department of revenue or the director's designee.

6. One person who represents a water district who is appointed by the president of the senate.

7. One person who represents an electric power provider who is appointed by the speaker of the house of representatives.

8. One person who represents a county who is appointed by the president of the senate.

9. One person who represents a city with a population of less than twenty-five thousand persons according to the most recent United States decennial census who is appointed by the speaker of the house of representatives.

B. The committee shall study gas-fired electrical generating plants with respect to the following:

1. The use of water, including groundwater and surface water, by the generating plant and its effects on the aquifers and other sources of water in this state.

2. The effects on the air quality of all of the regions of this state.

3. The impacts on revenue, taxation and economic development in this state.

C. The committee shall make recommendations based on its studies and issue a report to the speaker of the house of representatives and the president of the senate by December 15, 1999.

Sec. 2. Repeal

This act is repealed on December 31, 1999.

Appendix B:

Committee Agendas and Meeting Minutes

ARIZONA STATE LEGISLATURE

Interim Meeting Notice

Open to the Public

Joint Legislative Study Committee Gas-Fired Electrical Generating Plants

DATE: Tuesday, December 7, 1999

TIME: 1:30 p.m. -- 3:30 p.m.

PLACE: Senate Hearing Room 3

AGENDA

- I Public Comment
- II Committee Discussion
- III Adjournment

MEMBERS:

Representative Joe Hart
Representative Herschella Horton
Representative Jerry Overton
Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith
Mr. Preston Holland, Hohokam Irrigation and Drainage District, Coolidge, AZ
Ms. Sandie Smith, Pinal County Supervisor
Mr. Fred Kreiss, Citizens Utilities Company
Mr. Fred Carpenter, Town of Wickenburg

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12/2/99

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ARIZONA STATE LEGISLATURE

Interim Meeting Notice

Open to the Public

Joint Legislative Study Committee Gas-Fired Electrical Generating Plants

DATE: Tuesday, November 9, 1999
TIME: 9:30 a.m. – 11:00 a.m.
PLACE: Senate Appropriations Room 109

AGENDA

- I ACC – Regulation of Gas-Fired Generators
- II Water Cooled Plants vs. Dry Plants
- III Follow-up from Previous Meeting:
 - a. Tax Issues
 - b. Water Issues
- IV Public Comments
- V Committee Business
- VI Adjournment

MEMBERS:

Representative Joe Hart
Representative Herschella Horton
Representative Jerry Overton
Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith
Mr. Preston Holland, Hohokam Irrigation and Drainage District, Coolidge, AZ
Ms. Sandie Smith, Pinal County Supervisor
Mr. Fred Kreiss, Citizens Utilities Company
Mr. Fred Carpenter, Town of Wickenburg

tm
11/2/99

ARIZONA STATE LEGISLATURE

Interim Meeting Notice

Open to the Public

**Joint Legislative Study Committee
Gas-Fired Electrical Generating Plants**

DATE: Thursday, October 14, 1999

TIME: 3:00 p.m. – 4:30 pm

PLACE: Senate Hearing Room 1

AGENDA

I Call to order

II Committee Business

(a) Elect Chairman

(b) Staff Presentation – Committee Purpose

III Presentations:

Ms. Karen Smith, Director, Water Quality Division
Department of Environmental Quality

Ms. Cheryl Murray-Leba, Administrator, Property Tax Division
Department of Revenue

Department of Water Resources (Director or Designee to be announced)

IV Committee Discussion

V Public Comments

VI Adjournment

MEMBERS:

(See attached)

MEMBERS:

Representative Joe Hart
Representative Herschella Horton
Representative Jerry Overton
Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith
Mr. Preston Holland, Hohokam Irrigation and Drainage District, Coolidge, AZ
Ms. Sandie Smith, Pinal County Supervisor
Mr. Fred Kreiss, Citizens Utilities Company
Mr. Fred Carpenter, Town of Wickenburg

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P. 2

CORRECTED
November 17, 1999

ARIZONA STATE LEGISLATURE
Forty-fourth Legislature – First Regular Session

JOINT LEGISLATIVE STUDY COMMITTEE ON
GAS-FIRED ELECTRICAL GENERATING PLANTS

Minutes of Meeting
→ **Thursday, October 14, 1999**
Senate Hearing Room 1 – 3:00 p.m.

(Tape 1, Side A)

The meeting was called to order at 3:06 p.m. by Chairman Hart. The attendance was noted by the secretary.

Members Present

Senator Tom Smith
Senator Herb Guenther
Preston Holland
Fred Kreiss

Representative Joe Hart, Chairman
Representative Herschella Horton
Representative Jerry Overton
Sandie Smith

Members Absent

Senator Tom Freestone

Fred Carpenter (excused)

Speakers

Melodie Jones, House Research Analyst
Nancy Wrona, Director, Air Quality Division, Arizona Department of Environmental Quality (ADEQ)
Karen Smith, Director, Water Quality Division, Arizona Department of Environmental Quality (ADEQ)
Cheryl Murray-Leba, Administrator, Property Tax Division, Department of Revenue (DOR)
Steve Rossi, Office Manager, Assured and Adequate Water Supply Certification, Arizona Department of Water Resources (ADWR)
Frank Corkhill, Hydrologist, Technical Support, Hydrology Division, Arizona Department of Water Resources (ADWR)
Martin L. Schultz; Director, Government Relations, Arizona Public Service (APS); Vice President, Pinnacle West Corporation

Committee Business

Senator Smith moved, seconded by Representative Overton, that Representative Hart be named Chairman of the Joint Legislative Study Committee on Gas-Fired Electrical Generating Plants. The motion carried.

JLSC: GAS-FIRED ELEC.
GENERATING PLANTS
October 14, 1999

Melodie Jones, House Research Analyst, briefly reviewed the enabling act and charge of the Committee (Attachment 1). Senator Smith asked to have a copy of the enabling act provided to him. Ms. Jones indicated that she would provide each of the Committee Members with a copy.

Presentation by Arizona Department of Environmental Quality, Water Quality Division

Nancy Wrona, Director, Air Quality Division, Arizona Department of Environmental Quality (ADEQ), presented the *Summary of ADEQ Air Permit Processes for Gas-Fired Power Plants* (Attachment 2). In response to questions posed by the Committee, Ms. Wrona added:

- There are many gas-fired power plants (GFPP) in operation throughout the country. It is a popular format of power plant construction and has been constructed for approximately ten years.
- ADEQ checks for accuracy, with regard to the modeling process for pollution control, in a number of ways. First of all, they will review and check the actual emissions calculations based on the design and the capacity of the facility. For this review, ADEQ works directly with other states, particularly California, and other air pollution control agencies. ADEQ requires a proposed GFPP to compose a protocol for the mathematical models used to project their emissions. ADEQ then reviews their work. There are specific federal requirements that govern the modeling exercise.
- Modeling is a method to project the rate of emissions of a proposed GFPP and theoretically confirm that it will perform as proposed. ADEQ works with sister agencies, who have permitted similar facilities, to ensure that it understands the engineering involved in the project and that the results that are proposed in the permit application are realistic, based on the experience of the sister agencies. Again, the modeling methods are federally prescribed. The applicant must use them and their work is reviewed by ADEQ.
- ADEQ, upon successful processing of an application, will issue a permit, prior to construction, that is good for five years from the date of issue. The Environmental Protection Agency (EPA) then has an additional 45 days to review the application.
- ADEQ complies with Title V, and the provisions of Provision of Significant Deterioration (PSD) and New Source Review when issuing a permit.
- Even though an applicant is granted a permit from ADEQ, they will typically not begin the project until it has been granted a permit/approval from the EPA.
- Theoretically, the EPA has the authority to veto Title V and not grant a permit, even though ADEQ has granted a permit.
- Initially, in the application process, it is an objective and fairly straightforward process, in which it is determined that the project does or does not meet specific criteria, including the use of Best Available Control Technology (BACT).
- Though there may be public objections to a GFPP, if the project meets all of the criteria, ADEQ must issue the permit. The purpose of the public hearing process is to scrutinize the application and ensure full disclosure of the project.
- The offset provision requires that a GFPP built within the non-attainment area must remove more than one ton of pollution for every ton it generates. This can be accomplished by "cleaning up" another facility, typically owned by the applicant, or by making a permanent, enforceable change.
- There is a perception that, if a number of applicants are seeking to be established GFPPs outside the non-attainment area, the first applicant would have a better chance of being

granted a permit than the last applicant. However, all applicants must meet BACT criteria, which ensures equity in the applicant process. Theoretically, an area may run out of increment space as more GFPPs are established; however, this is unlikely. Under the offset provision, each facility will have to remove more than one ton of pollution for every ton it generates. So, theoretically, the area ought to be able to permit all facilities that meet the criteria.

- At this time, the permitting process appears to adequately protect the citizens of Arizona.
- The criteria used to consider an applicant a major or minor source of emissions is determined by the location in which the GFPP will be constructed, whether the facility will be located inside or outside the non-attainment area.
- The following would qualify as minor sources of emissions: 100 tons of conventional pollutants; 10 tons of any one federally listed hazardous air pollutant; or 25 tons combined of federally listed air pollutants. Specifically, tons per year. Anything over these limits would be considered a major source. There is no "cap" on the allowable emissions for a major source.
- Applicants must meet the PSD guidelines whether they plan to build inside or outside of the non-attainment area.

Chairman Hart stated his understanding that the permit granted to the Griffith energy project supercedes the permit for the North Star Steel plant, because its permit is currently under investigation for not meeting its contractual standards and is, therefore, invalid. Ms. Wrona stated that she is unable to discuss the contents of compliance issues; however, she mentioned that North Star Steel plant has submitted a new Title V application to address emissions previously unaccounted for.

Ms. Wrona explained that the status of one ought not to affect the other. Chairman Hart asked if the failure of North Star Steel to comply with its projections would grant primacy to the application of the Griffith energy project; specifically, would new applicants be obligated to trade off with Griffith or North Star Steel. Ms. Wrona explained that, in the Kingman area, a facility must meet the incremental analysis criteria; therefore, the issue of offsets would not arise. She noted that ADEQ conducted an air quality impact study on the combination of facilities within the radius in which the facilities existed.

Mr. Holland asked if a "new player" in the business of GFPPs wanted to enter the market, would they be barred because they wouldn't have anything to trade and offset, or would they be able to purchase offset and establish their plant. Ms. Wrona indicated that it is more difficult for new facilities to locate within the non-attainment area. She added that, under new legislation (H.B. 2405; alternative fuel vehicles), ADEQ is required to set up a bank, accessible to its sister agencies and to the Arizona Department of Commerce so that a facility might accumulate credits that can be banked or sold for offset. Mr. Holland stated his understanding that it is difficult for a "new player" to enter the market, but it is possible.

Representative Horton asked how much "money" was in the "bank." Ms. Wrona stated that the program had not been initiated yet.

Karen Smith, Director, Water Quality Division, Arizona Department of Environmental Quality (ADEQ), presented the *Summary of ADEQ Water Permit Processes for Gas-Fired Power Plants* (Attachment 3). In response to questions posed by the Committee, Ms. Smith added:

- The permits are issued for the life of the facility and are typically not modified unless the facility approaches ADEQ for a major modification. An example of such a modification would be an emerging or greatly improved technological advance.
- The proposed life of a GFPP is between 10 and 20 years.
- Theoretically, it would be possible for an applicant, in a critical water shortage area, to reclaim discharged waste water under aquifer protection permits (APPs) and the provisions of the best available demonstrated control technology (BADCT). In this case, the applicant would likely need additional permits from the Department of Water Resources. BADCT, however, is site specific and the feasibility of a permit would depend on the site.
- The water that would be "reclaimed" in the above example would be sludge or brine that has condensed and leaked under the water liner. It would not be hazardous water composed of dissolved solids, as is typical in wastewater ponds/facilities.
- In some cases, depending on the facility, the brine might be toxic. In either case, BADCT guidelines would be applied.

Presentation by the Department of Revenue, Property Tax Division

Cheryl Murray-Leba, Administrator, Property Tax Division, Department of Revenue (DOR), explained that the Property Tax Division is essentially the county assessor for utilities, airlines, railroads, and mining properties, which, she added, is typical in the western, mid-western and eastern states. She handed out *Electric and Gas Utilities: Overview and Summary of Valuation Process* (Attachment 4) and explained the advantages to central valuation; specifically, industries are treated equitably between counties, they have just one taxing authority to deal with, and centralization allows DOR to compose and maintain an experienced and expert staff.

Ms. Murray-Leba explained that DOR gets its information directly from the taxpaying industries, which are required to file reports with DOR each year in April, in addition to their other standard reports: regulatory reports, securities and exchange reports to stockholders, Corporation Commission reports, etc. DOR analyzes all of these reports in determining the value of the property, the property being all of the land, the buildings, and permanent property used in the particular business. DOR determines an overall value for the entire property and then allocates that value back to the taxing jurisdictions in which the property is located.

(Tape 1, Side B)

In the case of Palo Verde power plant, Ms. Murray-Leba explained, the property itself is not valued. The seven owning corporations of Palo Verde are valued and DOR allocates their total value based on the location of the property, i.e., Palo Verde.

Representative Overton stated his understanding that, under current DOR practices, the utility companies are taxed and they pass the cost on to their customers, which would suggest that the utility companies are, in fact, not paying the tax at all. Ms. Murray-Leba agreed in theory. Representative Overton asked if, under the new system, a market-based utility company that sells its power outside the State of Arizona, which is taxed by DOR, presumably passes the taxation onto its out-of-state customers. Ms. Murray-Leba agreed in theory. Chairman Hart noted that this appears to be an area that the Committee needs to address with regard to "fairness."

Ms. Jones explained that power sold in Arizona is subject to the state transaction privilege tax under the utilities classification. When the Legislature worked on the recent deregulation legislation, it addressed issues of NEXUS. Therefore, when a large power plant sells to a customer in Arizona, it would be taxable under the use-tax classification. If an Arizona power plant sells to a California resident, then such a transaction would be subject to California law.

In response to a question posed by Ms. Smith, Ms. Murray-Leba explained that power plants are not taxed by the same process or in the same classification as residents. Power plants are considered Class I and are taxed 25 percent.

Chairman Hart asked how much revenue state utilities contribute to the State's base budget. Ms. Murray-Leba stated that she did not have the information with her and that she would bring it to the next meeting. Ms. Jones noted that, when the legislative staff conducted its deregulation study, the total tax revenue generated by power plants was \$600 million. She further noted that mines and utilities are counted together. Chairman Hart asked Ms. Murray-Leba to segregate out the information on mines when she brings her data. Ms. Murray-Leba asked Chairman Hart if he wanted just property tax information. He indicated that he would like to review all tax information pertaining to power plants.

Presentation by the Department of Water Resources

Steve Rossi, Office Manager, Assured and Adequate Water Supply Certification, Arizona Department of Water Resources (ADWR), presented an overview of conservation requirements, with regard to large-scale power plants (Attachment 5). In response to questions posed by the Committee, Mr. Rossi added:

- There are no withdrawal guidelines, with regard to wells, outside of the active management area (AMA). An individual can mine all the water he/she wants. There is an exception for wells that are transferred to an AMA.
- Legislation was passed in 1998 that imposed limitations on withdrawal and transport of water from certain basins.
- The proposed Arlington power plant falls within the Phoenix AMA.
- If an individual has retired their land from agricultural use, and grandfathers the irrigation rights, then the water may be used by a power plant.
- If a farmer does wish to convert his water use for this purpose, it is unnecessary that the land be actively farmed up until the conversion; however, there will need to be a development plan on file that would allow for non-irrigation use of the water.
- With regard to the water use of a power plant in an irrigation non-expansion area (INA), it is handled similarly to "permitting" outside of an AMA. One similarity between an AMA and an INA, with regard to agricultural land, is that there is limitation on groundwater and no new lands can be irrigated, under current water supply management.
- If a power plant was built outside of an AMA and, after a number of years, is transferred into an AMA, the standard rights and conservation requirements may or may not apply to the plant. If the plant falls under the 1980 groundwater code, it is likely that the plant would be grandfathered.

- There are two possible approaches to making the entire State of Arizona an AMA: enactment by the Legislature, or by a vote of the residents.

Frank Corkhill, Hydrologist, Technical Support, Hydrology Division, Arizona Department of Water Resources (ADWR), presented an overview of well drilling (Attachment 6)

Chairman Hart asked Mr. Corkhill to speculate how much money it would cost to raise the water an additional 50 feet in a 900-to-1000-foot domestic well, for example, in Northern Arizona. Mr. Corkhill stated that it would be difficult to say precisely. He explained that the cost to raise water 25 feet, from 900 feet to 925 feet, would cost less, relatively speaking, than raising it from zero to 25 feet. Chairman Hart noted that 9000-to-1200-foot wells pump approximately one million gallons per day and that the electricity use amounted to approximately \$40,000 each month. He impressed on the Committee that raising water is a very costly enterprise.

Representative Overton asked Mr. Corkhill to confirm that well impact analysis does not include anything outside of the AMA. Mr. Corkhill confirmed the statement. He added that wells outside of an AMA require a notice of intent (NOI) but do not require any type of analysis.

Committee Discussion

Senator Smith asked Chairman Hart how many more meetings he anticipates there will be. He indicated the likelihood of two more meetings. Chairman Hart stated that his ultimate goal is to establish a standard in which power plants are taxed in relation to the degree in which they impact Arizona's resources. Power plants that utilize alternate energy sources (i.e., solar and wind), which create less of an impact on Arizona's "quality of life," ought to pay less taxes than another plant that has a huge impact on Arizona's resources.

Chairman Hart noted that water use is an important issue in his area. Though other power plants throughout Arizona use Central Arizona Project (CAP) water, Colorado River water, and effluent water, the power plant in his area uses ground water and he opined that the plant ought to pay more for impacting the local water resources. Chairman Hart asked Mr. Rossi if there was any truth to a rumor that there was a lawsuit filed in Utah, which might make its way to Arizona, suggesting that any impact on the water quality of an aquifer may be accountable under the Clean Water Act. Mr. Rossi stated that he is unfamiliar with such a rumor.

Chairman Hart noted that the only way to be sure how much water an aquifer contains is to "pump it dry." He added that if a person asks the opinion of ten hydrologists, he is likely to get ten opinions. He stated that there needs to be a standard set that will regulate the use of water for the purposes of power plants and other like uses. He added that the Corporation Commission only has oversight within an AMA.

Senator Smith asked how much water a GFPP uses. Chairman Hart indicated that water use for a GFPP approaches 4,800 gallons per minute, or approximately 8.2 million gallons per day. He added that statewide deregulation will not improve circumstances; therefore, it seems necessary to set the standard for water use and make it retroactive to be equitable.

Mr. Holland expressed his concern over GFPPs selling power outside of Arizona. Whether it leaves the State in the form of water or electricity, he explained, there is a loss of state resources

when this occurs. Representative Overton concurred and stated that making the entire State an AMA is not as "ridiculous" an idea as it may sound. He suggested requiring all new facilities to use reclaimed water.

Senator Guenther noted that Arizona does not regulate groundwater except in an AMA, where water mining is significant. He suggested that, if the Chairman is seriously contemplating making the entire state an AMA, adequate time be allowed to develop statewide regulations because this act will have far-ranging effects beyond power plants. He added that there are many aspects to and opinions about aquifer management and the relationship between ground water and surface water and, with the courts currently examining these very same issues, he iterated that the Legislature needs to be prepared to allow adequate time for implementing AMA standards statewide.

Chairman Hart iterated that he personally does not favor AMAs; however, he stated, major water consumers must pay the price for over-consumption.

Public Comments

Martin L. Schultz; Director, Government Relations, Arizona Public Service (APS); Vice President, Pinnacle West Corporation; gave an overview of the results of recent deregulation; specifically, H.B. 2663 (electric power competition) from the 43rd Legislature, 2nd Regular Session. He confirmed that the total tax revenue generated by power plants was \$600 million and explained that power plants collect taxes for the State and municipalities (from their customers), as well as franchise fees. Mr. Schultz indicated that GFPPs are the most efficient technology in use now.

Mr. Schultz explained that competition is going to influence where an entity chooses to build its GFPP, because the tax structure is different from state to state. He commented that Chairman Hart is "on top" of the water issue and he added that, in the case of APS, it is planning on using effluent water and not groundwater. In the case of its West Phoenix plant, it will be using an existing allocation of groundwater and that the established plant there is being expanded.

Mr. Schultz noted that the sitting committee of the Arizona Corporation Commission is responsible to site power plants and transmission lines. Additionally, they have the responsibility of providing a biennial analysis of reliability and capacity. With regard to the concern of some Committee Members that Arizona exports a great degree of electrical power, Mr. Schultz informed the Members that during the summer months, Arizona imports a significant amount of power as well.

Mr. Schultz acknowledged the need to address water issues, with regard to power plants, and suggested that they be viewed in context with air quality issues. He noted that Arizona has historically relied on the power industry to collect taxes. APS, he noted, has had its taxes increased since 1994 while it has lowered its rates by 8 percent and has made a commitment to continue to lower rates through 2004. Of course, attempts are made to recover all operational costs, especially in a competitive market. Mr. Schultz expressed his appreciation to the Committee and the Legislature for taking on such a complex issue.

Senator Guenther asked Mr. Schultz to clarify APS's use of groundwater at one of its facilities. Mr. Schultz explained that there are plans to expand the West Phoenix facility at 43rd Avenue and Van Buren, using an existing allocation of groundwater. He added that there are no more plans on the drawing board for additional plants. APS intends to be an aggressive competitor in the energy market in other western states in addition to Arizona.

Representative Overton asked Mr. Schultz for clarification on his statement that APS has experienced an increase in taxes while it has lowered its rates. Mr. Schultz indicated that he was speaking hypothetically, and noted that the Legislature has, in fact, lowered taxes. He explained that APS has honored its commitment to reduce rates and has even exceeded the property tax benefit and lowered rates even further. He iterated that he had been speaking hypothetically, as if taxes had been increased.

Without objection, the meeting adjourned at 5:03 p.m.



Seth Goodman, Committee Secretary

(Original minutes, attachments, and tape are on file in the Chief Clerk's Office. Due to technical difficulties, audio tape record is completely inaudible.)

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10/28/99

ARIZONA STATE LEGISLATURE
Forty-fourth Legislature – First Regular Session

JOINT LEGISLATIVE STUDY COMMITTEE
GAS-FIRED ELECTRICAL GENERATING PLANTS

Minutes of Meeting
Tuesday, November 9, 1999
Senate Appropriations Room 109 – 9:30 a.m.

Chairman Hart called the meeting to order at 9:40 a.m.

Members Present

Senator Tom Freestone
Senator Herb Guenther
Senator Tom Smith
Mr. Fred Carpenter
Mr. Fred Kreiss

Representative Joe Hart
Representative Herschella Horton
Representative Jerry Overton
Ms. Sandie Smith

Speakers Present

Dean Miller, Legislative Liaison, Arizona Corporate Commission
Janice Alward, Attorney, Arizona Corporate Commission
Steve Alaya, Chief Engineer of the Utilities Division, Arizona Corporate Commission
Ray Williamson, Chief of Economic Research, Corporate Commission,
Nick Svor, Manager of Generation Engineering, Arizona Public Service
Michael Patterson, Verde Resources
Jay Moise, Attorney, Moys, Storey Law Firm
Melody Jones, Research Analyst
Steve Ross, Manager of Assured Water, Arizona Corporate Commission

(Tape 1, Side A)

Chairman Hart stated that today's topic is electrical deregulation. He explained that there are approximately eleven plants being designed for Arizona and it will have a huge impact upon our quality of life unless we immediately set some standards to guarantee some regulation over the plants. He added that the Corporation Commission does not have regulation over the plants rather they are involved in the site planning.

JOINT LEGISLATIVE STUDY COMMITTEE
GAS-FIRED ELECTRICAL
GENERATING PLANTS
November 9, 1999

Presentation by the Corporation Commission

Dean Miller, Legislative Liaison, Arizona Corporate Commission, explained that his presentation would be offered in three parts and would be presented by Janice Alward, Steve Alaya and Ray Williamson.

Janice Alward, Attorney, Arizona Corporate Commission, briefly introduced the statutory and constitutional authority of the Commission and offered a summary of the applicable statutes. She explained that the Legislature recognized the need for construction of new electric facilities but were concerned about the location of these facilities so that they would not adversely affect the physical environment and the quality of life for those who live here in Arizona. The Legislature declared when they enacted statutes in 1981, that the purpose of the statutes was to create a single forum before the Commission and the Committee for an expeditious resolution of issues concerning the location of these facilities in our state.

Ms. Alward explained the difference between the Commission's jurisdiction over line siting of facilities, power plants and transmission and the Commission's jurisdiction over the state public service corporations. She explained that the jurisdiction over Public Service Corporations comes directly from the Constitution. Under the monopoly regulation, the Commission's authority is granted over all aspects of the provision of electricity. However, the facilities that are now being built are not all being regulated by the Commission under its constitutional authority. Many of the plants and transition lines that are being constructed today and seek authority from the committee are merchant facilities, which will sell energy into the competitive wholesale market.

Ms. Alward explained that as Arizona customers and the state's public service corporations purchase and compete in a retail as well as a wholesale market regulated by the Federal Energy Commission, the siting of these facilities directly impacts the public interest of the state. She added that their goal is to plan for the future in an attempt to protect our environment.

Senator Smith asked about additional power lines. Ms. Alward explained that as these merchant plants are built, they are going to have to seek a way to get that power to their markets, which may be in Arizona or outside of the state. She stated that one of the primary concerns of the Commission is the power lines that are going to crisscross the state and how that may affect the quality of life. Senator Smith inquired as to the cost of power lines and the possibility of using existing power lines. Ms. Alward explained that the power plants that are being built will need to transmit power to the transmission lines that crisscross the grid that is provided in this part of the country. The problem is that all new facilities will not be located directly on that highway and there will have to be substantial transmission lines built to move that power into the grid.

- The change being requested has to do with new power plants and new transmission lines. When an entity proposes in their ten-year plan to build a new transmission line or a new power plant, they should be required to submit a power flow study as to how that new power plant or new transmission line is going to affect the current transmission system in Arizona. Further, if this information was submitted with the ten-year plan, the committee could then review that information and make the proper recommendations to the Commission based on full and complete information.

(Tape 1, Side B)

In response to inquiry from Senator Smith, Mr. Ayala explained that there have been no new power plant sites in Arizona for many years with the exception of the Griffith Project in Kingman. He added that the items proposed for changes to the line siting law would apply to future power plants and future transmission lines.

In response to clarification by Senator Freestone, Mr. Ayala explained that the Corporation Commission does regulate the electric industry but that it is changing with the advent of deregulation, which means that power plants will no longer be regulated by the commission. In response to Senator Freestone's inquiry as to what this will do for the industry and for the people of Arizona, Mr. Ayala explained that the statute says there is a necessity to protect the environment. He added that every time a power plant or transmission line is added to an existing grid, there is going to be a change to the power flow and to the power stability of that transmission system.

In response to inquiry from Fred Carpenter, Mr. Ayala explained that the committee is not asking to add any new lines or power plants into the line siting statute. They are simply asking that, for those that would currently come under the statute, that they also submit a power facilities study which indicates how the facility would affect the state. He added that if millions of dollars are going to be spent to connect a power plant to a grid, it should be known if that can be done or if a new transmission line would need to be built.

Ms. Smith asked how is adding the regulation to the line siting committee going to resolve the problems in Mojave where there is no jurisdiction. Mr. Ayala explained that the regulations won't help anywhere where WAPA is doing the power plant construction because they fall outside of the jurisdiction and is regulated, owned and operated under the Federal government so their federal rights of way are not in any way under the control or jurisdiction of the state.

Janice Alward addressed the committee and explained that the Federal Energy Commission regulates the merchant plants that are being built here to some extent. She explained that the Commission regulates the siting of those merchant plants and transmission lines because of their police power and their police power is directly reflected in the line and power siting statute to protect the health and welfare of the residents of this state.

Ms. Alward explained that preemption does occur in that instance because they are not permitted to regulate the prices charged and also the Federal government does regulate the transmission because it is part of the interstate transmission grid. When there is an opportunity to exercise their police power to protect the public welfare, the state has a window of opportunity and it is because of that window that the laws fall out and the Commission can go in and regulate the siting of these plants and facilities for the benefit of the citizens. As for the voltage level and the amount of generation in each plant that the siting committee now regulates, that is up to the Legislature to decide the size of the transmission line and the size of the plant that it wishes to regulate in the state subject to that police power.

Representative Hart asked if this transgresses across someone's private property, shouldn't the state protect that individual's quality of life? Ms. Alward explained that the Federal government would acquire a right of way from that private individual in order to build that line. It can also bring some kind of proceeding where if it feels it is necessary to transverse that area, it can bring a proceeding to condemn that land and then get a right of way for that. Once WAPA owns that right of way or land, whether it acquires it through a direct contract or some other means, then no state would have jurisdiction because it is a federally owned piece of property, which is different from preemption.

Ray Williamson, Chief of Economic Research for Utilities Division, Corporate Commission, clarified Senator Freestone's inquiry and explained that the proposal for legislation is more of a request for new information to do what has already been required in H.B. 2663. H.B. 2663 required the Commission and the committee to conduct a bi-annual transmission system review. He explained that the concern is that there is not enough information to do that adequately or appropriately so they are proposing that they get the information they need to properly conduct that study. This is not an attempt to bring more regulatory authority to the committee.

Mr. Williamson explained that his presentation was to discuss the Commission's environmental portfolio rule that is currently being worked. In December of 1996 when the Commission passed its original set of retail electric competition rules, included in that was the Solar Portfolio Standard, which required that up to 1% of the electricity sold in the state would come from solar resources. The portfolio was to be phased in over a number of years and was modified in 1989 to include incentives for economic development, to locate the plants in the state and to locate manufacturing plants for those technologies here in the state.

In 1999, the Solar Portfolio Standard was removed from the retail electric competition rules and at the same time, the Commission started a process to replace it with a new environmental portfolio standard. The feeling was that there should be other technologies included to meet the portfolio requirement. He explained that there has been a series of negotiations on possible settlement on the issues of the Environmental Portfolio Standards.

He stated that the process is not finished. However, when it is done the Commission will consider the possibility of adding an environmental portfolio standard back into its retail electric competition rules.

Representative Horton asked for clarification regarding the economics of developing wind as an alternative energy source in Arizona. Mr. Williamson stated that the Commission felt if they were going to move towards renewable technologies, they should be based in state. He stated that he looked at the studies for wind resources and Arizona has very little that is economically viable. The concept suggested by other people is to import wind energy, geothermal energy and biomass energy from other states to meet those requirements. The original intent of the portfolio standard was to try to focus that effort here in Arizona to use our own natural resources. However, we could import wind from Texas or Colorado there is geo-thermal activity in California and Nevada and biomass can be provided in other state but those technologies are not abundantly available here in Arizona.

In response to inquiry from Representative Horton, Mr. Williamson explained that one of the problems is that we don't have much wind resource but wind is a relatively cost effective resource so if it can be obtained from a state that has a fair amount of wind power available, it is somewhat less expensive than some of the solar technologies that we would be considering. He said the original problem was to avoid overloading the transmission lines bringing in power from out of state. He added that there are a few places in Arizona where wind can be developed.

Nick Svor, Manager of Generation Engineering, Arizona Public Service, provided an overview of what a combined cycle power plant is and how that compares to a simple cycle power plant. He discussed how water is used in the production of electricity and the difference between the water cooled versus the air-cooled technology. He covered the following:

- The combined cycle technology is a combination of natural gas and steam. The gas is ignited and run through a turbine that produces steam, which is used to produce electricity. The combined cycle is the most cost-effective way of producing electricity.
- There are two main uses of water in producing electricity; one is to make the steam and the other is to provide cooling and condensing of that steam. The bulk of the water typically goes to cooling.
- The annual water consumption with the water-cooled system is 3350-acre feet per year. In comparison, the annual water consumption for a dry cooled system is 550-acre feet per year. To reduce the amount of water being used is an advantage but the reason dry cooled has not caught on is because it is significantly more expensive than water-cooled.

- The air cooled condenser takes up about 2 acres of land and is about 100 feet high, four or five feet wide and 150 feet long. Depending on the design, they can be very large. There is also a noise issue because the fans are 25 feet in diameter.

In summary, Mr. Svor stated that they are feasible in the desert and one is currently being installed in Las Vegas. The reason they are not used is because the operating costs are higher for the air-cooling and the initial capital expenditures are very high.

In response to inquiry from Mr. Kreiss, Mr. Svor explained that there is an increase in fuel consumption of one percent and that the water quality and the treatments determine how many times the water is cycled through the plant. He added that they try to obtain fifteen cycles of concentration.

Preston Holland stated that a one percent increase in fuel costs doesn't seem like much. Mr. Svor explained that although it does not seem like much, a one percent increase in fuel costs can amount to \$1.5 million per year which has a significant impact on the profitability and the viability of the plant.

Michael Patterson, Verde Resources, gave a brief summary of his business and background and stated that his company started building windmills in California in 1980. He explained that in Tahachapi, 700 megawatts of electricity is generated and in the State of California, roughly 1500 megawatts is generated which is enough to form wind energy which is enough to light up the city of San Francisco on an annual basis. Mr. Patterson stated that the energy is clean, they import no fuels, leave no residue of any kind and it is probably one of the most friendly land uses of all of the alternative or renewable energies.

He explained that his company could supply 100 percent of the one percent that is proposed in Arizona with wind energy inside the state, which would be about 160 megawatts of wind energy. That is based on power sales figures and would require 160 wind turbines. Those wind turbines would require approximately 20 acres of land and the impact to that 20 acres on the surface would be roughly 1/33 of that 20 acres. Mr. Patterson added that the areas where wind farms are developed are generally the least desirable areas to build anything else.

In response to Representative Horton's inquiry regarding where to find wind in Arizona, Mr. Patterson explained that Tucson Electric has identified five resource areas and testing is being done in Northern Arizona for possible sites. He stated that 3200 acres around the Kingman area is believed to be a viable area and is being considered. He added that the design of wind turbines basically has changed quite a bit in the last twelve years and that there is very little, if any, danger to birds.

(Tape 2, Side A)

Mr. Patterson stated that in the wind energy industry, it is believed that a viable mix of technologies is the most appropriate way to handle all of the generation all over the country and in an area where there is a natural resource that is a clean natural resource, then that area should be developed. The problem is that legislation may sometimes be inappropriate in helping to foster that generation and sometimes it is better left to the private sector to determine where things will be developed.

Representative Horton stated that by focusing on what is best for the state, we should keep in mind what is viable and what is reliable and affordable.

Preston Holland asked how much wind it takes to run one of the turbines. Mr. Patterson explained that it depends on the size of the turbine. He stated that, generation would start at around a seven mile per hour resource. When wind energy regime is measured, an annual average wind speed is referred to and they can go anywhere from twelve miles on up. He discussed capacity factors and explained that they are generated off of annual wind speeds that are site specified and stated that a capacity factor of 36 to 42 percent would be considered a very viable resource.

Jay Moise, Attorney, Moys, Storey Law Firm, responded to inquiry from Representative Hart and explained that he conducted the line siting committee hearing for the Griffith Project that was held in Kingman in September 1998. He explained that testimony was presented with respect to all aspects of the project and that upon completion of the recycling of water through the cooling process, whatever salts and substances that were in the water to begin with become very concentrated. That concentrated brine is then finally disposed into a holding facility or a brine disposal pond. He added that whatever substances were in the water to begin with, will get concentrated. However, those concentrations are not allowed to be discharged back onto the soil or ground water so they are contained in a regulated monitored holding facility.

Follow Up From Previous Meeting

Melodie Jones, Research Analyst, addressed inquiries posed by the Chairman at the last meeting regarding taxes paid in general by Arizona utilities. She provided excerpts from a report provided to another committee on deregulation in 1997.

Ms. Jones explained that in 1997, electric companies in the State of Arizona paid over 40 million in corporate income tax, around 250 million dollars in transaction privilege taxes and 6.7 million dollars in Arizona use taxes. Property tax was significant at the time this study was done because it represents about 11 percent of the property tax burden in this state.

Steve Ross, Manager of Assured Water, Arizona Corporate Commission, response to inquiry from Kreiss, and he explained that there is a difference in the program as it applies in the active management areas (AMA) as opposed to subdivisions that occur outside of the AMA's. In AMA's any new subdivision that is proposed must demonstrate that they have 100 years worth of water that is physically, legally and continuously available. Newer rules that came into effect in 1995 states that the water has to be a renewable water supply. Outside of AMA's the program is different and the 1973 statute that requires disclosure of the water supply situation for new subdivisions but does not prevent approval of those subdivisions if there is not 100 years worth of water.

In response to inquiry from Kreiss, Mr. Ross explained that the assurance supply program does not apply to a power plant that would be using ground water. The standard that is used for assured water supply is that any ground water that is pumped for these new subdivisions needs to be available above a maximum of 1000 feet below land surface over 100 years. What that means is that they project out all of the current uses of ground water in a basin, look at the decline rate and then add that new use to it. At the end of the 100-year period, if the water is still above 1,000 feet below land surface, then it qualifies for the assurance water supply. He explained that the use of pumped ground water does require replenishment obligation but that does not apply to industrial use, such as a power plant. He added that it couldn't go any lower than 1000 feet during the 100 years of usage.

In response to inquiry from Representative Hart, Mr. Ross explained that the main standard applies to the well impact rules, which is strictly for new wells that are being drilled. They look at a draw down level of ten feet over a five-year period of time. If the draw down exceeds ten feet over five years, then any wells that are within the projected cone of depression must give approval before the permit could be issued.

Mr. Kreiss asked if the hydrological studies take "recharge" into account. Mr. Ross explained that their modeling efforts did take into account recharge for the various locations. He added that their model is based on the best known information and they constantly take in new hydrological information to keep it current.

Committee Business

In response to inquiry from Preston Holland, Representative Hart explained that the purpose of this committee is to establish standards to be administered statewide to preserve our quality of life, and to help protect our air and water. Also, set a taxing structure that is fair and equitable to everyone involved.

Representative Horton suggested that committee members obtain a copy of the committee guidelines.

Preston Holland explained that his concern is with respect to these power plants seeking tax relief.

(Tape 2, Side B)

Representative Hart suggested that if anyone has information regarding other states that would be beneficial to this committee, to get that information to Melody. He clarified the retroactive issue and explained that it would not mean paying back taxes rather an established tax that would guarantee a level playing field. He added that his intention was to put forth his best effort to make this fair to everyone involved.

Representative Horton added that the fairness issue is not limited to the taxing structure.

Without objection, the meeting adjourned at 11:20 a.m.


Robyne Richards, Committee Secretary

(Original minutes, attachments and tapes are on file in the Chief Clerk's Office)

**Minutes from the December 7, 1999 meeting were
not transcribed at the printing of this report.
Copies of the minutes should be available on the
Arizona Legislature Web Site –
www.azleg.state.az.us**

Appendix C:

Information submitted to the Committee by
Verde Resources, Lone Pine, California

VERDE RESOURCES

Rt. 1 Box 5 Swansea, Lane Plm, CA 93545
(700) 876-4154

Mr. Joe Hart
Speaker Pro Tempore
ARIZONA HOUSE OF REPRESENTATIVES
1700 West Washington
Phoenix, AZ 85007-2848

December 8, 1999

Subject: Arizona's **Retail Electric Competition Rules** and the formulation of its **Renewables Portfolio Standard (RPS)**.

Dear Mr. Hart:

Verde Resource's (Verde) goal, for this correspondence, is two fold:

First, to point out the critical need for Arizona's legislative and regulatory bodies to quantify and establish a range of social, environmental and economical costs associated with each method of electricity generation. The entire range of these true costs, which Verde identifies as "**Actual Complex Energy Costs (ACEC's)**", need to be clearly defined and evaluated, so that an "**Equal Condition Marketplace (ECM)**" can be created between the electrical generation technologies.

Second, to provide written testimony to the Gas Fired Generation Study Committee, for which you are Chairman.

This correspondence is not intended as an exhaustive treatise on any source of electrical generation, utility planning, or generation related externalities, etc.

Verde has been closely following various testimonies taken by the Arizona Corporations Commission in recent months. It appears that while there are still substantial differences of opinion, the State, the Utilities (both Electric Service Providers and Utility Distribution Companies) and a variety of other stakeholders recognize that some fraction of the electricity consumed in Arizona will come from some Renewable Energy Source.

In testimony, the Arizona Public Service Co. expressed the concern that a Renewable Energy "mandate" would "only serve to obscure the true costs" of those resources. Additionally they stated that "If solar (read renewable)

energy can meet or beat the market cost of electricity, Energy Providers will be buying every Kw/hr they can with or without the proposed Portfolio Standard."

Verde maintains that the "true (ACEC) costs" of electricity derived from conventional electrical generation are already obscure, and that by being so, create an un-level playing field on which Renewable Technologies must compete.

Naturally, the Utilities are quite satisfied with the status quo. "Business as Usual" is their most profitable scenario. The forces of Deregulation, Competition and Transmission "Wheeling" may induce a death spiral for some Utilities who will be threatened with the loss of some of their largest customers. Loss of customers would naturally raise prices for other customers. These eventualities are causing many of the Utilities to entrench with what are incorrectly perceived to be their cheapest sources of generating fuels. Today these conventional fuel sources (coal, oil, natural gas, uranium, and others) are recognized as the most problematical, and in some cases, the filthiest, and most consumptive we have.

GENERAL DISCUSSION

Externalities should be a component of ACEC's

Scientists and economists have been, for some time, measuring levels of exposure and effects, and evaluating the impacts ("externalities") attributed to the various electrical power generation technologies.

In their July, 1998 paper, "Towards a Quaker Approach to Energy", authors Karen Street and Peter Trier offer their definition of the term "**Externalities**":

"Externalities are costs resulting from environmental degradation, death and suffering, and costs not included in the customers utility bill. Costs may be paid for and (or) underwritten by increased taxes, health insurance and other personal expenses, or not paid for at all. ...Externalities are a cost or benefit imposed on one person or group of people by another without corresponding compensation."

In the Arizona Corporation Commission's hearings this year, the Direct Testimony (page 20) of Mr. Ray Williamson (Acting Director of the ACC's Utilities Division) listed 17 "electricity production externalities", and 9 "human and biological factors that should be considered in relation to electrical power plants."

It is certain "externalities" include:

- Human health effects in the form of morbidity and mortality risks.
- Agricultural effects in the form of reduced crop yields.
- Materials damage in the form of stone and metal corrosion and surface soiling.
- Ecosystem degradation and destruction.
- Misuse of certain water resources including the wide variety of costs, and environmental impacts associated with over-consumption or poor stewardship.
- Fuel Subsidies.
- Others.

The Arizona Capitol buildings have been undergoing a recent restoration. One wonders how much of the exterior corrosion, degradation and soiling could be attributed to airborne pollutants from electrical generation facilities?

General Environmental Impacts

In an article entitled "The Heat is On", Popular Science Magazine, August 1999, by Douglas Gantenbien, the statement is made; ***"Man is playing a wild card game with nature."***

In Ray Williamson's 7-30-99 testimony he states that *the burning of fossil fuels is harming Arizona's environment* and causing secondary restrictions on growth, limits on auto emissions, and having impacts on the daily business operations of a wide variety of companies.

In 1987 the UN Environmental Program and the World Meteorological Organization created the Intergovernmental Panel on Climate Change (IPCC). The IPCC has stated that in order to stabilize the earth's climate, (they) estimate that carbon-dioxide (greenhouse gas) levels will need to be reduced by at least 50% below 1990 levels by 2050. In the IPCC's 1992 supplement to its Scientific Assessment of Climate Change, they state that "emissions resulting from human activities are substantially increasing the atmospheric concentrations of greenhouse gasses."

Others have stated that "if we choose not to act and unprecedented climate change occurs, we could incur catastrophic ecological losses. If we act to prevent global warming and later discover the impact is relatively benign our costs will be limited to some unnecessary emission reduction expenses."

During the 1997 Kyoto Conference on Climate Change it was found that the amount of carbon dioxide pumped into the atmosphere annually, by coal

burning plants, vehicles and myriad other human activities will double by around 2050.

Tree-ring samples are considered an excellent indicator of weather-related growth changes. M. Mann and R. Bradley of Massachusetts and Malcolm Hughes of Arizona, have studied tree ring samples taken world wide. They found "there haven't been any variations in the past 1,000 years like we've seen in the past 100!"

Fossil Fuels: Facts and Externalities Characteristics

Aside from the transportation industry, America's \$200 Billion electricity industry consumes more fossil fuels and spews more harmful pollutants into our environment than any other industry.

In 1997 fossil fuels accounted for 46.97% of Arizona's electrical generation. 43.74% was from coal, 3.15% was from natural gas and .08% was from petroleum.

The EPA has identified 67 air toxins or pollutants, associated with fossil fuel electricity generation, which are known to cause birth defects or reproductive effects.

Conventional power plants are known to be major contributors to the problem of Global Warming, through the release of Greenhouse Gasses and Airborne Particulate Pollutants (U.S. EPA "PM-10").

While electrical generation from conventional fuels may be considered to be an enemy of global ecology, *the industrialized nations owe their high standard of living to those sources*. Unfortunately, for us all; we are now aware of our finite supply of fossil fuels, minerals, (often) water, etc., as well as myriad harmful "externalities" that come with conventional electrical generation.

Carbon-dioxide is considered the worst of the greenhouse gasses that contribute to global warming. Under the terms of an international treaty known as the Framework Convention on Climate Change (FCCC) the U.S. would be obligated to reduce anthropogenic (man-made) emissions of carbon-dioxide to 1990 levels by the end of the decade. The utilities would have to implement measures to substantially reduce carbon-dioxide emissions if the U.S. was to meet it's treaty obligations. The U.S. Senate ratified the treaty in 1992.

EPA statistics from June, 1999 indicate that in 1997 Arizona power plants dumped 48,201,000 tons of Carbon-dioxide into the atmosphere.

Coal: Facts and Externalities

Coal is the most carbon intensive of the fossil fuels. It releases roughly 29% more carbon per unit of energy than oil and 80% more than natural gas.

The primary pollutants from burning coal are "particulates" (particulate matter usually measured under 10 microns and labeled as PM-10) and sulfur-dioxide. Worldwide, in urban areas, these pollutants cause an estimated 500,000 premature deaths and millions of new respiratory illnesses each year. One 1983 study found that doubling the coal use in the Ohio Valley would shorten the lives of 45,000 people over a 5 year period, even if \$3.2 Billion was spent on pollution control. 50,000 Americans die annually from coal pollution. As the Quaker study put it:

"If the effect on the U.S. of coal use remains constant, some 3 million Americans will die over the next century, and the cost to agriculture will be enormous. This is the cost to Americans only, from U.S. coal use only. Hastening coals decline is imperative if climate change is to be slowed in the next century."

A recent finding of fact in a Minnesota Administrative Law Court stated that:

"Small particle emissions from coal-fired generating facilities present a very grave threat to human health. Inhalation of fine particles, especially fine sulfate particles, increases the risk of mortality (shortening by several years) and morbidity even in areas in attainment with National Ambient Air Quality Standards (NAAQS) for particulate and sulfur-dioxide emissions."

One witness, in that same Minnesota Court, estimated that 1 ton of PM-10 emitted from a Minnesota coal-fired plant increases the states death rate by 0.0016 persons per year. *Verde has not determined what Arizona's Particulate Matter emissions amount to.*

A 1992 report from Ohio stated that when deregulation began, coal generated electric increased 15.8% annually. Utilities used 87% of U.S. Coal in 1997.

Electric Utilities are responsible for the largest share of carbon-dioxide emissions due to their reliance on carbon intensive coal for their primary energy. Carbon-dioxide emissions increased an average of 1.4% annually between 1990 and 1997, primarily because of a strong U.S. economy

coupled with relatively low energy prices. It has been estimated that the carbon-dioxide dumped by coal burning plants and vehicles will have doubled by 2050.

On November 3, 1999 the U.S. Attorney General filed suit against 11 Electric Utility Companies for air pollution violations. In an accompanying press release, the EPA cited "drifting coal plant pollutants" as causing a 118% increase in asthma related deaths among children between 1980 and 1993.

Natural Gas: Facts and Externalities (including process steam/water demand)

Natural Gas produces half as much carbon-dioxide as coal. Between 1990 and 1997 emissions from natural gas burned at electric utilities rose by 6%.

In 1992 the United States was the world's #2 producer of natural gas. It was estimated that we would have roughly 60 years worth of gas resources at the 1992 extraction rate.

Electric Utilities natural gas use increased significantly in 1994 and 1995 as prices and supply had stabilized following a series of cold winters and a period of industry restructuring. In 1996, natural gas prices paid by Utilities increased 33%, making gas based electricity generation less economical. Utility consumption declined 15% that year. In 1997 Utility consumption of natural gas rose 9%. The cause of the increase was primarily due to the decline in hydro-power and nuclear generation capacity in California and New York.

Natural gas makes a good bridge fuel; a temporary buffer. It is not oil's equal, but can help cushion us against oil shocks. Use of natural gas will help slow global warming by replacing electrical generation from coal and oil.

In the 10-19-99 brief submitted by The City of Tucson, to the Corporation Commissions hearings, the City stated: "natural gas costs are currently low, but being a commodity, it's cost can fluctuate quickly and dramatically." Unfortunately, deregulation will introduce the widespread use of natural gas electric power at the expense of even safer sources.

Arizona currently has 11 new natural gas generating plants in planning and construction stages, for a total of 10,000 Megawatts of new electrical capacity.

In terms of pollution, natural gas is by far the cleanest fuel, however, one externality to its use that should be of primary concern is water consumption.

Natural Gas Plants and Water Consumption

Verde understands that one 500 Mw gas plant proposed near Kingman will use approximately 9,000 acre-feet of water per year. This is, coincidentally, roughly the same demand as the city itself. This equates to a demand for 18 acre-feet of water annually for each Mw of installed capacity.

Ben Franklin advised us "when the well's dry, we know the worth of water". Mark Twain later advised "whiskey's for drinkin', and water's for fightin' over." In Ray Williamson's 7-30-99 testimony, he stated "we live in a desert... ..part of our limited valuable water supply is being evaporated away because our utilities choose certain technologies."

In a recent conversation with California's SCE Co., an SCE Transmission specialist noted that in the Southern California Desert, there is a rush to purchase properties where transmission lines, gas lines and ground water are found in close proximity.

Over-pumping of ground water is common place in parts of the western United States and Mexico. In addition to Beijing, New Delhi and other places, Phoenix, Arizona is listed as one of the places in the world where there is competition for water. Water-short cities and farmers have traditionally been laying claim to the same limited supply. *Now Arizona can add natural gas electrical generation plants as competitors for it's precious water.* We know groundwater can be pumped faster than the natural recharge. Fossil water aquifers can hold water that is hundreds or thousands of years old, and those aquifers may receive little to no replenishment from rainfall today.

Verde is not knowledgeable about the dollar value of water in Arizona, however we do have experience in Southern California, and most particularly in Eastern California's Owens Valley.

The Owens Valley is considered the birth-place of water wars between Cities and Utilities on one side and Farmers and Ranchers on the other. The City of Los Angeles, Department of Water and Power (LADWP, a Municipal Utility) gathers the water and concurrently generates electricity in the Owens Valley. One acre-foot of water is sold in Los Angeles for roughly \$450, and at that price, is considered a bargain.

On the other end of the spectrum, The City of Santa Barbara, during a drought period nearly 10 years ago, was considering water, priced at \$3,000 per acre foot, not out of the question.

L.A.'s water gathering and power generation activities in the Owens Valley caused the desiccation of the 110 sq. mile Owens Lake. The social,

environmental and economical impacts are numerous and enormous. As one impact-externality, LADWP has recently agreed to a very large environmental reclamation project on the dry bed of the former lake. LADWP will probably spend \$150 to \$200 Million on mitigation measures to control PM-10 particulate emissions from the dry lake-bed. In addition to money for infrastructures, they may be applying 40,000 acre-feet, or more, of water per year to the dry lake's surface...in perpetuity! LADWP has been funding a very extensive, lengthy and expensive groundwater hydrological study, in the area, to determine what impacts would occur with the mining of that additional volume of water.

Hypothetically, if 1 Mw of natural gas electrical capacity requires the consumption of 18 acre-feet of water annually, then it may be estimated that 10,000 Mw of planned natural gas capacity in Arizona could result in the consumption of 180,000 acre feet of water annually. Today, that is the amount necessary for the needs of 20 cities the size of Kingman. That same water, sold at a bargain in Los Angeles would be worth roughly \$81 Million, annually.

In addition, there may be other social, economical and environmental externalities, associated with mining or gathering that amount of water, which should be evaluated. Water table draw-downs can cause species alteration or death of local plant communities. Wetlands habitats can be damaged due to reduced seep or spring flows. The list goes on.

Verde does not know if hydrological studies have been performed, or required in relation to the planned natural gas fired generation plants in Arizona.

Petroleum-Oil consumption rose 14% in 1997.

Nuclear Power: Facts and Externalities

Nuclear Power accounted for 37.19% of the electricity generated in Arizona in 1997. It was heralded as an environmentally safe source of electricity between the mid-1950's and early 1970's. Today, no other energy source has received as much governmental support or stirred so much controversy.

According to the World Watch Institute, the use of Nuclear power grew 700% in the 1970's, 140% in the 1980's and less than 5% in the 1990's. In 1997 several U.S. Nuclear plants were shut down and 2 were closed permanently. This loss of capacity led to an increase in the burning of fossil fuels, increasing the release of pollutants into the atmosphere.

The average reactor service life is less than 17 years. In 1992 there had been no new Nuclear Power Plants ordered in 14 years. It is estimated that

nuclear expansion will nearly stop in the next few years. Wall Street analysts and the Washington International Energy Group predict that as many as 1/3 of U.S. and Canadian reactors are vulnerable to shut down in the next 5 years. The main reason is cost: nuclear energy cannot compete in increasingly competitive power markets.

As of 1992, Civilian Nuclear Power has produced roughly 95% of the radioactivity, in the world, coming from nuclear waste. No nation has developed a proven method of containing radioactive waste permanently. In 1975 the U.S. planned on a high-level waste site at Yucca Mt., Nevada, operating by 1985. By 1992 the goal had been pushed to 2010. Officials and citizens in neighboring Inyo County, California have expressed a number of concerns, including the risk of ground water contamination from the storage site.

In the interim, in the U.S., spent fuel rods are stored at their respective power plants. It has been estimated that thousands of loads of spent fuel rods will require transportation across the country to Yucca Mt., when it opens.

The Quakers point out that Americans dispose of fuel rods, reasoning that uranium prices are currently cheap and there is well over a 100 year supply. Europeans reprocess the majority of their fuel rods, a practice that worries U.S. officials concerned about terrorist theft. Additionally, reprocessing fuel rods requires the consumption of large amounts of fossil fuel generated electricity, again, dumping tons of pollutants into the atmosphere.

In 1988 the World Commission on Environment and Development published the book "Our Common Future." It reported that "available analysis indicate that although the risk of a radioactive release is small, it is by no means negligible for reactor operations at the present time. ...the problem of nuclear waste disposal remains unsolved. The generation of nuclear power is only justifiable if there are solved solutions to the presently unsolved problems to which it gives rise."

Hydroelectric: Facts and Externalities

Hydroelectric generation accounted for 15.73% of Arizona's generation in 1997.

No other energy source provides as many immediate positive externalities as does hydro. In addition to providing reliable electricity, hydroelectric dams provide water for consumption, irrigation, flood control and navigation. They also provide numerous recreational opportunities.

Hydroelectric generation also contributes numerous adverse externalities and they are quite complex. One study cited 21 negative externalities in the biological arena alone. Sedimentation behind the dams affects both storage volume and facility life. Down-stream damage to riparian environments directly limits hydro-plant discharge, placing an environmental ceiling on plant electrical capacity. Glen Canyon's electrical generation capacity has been de-rated from over 1300 Mw to between 500 and 800 Mw because of that fact.

The controversial Arizonan, Interior Secretary Bruce Babbitt, is one of many who are actively campaigning for the decommissioning and demolition of numerous hydroelectric dams in the U.S..

There is a high probability that no new large hydroelectric capacity will be constructed in the Desert Southwest. The life span of older facilities is directly linked to the amount of sedimentation occurring. It has been re-calculated that the 36 year old Glen Canyon power plant will have its intake valves covered by sedimentation in 150 years.

Photovoltaic (PV) generation: Facts and Externalities

Photovoltaic generation is proposed for 35% of 1% of Arizona's generating capacity (RPS).

In testimony to the Corporations Commission, the Arizona Clean Industries Alliance (ACIA) stated:

"If Glen Canyon Dam turbines ran at full capacity (today between 500 and 800MW) covering an area the size of Lake Powell with photovoltaics (solar electricity) would generate 5 times more power even assuming a 20% capacity factor."

Lake Powell covers 252 sq. miles or 161,000 acres. Given those assumptions, respective calculations reveal that the water stored in Lake Powell generates 1Mw for every 201.25 acres inundated, while it would only take 40.25 entirely covered acres to generate 1Mw of photovoltaic electricity.

The City of Phoenix encompasses 476.7 square miles. If 47% of Phoenix's land area was made up of back yards, playgrounds, parks and greenbelts, roads and exposed parking areas, all of the remaining 53% (252 square miles of rooftops, windows, parking structures and other surfaces) would need to be clad with photovoltaic panels, to equal "5 times" the generating capacity of Glen Canyon Dam.

With some probable exceptions, PV generation will be confined to rooftops, etc. Given the environmental problems of the future, completely covering

large tracts of agricultural or ranch lands may not be practical. Some significant tracts of open land will naturally be developed into new housing, commercial and industrial buildings. Both retrofitted and newly constructed buildings are ideally suited for the deployment of PV panels.

Wind Power: Facts and Externalities

Wind Power is now the world's fastest growing energy source. Since 1996 it has experienced an annual growth rate of 20%.

Wind power capacity is proposed to be 5% of 1% of Arizona's total (all sources) generating capacity. In their 7-30-99 testimony, Corporations Commission Staff estimated that the total RPS capacity from RT's would reach 299 Megawatts by 2010. Only 15 Megawatts of the total RPS are calculated to come from wind. *Given those calculations, Verde can supply Arizona's total RPS capacity for wind power on less than 200 acres. This is a gross underestimation of the wind energy resource in Arizona.*

In fact, with today's wind power technology, Wind Energy could easily supply all of Arizona's proposed RPS before 2003. To do so would require the land use of approximately 3,000 acres (4.7 sq. miles). Actually, of that land area, less than 10% would need to be developed with wind turbines and access roads. Land use of the unaffected 90% would remain productive for agriculture, ranch or open-space purposes.

In addition to a minor amount of land disruption, Wind power has 3 other negative externalities: visual impacts, avian mortalities and noise pollution. Wind Turbine Generators (WTG) manufactured in the early 1980's operated with high revolutions per minute. Today's WTG's operate at a much lower rpm, and consequently the impact to bird populations has been substantially reduced. Due to an out of court settlement with a large wind power developer in California, the National Audubon Society has re-endorsed wind power. Agreement was reached with a land exchange, where bird populations were not at issue, and the wind resource was comparable. Most modern WTG's cannot be heard within a short distance of the installation. Visually, beauty will continue to be in the eye of the beholder.

In their 7-30-99 testimony, APS stated "the stranded cost risk (of investment in generation assets that cannot compete in an unregulated marketplace) will make affordable financing difficult if not impossible." Generally *this is not the case.* Today, well thought-out wind power projects are being financed around the world.

APS also stated "during 1998 only approximately 120Mw of solar capacity was installed world wide." *This is somewhat misleading.* Many do not differentiate between "solar" and "renewable" technology. For years Wind

was considered a solar technology, as the primary force is derived from the sun. Globally, between 1994 and 1995, over 1,200Mw of Wind capacity was installed. Today Wind capacity is well over 5,000 Mw. *The most accurate answer is: today there is well over 5,120 Mw of "solar capacity" installed world wide.*

By offsetting air pollution, between 1981 and 1991, wind power in California saved an estimated 205 lives. (Brookhaven National Laboratory)

U.S. Secretary of Energy, Bill Richardson has announced plans that would see 5% of the U.S. needs met by wind energy by 2020 and 5% of the U.S. Governments needs by 2010. Currently, roughly .001 of U.S. electricity is wind generated.

ELECTRICAL CAPACITY DEMAND FOR THE FUTURE

The Global Population reached 6 Billion on October 12, 1999.

U.S. Energy Use is increasing at just over 1% annually. Under business as usual assumptions, energy use will increase roughly 75% by 2050, and fossil fuel use will increase even faster because of the retirement of nuclear power plants.

Arizona is encouraging industrial expansion with the development of it's Renewables Portfolio Standard. It expects RT manufacturers to relocate and take advantage of what Arizona has to offer. It expects an increase in the labor force, which will impact, housing, transportation and utility capacity, etc. . Additionally, Arizona is one of our Desert Southwest States whose population is swelling from a steady influx of "environmental, political and economic refugees."

Testimony given by the Renewable Energy Leadership Group stated that "assuming that Arizona's growth in demand for electricity is...about 2% annually, from now through 2005, the demand for electricity in the state will still increase almost 15% by 2005." *Verde agrees that a portfolio standard that requires only 1% by 2005 may be a "too little, too late" standard.*

U.S. Energy Secretary Bill Richardson has announced plans for a Federal Renewable Portfolio Standard. Titled the "Comprehensive Electricity Competition Act" (CECA), the legislation will require distribution utilities retail electric sales to include 7.5% from RT's by 2015. *If passed, the Federal CECA requirements will substantially surpass Arizona's portfolio standard.*

Tucson Electric Power Co. (TEP) 8-30-99 testimony stated "there should not be a percentage quota required of each available renewable option, but

instead allow the market to determine the appropriate split between Renewable Technologies." *Verde stringently points out that the actual physical character of Arizona's Renewable Resources, in quality, quantity and location, should ultimately determine the percentage of capacity each RT adds to Arizona's electrical generation technology mix.*

SUBSIDIES SHOULD BE A COMPONENT OF ACEC'S

RT's, most notably Wind projects, are often scorned for having benefited from the late Federal (Solar) Energy Tax Credits.

Conventional Utilities have enjoyed subsidy for decades, even though they claim to withstand the "market test" over emerging renewables.

In a 1993 report on Federal Energy Subsidies, by Douglas N. Koplow it was reported that by 1989:

- ⇒ Fossil Fuels (coal, oil, natural gas) had received \$21 Billion in subsidies. (Since 1984 more than \$1.5 Billion has been spent on the Clean Coal Technical Program (CCTP), which provided up to 50% matching funds.
- ⇒ Nuclear had received \$11 Billion in subsidies. (Note the 1992 Energy Policy Act.)
- ⇒ Energy Efficiency or Energy Saving ("Negawatts") products had received \$1 Billion in subsidies.
- ⇒ Renewable Technologies had received \$1 Billion in subsidies.
- ⇒ Hydro-power Generation had received \$600 Million in subsidies.

Verde is not aware what the total subsidies, by technology, are today. It is, however, safe to assume that the subsidies do continue proportionately.

SOCIETY'S "WILLINGNESS TO PAY"

There is no free lunch. All sources of electricity have associated externalities.

As stated in testimony by the Renewable Energy Leadership Group:
"...unless the (Arizona) Commission adopts the Renewables Portfolio Standard as a formal part of the State's Retail Electric Competition Rules, Energy Service Providers have no motivation to take steps that will cause a cleaner environment... ."

Where public opinion polls have been held, an overwhelming majority of citizens (ie: 82% in Minnesota) believe that their respective states should make at least some change to reduce the potential for global warming. It is

believed that the adoption of externality values for greenhouse gas emissions is an important step that should be taken to reduce the risk of climate change.

In their 7-30-99 testimony, APS stated that "environmental benefits (of renewables) come with higher cost than is sustainable under current market conditions." This statement is a demonstration of how many, in the energy sector, discount the long-term social, political, environmental and economical consequences of "business as usual" energy investment, and instead, choose to focus on short-term returns.

In a July 1999 Review of Utility Market Research, titled WILLINGNESS TO PAY FOR ELECTRICITY FROM RENEWABLE RESOURCES, by Barbara C Farhar, Ph.D., it was found that:

"Widespread preference for renewables has been found in national polls for the past 20 years. Majorities of 52% to 95% of residential customers say they are willing to pay at least a modest amount more per month on their electric bills for power from Renewable sources. Deliberative polls show that willingness to pay increases when customers are educated about utility energy options."

Apparently Arizona has earmarked some \$300 Million for Utility customer education. *Verde recommends utilizing a large portion of those funds to educate electricity consumers about the "true (ACEC) costs" of electric utility, from both conventional and renewable sources, including all the costs of the various externalities and how those true costs should impact the Renewables Portfolio Standard.*

Examples

Today, when Minnesota's energy commission is evaluating and selecting resource options, the Utilities are required to assign the following externality values for pollutants emitted from their electric power plants:

- Carbon dioxide emissions \$25 per ton

If Arizona valued carbon dioxide emissions at \$25 per ton, it's 1997 releases would be worth \$1,205,025,000, or cause that much damage.

- Methane emissions \$550 per ton
- PM-10 emissions \$648/ton (morbidity)
\$7,200/ton (mortality)

(These PM-10 values were an underestimation, and did not reflect costs associated with adverse effects on the "natural environment.")

- Mercury emissions \$50 Million per ton

(In a 7-31-95 EPA correspondence it was noted that "utilities are likely to become the largest unregulated source of Mercury emissions in the U.S..")

The European Community has developed a set of values for externalities they have dubbed "ExternE." The values are expressed as additions to the cost of a kilowatt of electricity from the various generating resources. The Europeans have a somewhat different view of certain externalities, but we can use their ideas as a "rough draft" as follows:

<u>Generating Source and Externalities</u>	<u>European ExternE adder/Kwhr</u>
<u>Wind Power:</u> construction, noise, visibility, accidents. (considered for <i>all sources</i> of energy.) <i>(Verde would add potential bird problems.)</i>	less than \$0.003
<u>Photovoltaic Power:</u> fabrication costs including energy, and heavy metals added to the environment. <i>(Verde would add land use/large area impacts such as the Lake Powell/Glen Canyon discussion, above.)</i>	\$0.004
<u>Nuclear Power:</u> mining, accident risk, radiation release to atmosphere and water, transportation costs and waste disposal. <i>(Verde notes that Europeans handle waste disposal and storage differently than the U.S.. Also, we seem to be more concerned about terrorist theft. Some European countries are openly more pro-nuclear than are Americans.)</i>	\$0.005
<u>Hydro-power:</u> from alterations to river flow rates, water bodies and dams geomorphology, agriculture, ecosystems and wildlife. Note: construction and population displacement costs were ignored. <i>(Verde would add and subtract for a long list of negative and positive externalities considered in our Desert Southwest.)</i>	\$0.007
<u>Natural Gas fueled Generation:</u> for emissions of air pollutants. <i>(Verde would add for water externalities.)</i>	\$0.01-\$0.04
<u>Oil-fired Generation:</u> for emissions of air pollutants.	\$0.03-\$0.12

Coal-fired Generation: for emissions of air pollutants. \$0.02-\$0.17

Example #1: Under the "business as usual" standard, if 1 Kwhr of coal generated electricity normally costs \$0.05/Kwhr, the ExternE value would be added, and the "ACEC (actual complex energy cost)" would be between \$0.07 and \$0.22/Kwhr.

Example #2: If 1 Kwhr of wind generated electricity normally costs \$0.08/Kwhr, the ExternE value would be added, and the "ACEC" would be \$0.083/Kwhr.

Example #3: If 1 Kwhr of photovoltaic electricity normally costs \$0.26/Kwhr, the ExternE value would be added, and the "ACEC" would be \$0.264/Kwhr.

The calculations listed above demonstrate that when externalities costs are added to "business as usual" marketplace prices, the resultant "ACEC" becomes representative of the more level playing field Renewables need.

ExternE did not examine the cost of research and development, the costs of roads or airports, or the cost of war and the preparations for war that are related to energy issues.

CONCLUSIONS

Electric Utility customers are rapidly becoming aware of the numerous negative externalities associated with conventional electrical generation including: Global Warming, human/plant/animal mortalities and materials damages.

Given the enormity of the cumulative impact of these externalities, it is likely that there will be unprecedented re-structuring of the industry within the immediately foreseeable future.

Demand for new electrical capacity in Arizona is forecasted at a growth rate of between 1.5% to 2% per year.

If adopted as presently suggested, new capacity from Arizona's Renewable Portfolio Standard will fall substantially short of matching the State's forecasted new electrical capacity demand growth rate.

If new capacity from RT's cannot match the States growth requirements, Arizona will be forced into accepting new Fossil Fuel/electrical capacity.

New Fossil Fuel electrical capacity increases will also increase state and world wide pollution levels.

There is a very high probability that no new Nuclear electrical capacity will be constructed in the foreseeable future. It is also probable that present Nuclear capacity will diminish due to plant closings and decommissioning.

There is a very high probability that no new Hydroelectric capacity will be constructed in the foreseeable future. It is also probable that present Hydroelectric capacity will diminish due to numerous riparian/biological externalities.

Electric Utility Customers are willing to pay more for electricity from RT's with far fewer externalities than Conventional, Nuclear and Hydroelectric Power Plants.

There is an enormous difference in negative externalities impact between Fossil Fuel/Nuclear/Hydroelectric generators and the Renewable Technologies.

Kilowatt-hours (Kwhr) produced from RT's could be considered "Negawatt-hours (Nwhr)", because in addition to marketing electricity, RT's are marketing a significant lack of negative externalities.

RECOMMENDATIONS

Arizona has earmarked some \$300 Million for Utility customer education. It should use a portion of funds to educate electricity consumers about the "true (ACEC) costs" of electric utility, from both conventional and renewable sources, including all the costs of the various externalities and how those costs should impact the Renewables Portfolio Standard.

Additionally, Arizona should fund a statewide Renewable Resources Assessment Program (RRAP) to determine, as closely as possible, what the exploitable resource base is. This assessment may include hydrological studies as a prerequisite to permitting steam/electrical generating facilities.

Note: In regards to the Renewable Portfolio Standard, if the RT is owned by an Energy Service Provider, or Utility Distribution Company, the Corporations Commission should determine what factors must be applied to arrive at the appropriate Kwhr cost that will be passed on to the Utilities customers. Verde chooses not to comment on that eventuality.

If the RT is a "wholesaler" of electricity, selling power to ESP's or UDC's, two basic questions remain:

- Q) How much new capacity should come from RT's?
- A) **The actual physical character of Arizona's Renewable Resources should be the sole determiner of the RT capacity in the RPS.**
- Q) What should RT's be paid per Kwhr of electricity generated?
- A) **RPS mandated "Actual Complex Energy Cost's (ACEC) should be the basis for negotiations between RT's, ESP's and UDC's. This is similar to the "Avoided Cost" (concept used in negotiations between Small (primarily Wind)Power Producers and Public Utility Co.'s in California in the early 1980's) with the additional factoring of subsidies, externalities, etc.. It may be an "Avoided Externalities" issue, and/or a Negawatt concept that could be factored in. Arizona should use what ever is required to arrive at an "Equal Condition Marketplace (ECM)" between RT's and the Utilities.**

The Term Length for RT's Negotiated Power Purchase Contracts will significantly affect the financial viability of any RT project. The State's Retail Electric Competition Rules may need to stipulate a Minimum Term of Contract length to assist RT's in their financial planning, and to motivate ESP's into helping clean up the environment.

The principals of Verde Resources have a cumulative experience of over 60 years in the Renewable Energy Industry. We hope this communication helps Arizona move into a new era in its utility planning, and we hope that the resultant Retail Electric Competition Rules and the Renewables Portfolio Standard make it possible for Verde to become a valuable and vital part of that new area.

Thank you,

Sincerely,



Michael A. Patterson
VERDE RESOURCES

Appendix D:

**Information submitted to the Committee by the
Arizona Corporation Commission**

CARL J. KUNASEK
CHAIRMAN
JIM IRVIN
COMMISSIONER
WILLIAM A. MUNDELL
COMMISSIONER



BRIAN C. McNEIL
EXECUTIVE SECRETARY

ARIZONA CORPORATION COMMISSION

December 14, 1999

The Honorable Joe Hart
Chair, Joint Legislative Study Committee on Gas-Fired Electrical Generating Plants
The Arizona House of Representatives
1800 West Washington
Phoenix, Arizona 85007

Dear Representative Hart:

At this time, the Arizona Corporation Commission (ACC) is not recommending any legislative changes to the Committee.

As you know, the 1998 legislation requires electric suppliers to submit 10-year plans on transmission lines and the ACC to compile a report every two years on the adequacy and reliability of the transmission facilities to meet the state's present and future energy needs.

In the wake of retail electric competition, the ACC is aware of the possibility of 11 new power generation plants across the state. Any new power plant, once connected to the Southwestern Grid, directly affects the operation of the state's transmission system.

At the November 9 committee hearing, ACC staff testified that the Commission apparently does not have the statutory authority to ask for information necessary to analyze the state's transmission system.

However, after careful consideration, the ACC decided it would try an administrative, rather than a legislative, resolution by asking for the requisite information from power producers either on an informal basis or through the rule-making process.

Please call me at 542-3925 if you have further questions on the ACC's position on this matter.

Sincerely,

A handwritten signature in cursive script that reads "Dean Miller".

Dean Miller
Executive Consultant, Government Affairs

Appendix E:

**Information & testimony submitted to the
Committee during the public hearings**

ELECTRIC AND GAS UTILITIES

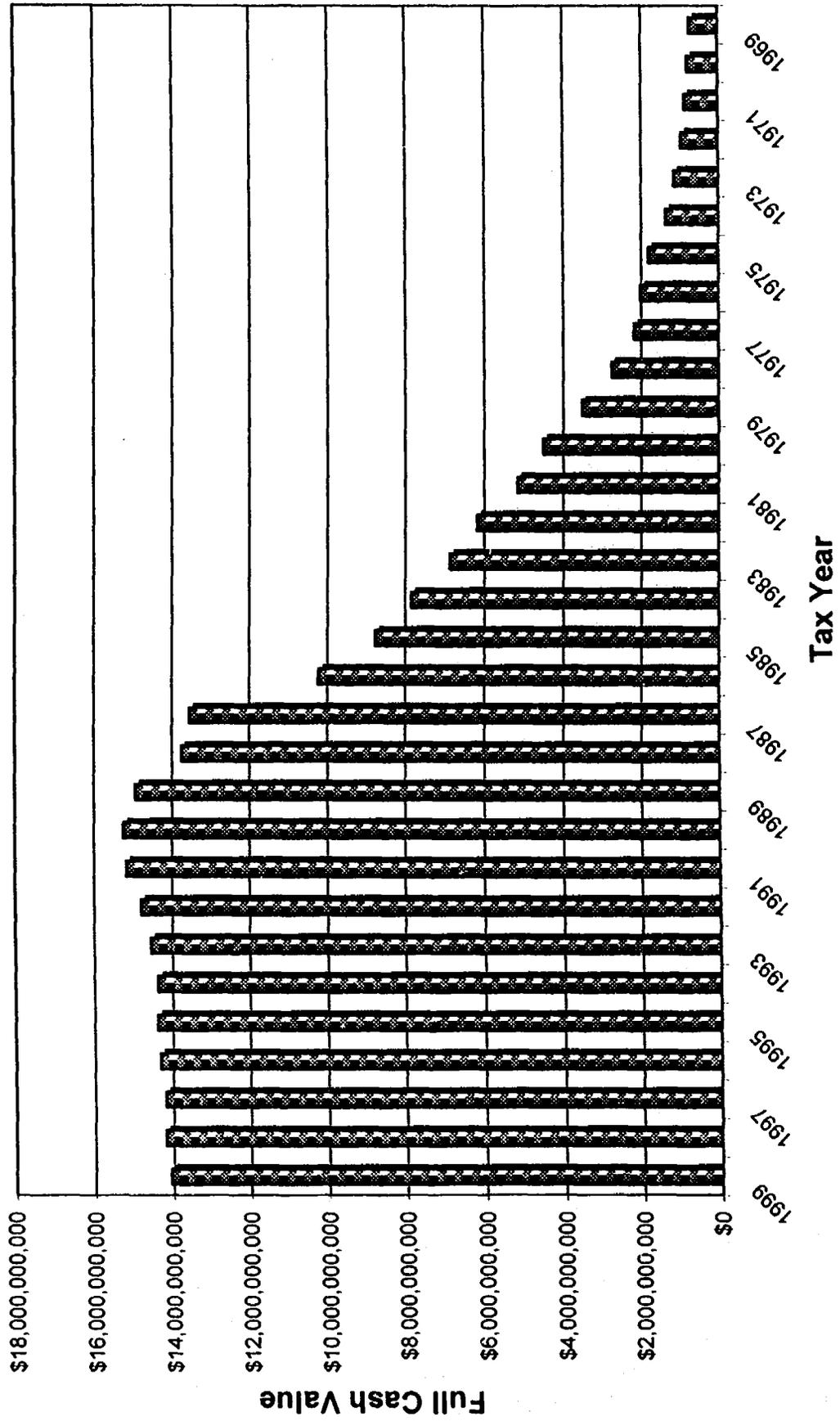
OVERVIEW AND SUMMARY OF VALUATION PROCESS

- Electric and gas properties are valued by the Department of Revenue, Property Tax Division, Centrally Valued Property Unit. They represent approximately two-thirds of the total value of all centrally valued properties. As with most centrally valued property, they are valued as a unit. A unit valuation is a combined valuation of the personal property, land, buildings and improvements as a business or going concern.
- The method for valuing this property is defined under A.R.S. §42-14151 through 42-14154 and was adopted in 1980. The defined approach is basically a book value approach with additional subtractions. This basic method would be called "historical cost less depreciation" (HCLD). From HCLD the statute required that we subtract 50% of the value of construction work in progress (CWIP) and 50% of the value of environmental protection facilities (EPF).
- Construction work in progress (CWIP) is defined in the statute as "the total of the balances of work orders for an electric, gas distribution or combination electric and gas distribution plant in process of construction on December 31 of the preceding calendar year exclusive of land rights and licensed vehicles."
- Environmental protection facilities (EPF) are defined as "the acquisition or construction costs of any building, structure, equipment, facility or improvement designed and constructed solely for control, reduction, prevention or abatement of discharges or releases into the environment of gaseous, liquid or solid substances, heat or noise or for the control, reduction, prevention or abatement of any other adverse impact of an activity on the environment."

MAJOR ARIZONA POWER PLANTS

COUNTY	PLANT	1999 FULL CASH VALUE
APACHE	CORONADO	460,109,279
APACHE	SPRINGVILLE	749,311,304
COCHISE	APACHE	142,401,298
COCONINO	NAVAJO	503,010,189
MARICOPA	PALO VERDE	5,528,912,913
MARICOPA	WEST PHOENIX	87,559,549
MARICOPA	OCOTILLO	64,934,219
MARICOPA	AGUA FRIA	75,755,582
MARICOPA	KYRENE	98,090,356
MARICOPA	SANTAN	99,278,502
MARICOPA	CROSSCUT	266,265,950
NAVAJO	CHOLLA	488,347,749
PIMA	IRVINGTON	210,367,683
PIMA	NORTH LOOP	19,138,883
PINAL	SAGUARO	54,152,049
YUMA	YUMA AXIS	40,378,176
TOTAL FULL CASH VALUE		8,888,013,681

GAS & ELECTRIC UTILITIES



**LARGE-SCALE POWER PLANTS
THIRD MANAGEMENT PLAN (2000-2010)
Department of Water Resources
October 14, 1999**

CONSERVATION REQUIREMENTS

Within the Phoenix, Pinal and Tucson AMAs:

- Large-scale power plants in operation before 1984 must achieve 7 cycles of concentration.
- Large-scale power plants that begin operations after 1984 must achieve 15 cycles of concentration.

Large-Scale Power Plants: Power plants that produce, or are designed to produce, more than 25 megawatts of electricity.

Cycles of Concentration: In power plants, water is lost through evaporation and blowdown, and replaced by make-up water. Blowdown is the process of routinely releasing water with high mineral levels to prevent equipment damage. Based on the regularity of blowdown, the efficiency rate of large-scale power plants is determined by "cycles of concentration" calculated by dividing the concentration of a constituent in the blowdown water by the concentration of the constituent in the make-up water.

Example (mg/L = milligrams of constituent per liter of water):

1,500 mg/L in blowdown water/100 mg/L in make-up water = 15 cycles

EXEMPTIONS

- Apply to the Director for alternative conservation measures.
- Request a conservation requirement waiver if all blowdown water is completely reused.
- Receive a 12 month exemption from conservation requirements if at least 50 percent of the total water used is effluent. At the end of the 12 month period, the facility must either comply with regulations or propose alternative blowdown standards.

Selected Statutes and Rules Concerning Well Drilling in Arizona

- A.R.S. 45-594** **Well Construction Standards; remedial measures**
- A.R.S. 45-595** **Well Construction Requirements; licensing of well drillers**
- A.R.S. 45-596** **Notice of Intention to Drill**
- A.R.S. 45-597** **Deepening and Replacement Wells in Active
Management Areas; filing of notice**
- A.R.S. 45-598** **New Wells and Replacement Wells in New Locations in
Active Management Areas; rules; permit required**
- R12-15-801 -
R12-15-822** **Well Construction and Licensing of Well Drillers**
- R12-15-830** **Well Impact and Well Spacing**
- R12-15-840** **Replacement Wells in the Same Location**

Types of New Wells Requiring Notice of Intention (NOI) to Drill or Groundwater Withdrawal Permit (GWP) Filings

Within AMAs		Outside AMAs	
<u>NOI</u>	<u>GWP</u>	<u>NOI</u>	<u>GWP</u>
<u>Well Impact Not Required</u>		<u>Well Impact Not Required</u>	
Exempt (Domestic)	Dewatering (Mines)	All	None
Monitor/Piezometer	Mineral Extraction		
Exploration	General Industry Use		
Replacement Well in Same Location	Poor Quality GW		
Deepening or Modifying an Existing Well	Temporary Electrical Generation & Dewatering		
	Drainage (Ag)		
	Hydrologic Testing		

Well Impact Required

- IGFR, Type1, Type2
- Service Area (City, Town, Water Co., Irrigation District)
- Replacement Well in New Location

General Requirements of Well Impact Rules

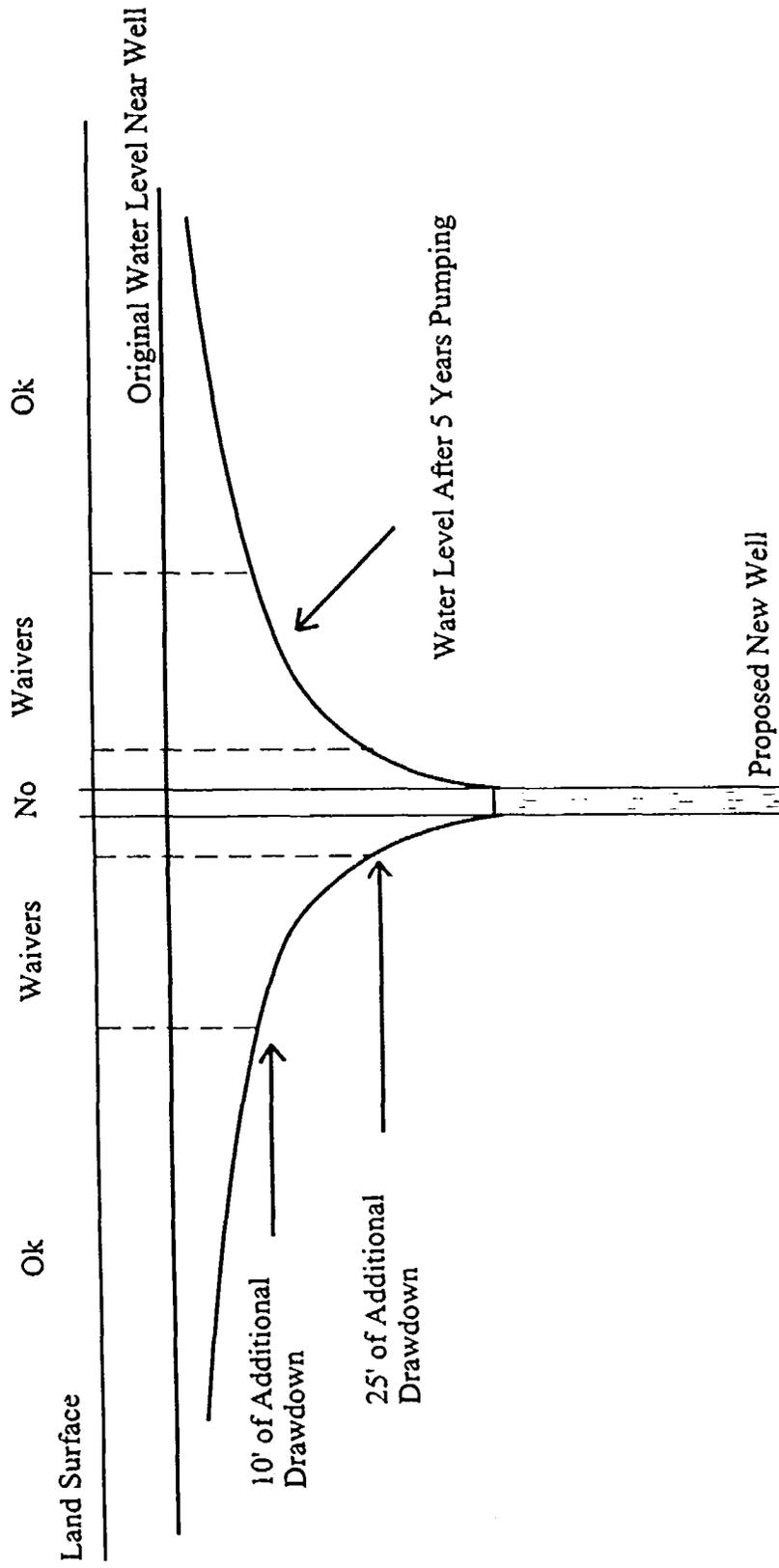
R12-15-830.A “The Director shall review all well permit applications submitted pursuant to A.R.S. 45-599, and shall approve such applications only if he determines that the proposed well will not cause unreasonably increasing damage to surrounding land or water users from a concentration of wells.”

R12-15-830.B “Those applications which indicate a proposed design pumping capacity in excess of 500 gallons per minute, or which propose the drilling of multiple wells, shall include a hydrologic study of the projected decline in water levels due to the operation of the proposed well or wells. The study shall delineate those areas surrounding the wells in which the projected impacts on water levels would exceed 10 feet and 25 feet of additional drawdown, respectively, after the first five years of operation of the proposed well or wells...”

R12-15-830.C “In appropriate cases, including when the proposed well is to be located in an area of known land subsidence or poor water quality, the Director may require the applicant to submit hydrological studies or data relating to these considerations. The application shall be rejected if the Director determines that the proposed well would cause an unreasonable and adverse impact from additional regional land subsidence or migration of poor quality water.”

R12-15-830.D “...if the probable impact of the proposed withdrawals will not exceed 10 feet over a five year period, the application shall be deemed to have met the requirements of subsection A... if the probable impact of the proposed withdrawals exceed 25 feet over a five year period, the application shall be rejected as not in compliance with subsection A.”

Example of Well Impact Analysis



- Notes:**
- OK Zone** = Proposed 5-Year well drawdown is less than 10 feet and meets requirements of rules
 - Waivers Zone** = Proposed 5-year drawdown is more than allowed, but can be mitigated by obtaining waivers from impacted well owners, or lowering pumping rate, or moving the proposed well
 - No Zone** = Proposed 5-year drawdown exceeds 25 feet, and is not permitted under the requirements of the rules

**SUMMARY OF
ADEQ WATER PERMIT PROCESS FOR
GAS-FIRED POWER PLANTS**



Prepared for the Joint Legislative Study Committee on
Gas-Fired Electric Generating Plants

Arizona Department of Environmental Quality
Water Quality Division
October 14, 1999

Aquifer Protection Program

Aquifer Protection Permits

- ▶ Required for any facility that discharges
- ▶ Discharge
 - The addition of any pollutant from a facility, either directly or indirectly, to the land surface, vadose zone, or aquifer in such a manner that there is a reasonable probability, that the pollutant will reach an aquifer.



Aquifer Protection Program

Individual Aquifer Protection Permits

General Permits

Individual Aquifer Protection Permits (APPs)

- Generally Identifiable Point Source
- Categorical Discharges Listed in
Law
- Must Make an Individual
Application



Individual APPs:

Two Key Requirements

- Facility must demonstrate pollutant discharge reduction using best available demonstrated control technology (BADCT)
 - Design
 - Construction
 - Operational Methods/Processes
 - Site specific hydrologic and geologic characteristics will be considered
- Facility must meet Aquifer Water Quality Standards (AWQS) at applicable point of compliance

Individual APPs: Additional Requirements

Must demonstrate:

- Technical Capability
- Financial Capability
- Evidence of Proper Zoning

Example of APP Requirements for Gas Fired Power Plant with Wastewater Discharge to a Surface Impoundment

BADCT Demonstration

- Wastewater recycling for water usage reduction
- Wastewater disposal into a lined pond
- Leak detection monitoring system
- Specific requirements depend on site characteristics

Monitoring Requirements

- Pre-operational inspection and testing of liner installation
- Periodic inspections of pond, liners and leak detection system

Reporting Requirements

- Monitoring results
- Permit violation or leak detection
- Contingency plan for liner failure or pond overtopping



Contingency Requirements

- Additional inspection and testing of liner
- Assessment of potential subsurface impact from leakage, pond overtopping
- Evaluation of groundwater monitoring and remediation needs

APP Closure Requirements

- Characterization of sludge and soil beneath liner to determine proper disposal and closure methods
- Post-closure monitoring and maintenance may be necessary

ADEQ AQUIFER PROTECTION PERMIT PROCESS

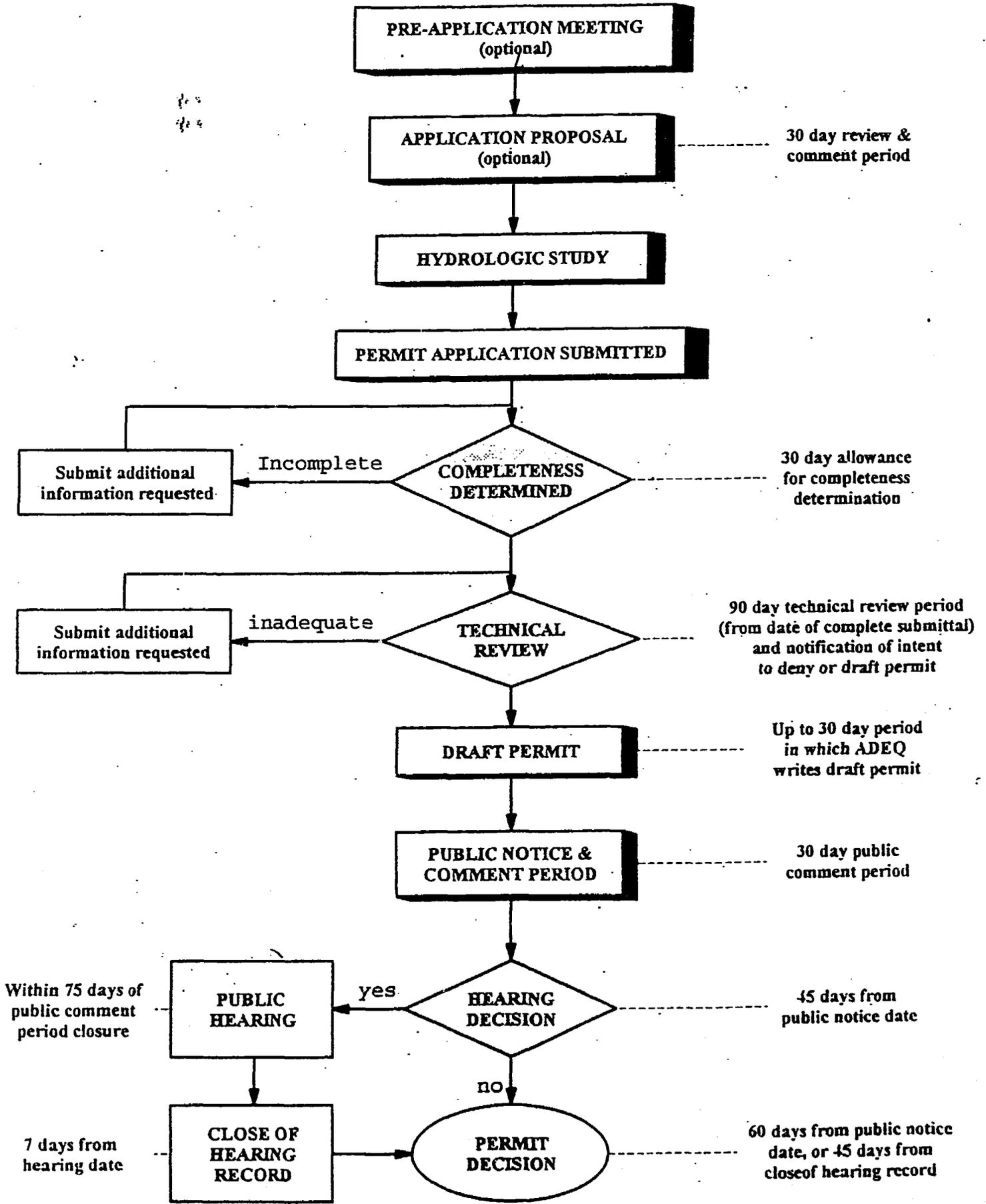


Figure 1

**SUMMARY OF
ADEQ AIR PERMIT PROCESSES FOR
GAS-FIRED POWER PLANTS**



Prepared for the Joint Legislative Study Committee on
Gas-Fired Electric Generating Plants

Arizona Department of Environmental Quality
Air Quality Division
October 14, 1999

- Arizona statutes divide jurisdiction between ADEQ and three county air pollution control programs - Maricopa, Pinal and Pima.
- Arizona statute requires an air quality permit prior to construction of any non-exempt facilities that have emissions of air pollutants.
- Because these plants are not exempt, all must receive permits.
- Arizona has two classes of permits based on the amount of emissions from the facility.
 - A Class I permit is required for a major source.
 - A Class II permit is required for a minor source.
- Commercial gas turbine power plants generally emit sufficient quantities of oxides of nitrogen and carbon monoxide to make them major sources, requiring that they obtain a Class I permit.

- Permit procedures vary depending on the location of the facility.

In an attainment area, a Prevention of Significant Deterioration (PSD) permit is required.

In a nonattainment area, a New Source Review permit is required.

- PSD permit applications must:

Use Best Available Control Technology

Protect National Ambient Air Quality Standards and increments

Assess effects on soils, vegetation and visibility

Protect air quality related values in national parks and wilderness areas

- NSR permit applications must:

Meet Lowest Achievable Emission Rate (LAER).

Offset of emissions from the facilities to continue progress towards achieving National Ambient Air Quality Standards

- Permit application processing procedures in Arizona:

Completeness Review - review of application for all required elements

Application Review and Drafting Proposed Permit - ensuring compliance with all applicable requirements.

Permit conditions include:

Emission limits and standards

Description of air pollution control equipment

Monitoring, record keeping and reporting requirements

Emission testing requirements

Public Notice and Hearing - Two notices in two newspapers in the county where facility will be located, with the public hearing held after at least 30 days notice

Responsiveness Summary - Consideration of and response to all comments

Final Permit Drafting - Final permit prepared, considering comments

EPA Review - 45 day duration

The Corporation Commission's Power Plant and Line Siting Jurisdiction.

The Commission's jurisdiction for power plant and line siting is under ARS 40-360 et seq. These statutes were first enacted in 1971 because the legislature recognized the need for the construction of new electric facilities, but was concerned that the location of the facilities would not adversely affect the physical environment and the quality of life of the people living in Arizona. The legislature declared that the purpose of the statutes was to create a single forum for expeditious resolution concerning matters related to the location of major new facilities. (Hist. note, ARS 40-360.)

The Commission's jurisdiction over facilities siting is different than the Commission's jurisdiction over public services corporations under Article 15, section 3 of the Arizona Constitution. Under monopoly regulation, the Commission's constitutional authority over all aspects of the provision of electricity by the state's public service corporations was complimented by its concomitant jurisdiction over the siting of the facilities that were built by public service corporations to provide electricity to their customers. However, with the advent of competition the facilities that are being built are not all regulated by the Commission under its constitutional authority. Many of the plants and lines currently seeking siting authority, are merchant facilities, which will sell energy into the competitive wholesale market, in this state and in others.

This recent development of an increasing number of merchant plants and related transmission facilities seeking siting authority in Arizona, makes the Commission's role and that of the power and line siting committee more important than ever before. The concerns expressed by the legislature at the time of the enactment of the power and line siting statutes to conserve and protect the environment are just as relevant and even more compelling today. As Arizona customers and its public service corporations purchase and compete in the retail as well as the wholesale competitive market deregulated by the Federal Energy Regulatory Commission, the siting of facilities directly impacts the public interest.

It also appears that the goals of the power and line siting statutes could be enhanced by the provision of more information to the Commission concerning the future planning of both transmission and power plant sitings in this state. With additional information related to reliability, safety, and the environment included in ten year plans for both power and transmission facilities, the Commission would be better able to review and analyze the system for siting purposes intended by ARS 40-360-02. In addition, this information would serve the public interest in aiding the Commission to carry out its constitutional responsibilities as well.

The Commission is currently conducting rule-making proceedings to adopt an environmental portfolio standard for the provision of electricity to Arizona's consumers. The ultimate goals of these rules and the power and line siting statutes coincide to provide Arizona residents with safe, reliable and environmentally-friendly electricity, just and reasonably priced, in a competitive power market.

A BRIEF OUTLINE OF THE ACC'S ENVIRONMENTAL PORTFOLIO RULE

- In 1996, the Corporation Commission adopted a Solar Portfolio Standard as part of the Retail Electric Competition Rules.
 - The Portfolio Standard required utilities/competitors to provide up to 1% of electricity from solar resources.
 - The Portfolio was to be phased in over a number of years.
 - The portfolio included incentives for economic development in Arizona. It encouraged the location of solar power plants in Arizona and the construction of solar manufacturing plants in Arizona.
- In 1999, the Solar Portfolio Standard was deleted from the Retail Electric Competition Rules.
- In April 1999, the Commission commenced a process to consider a new Environmental Portfolio Standard as part of the Retail Electric Competition Rules.
 - July 1999: Direct testimony filed.
 - August 1999: Rebuttal Testimony filed.
 - September 1999: Hearings on Sept. 16, 17, & 27
 - Current status: Negotiations are continuing toward possible settlement.
 - Legal briefs due: November 12, 1999.
 - Resources being considered for the Portfolio: solar electric, solar water heating, wind, hydro, landfill gas, biomass, and geothermal