ARIZONA HOUSE OF REPRESENTATIVES
Fifty-second Legislature – First Regular Session

COMMITTEE ON ENERGY, ENVIRONMENT AND NATURAL RESOURCES

Report of Regular Meeting
Monday, March 16, 2015
House Hearing Room 1 -- 2:00 p.m.

Convened 2:59 p.m.
Recessed
Reconvened
Adjourned 4:27 p.m.

Members Present	**Members Absent**
Mrs. Barton	
Mrs. Carter	
Mr. Clark	
Mr. Finchem	
Mr. Leach	
Mr. Saldate	
Ms. Steele	
Mr. Bowers, Vice-Chairman	
Mr. Pratt, Chairman	

Request to Speak
Report – Attachment 1

Presentations

Name	**Organization**	**Attachments** (Handouts)
None		

Committee Action

Bill	**Action**	**Vote**	**Attachments** (Summaries, Amendments, Roll Call)
SB1007	DP	9-0-0-0	2, 3, 4
SB1200	DPA	9-0-0-0	5, 6, 7, 8

Angela Diaz, Chairman Assistant
March 17, 2015

(Original attachments on file in the Office of the Chief Clerk; video archives available at http://www.azleg.gov)

Information Registered on the Request to Speak System

House Energy, Environment and Natural Resources
(3/16/2015)

SB1007, technical correction; trust lands; access (NOW: state plans; carbon dioxide emissions)

Testified in support:

Jason Baran, SR. Govt Relations Rep, SALT RIVER PROJECT (SRP); Steven Eddy, TUCSON ELECTRIC POWER COMPANY; Philip Bashaw, GRAND CANYON STATE ELECTRIC COOP ASSN; Lori Lustig, Arizona Corporation Commission; Mark Ourada, representing self

Testified as neutral:

Sandy Bahr, Sierra Club - Grand Canyon Chapter; Beth Hager, Arizona Department Of Environmental Quality; Tom Dorn, Peabody Energy/Arizona Western Coal Company

Support:

Farrell Quinlan, State Director, NATIONAL FEDERATION OF INDEPENDENT BUSINESS; Kelly Norton, AZ MINING ASSN; Steve Trussell, Arizona Rock Products Association; Patrick OMalley, representing self; Mike Huckins, GREATER PHOENIX CHAMBER OF COMMERCE; Garrick Taylor, Arizona Chamber Of Commerce And Industry; Robert Medler, TUCSON METROPOLITAN CHAMBER OF COMMERCE; Spencer Kamps, HOME BUILDERS ASSOCIATION OF CENTRAL AZ; Rodney Ross, AZ PUBLIC SERVICE COMPANY (APS)

All Comments:

Kelly Norton, AZ MINING ASSN: The AMA supports this bill with house amendments as we prefer to have a SIP and not a FIP.; Rodney Ross, AZ PUBLIC SERVICE COMPANY (APS): If I am not present, my colleague, Michael Vargas will speak for APS.; Beth Hager, Arizona Department Of Environmental Quality: Available for questions.

SB1200, technical correction; mining museum (NOW: mining and mineral museum; transfer)

Testified in support:

Dick Zimmermann, representing self; Harvey Jong, representing self; Deborrah Miller, representing self; Charles Connell, representing self

Testified as neutral:

James Norton, Arizona Historical Society; Lee Allison, ARIZONA GEOLOGICAL SURVEY

Support:

Joyce Hill, representing self; Terry Hill, representing self; Ann Heins, representing self; Dawn Monahan, representing self

Attachment 1

All Comments:

Harvey Jong, Self: Represent the Earth Science Museum; Charles Connell, Self: Monday Crew

STATEMENT OF JAMES W. MILLER SB 1200

I AM NOW RETIRED; HOWEVER, PRIOR TO RETIRING AND DURING MY EMPLOYMENT YEARS I WAS ACTIVE WITH AMIGOS (AZ MINING INDUSTRY GETS OUR SUPPORT) AND AM A PAST PRESIDENT AND EMERITUS MEMBER THEREOF.

I SERVED AS A MEMBER OF THE BOARD OF GOVERNORS FOR THE DEPT. OF MINES AND MINERAL RESOURCES, AND AT THAT TIME, THE BOARD WAS RESPONSIBLE FOR THE MINE AND MINERALS MUSEUM HOUSED IN THE OLD EL ZARIBAH SHRINE AUDITORIUM. THE MUSEUM HAD BEEN RELOCATED TO THIS LOCATION IN 1991 AND NAMED IN HONOR OF POLLY ROSENBAUM.

I WAS APPOINTED TO THE BOARD BY GOV. JANE HULL IN MARCH OF 2000 AND SERVED AS CHAIRPERSON OF THE BOARD IN THE LAST YEAR OF MY TENURE.

THE MUSEUM HOSTED THOUSANDS OF SCHOOL CHILDREN AND VISITORS AND PROVIDED GUIDED TOURS AND DISPLAYS OF MINERALS.

IT IS MY UNDERSTANDING THAT THE MINERALS AND CASES ARE ALL STORED AND NOT ABLE TO BE SEEN BY THE PUBLIC.

IT IS MY BELIEF THAT THE MUSEUM SHOULD NEVER HAVE BEEN CLOSED AND FOR THE LAST FIVE YEARS THERE HAVE BEEN A LOT OF SCHOOL CHILDREN MISSING PART OF THEIR EDUCATION ABOUT ARIZONA.

I WOULD ASK THIS COMMITTEE AND THE LEGISLATURE TO PASS THIS LEGISLATION TO RE-OPEN THE MUSEUM IN ITS FORMER SITE.

REVENUE FROM A GIFT SHOP AND ADMISSION CHARGES COULD BE COMBINED TO PARTIALLY OFFSET THE COST OF RUNNING THE MUSEUM.

IF WELL MANAGED AND WITH A GOOD AD CAMPAIGN THE REVENUE FROM THE OPERATION COULD BE SUBSTANTIAL.

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE---THANK YOU FOR ALLOWING MY STATEMENT TO BE READ AND I WOULD BE GLAD TO ANSWER ANY QUESTIONS YOU MAY HAVE VIA MY E-MAIL ADDRESS.

JAMES W. MILLER

SUN LAKES, AZ

JWMILLER@WBHSI.NET

HOUSE OF REPRESENTATIVES

SB 1007

state plans; carbon dioxide emissions
Sponsor: Senator Burges

X Committee on Energy, Environment and Natural Resources

Caucus and COW

House Engrossed

OVERVIEW

SB 1007 establishes a six-member joint legislative committee to review the proposed Rule 111(d) state plan (plan) prior to submitting the plan to the Environmental Protection Agency (EPA).

HISTORY

The EPA issued proposed CO_2 reduction standards on June 2, 2014, which requires a nationwide 30% reduction in emissions by 2030 from 2005 CO_2 levels (EPA-HQ-OAR-2013-0602). The state-specific proposal requires the environmental authority in each state to update their state implementation plan (SIP) to meet the reduction goal. The proposal provides states up to two years for submission of their SIP and up to 15 years for full implementation of reduction measures, after the SIP is approved by the EPA. States that opt for a regional or multistate plan will have up to three years to submit a plan to the EPA. The rule as proposed would require Arizona to achieve a 52% reduction in CO_2 emissions, the second highest reduction goal in the nation. The Rule 111(d) is expected to be finalized in the summer of 2015.

Section 111 of the Clean Air Act (Act) requires the EPA to develop regulations for categories of sources which cause or significantly contribute to air pollution, which may endanger public health or welfare. Section 111(d) of the Act requires states to develop Section 111(d) plans for existing sources of pollutants, which are subject to EPA review and approval.

Arizona Revised Statutes § 49-191 prohibits state agencies from adopting or enforcing a state or regional program to regulate greenhouse gas emissions without legislative approval.

PROVISIONS

Joint Legislative Review Committee on State Plans Relating to CO_2 Emissions from Existing Power Plants (Committee)

1. Establishes the Committee with the following members:
   a. The chair of the Senate Water & Energy Committee, or its successor committee;
   b. The chair of the House Energy, Environment and Natural Resources Committee, or its successor committee;
   c. Two members of the Senate, appointed by the President, representing different political parties; and
   d. Two members of the House, appointed by the Speaker, representing different political parties.
2. Designates the chairs of the Senate Water & House Energy and Energy, Environment and Natural Resources committees as co-chairs of the Committee.

3. Allows the Committee to meet as often as deemed necessary.
4. Specifies that a majority of members constitutes a quorum.
5. Sunsets the Committee on July 1, 2018.
6. Requires the Committee to review the proposed plan within 60 days after the director of ADEQ submits the plan to the Committee, take public comment, and consider whether submission of the plan to the EPA is in the public interest.
7. Allows the Committee to develop factors that may be considered in reviewing the proposed plan, such as:
   a. Electrical power grid security;
   b. Availability of natural gas and access to natural gas infrastructure;
   c. Effects of improved technologies and efficiencies in power generation;
   d. Effects of exempting existing electric generating plants from further measures;
   e. The role of stranded costs in the operation of existing or new generating plants;
   f. Effects on local and the state economy, including impacts on jobs, housing affordability, income and employment levels;
   g. The impact on the state's ability to attract capital investment, new businesses and to develop and expand existing businesses;
   h. The relative costs and benefits of the proposed plan;
   i. Challenges faced by small utilities and electrical cooperative associations;
   j. Effects on local ratepayers;
   k. Effects on the customs, culture, history and heritage of Arizona and its communities; and
   l. Any other factors the Committee deems appropriate.
8. Permits the Committee to review the proposed plan concurrently with any public review.
9. Requires the Legislature to provide staff assistance to the Committee on request of the Speaker and the President.

Plan; CO_2 Emissions from Power Plants

10. Requires the director of ADEQ (director) to develop, adopt and enforce the plan and submit a quarterly report to the Committee detailing the progress of developing the plan.
11. Allows the director to participate in multijurisdictional plans or agreements, including agreements or plans with Indian tribes.
12. Requires the director to submit the plan to the Committee 90 days prior to submitting the plan to the EPA and prohibits submitting the plan to the Committee until the EPA adopts the finalized Rule 111(d).
13. Allows the director to submit the plan to the EPA if the Committee fails to review the plan in a timely manner.
14. Allows the director to adopt rules in order to develop, adopt and enforce the plan and exempts these rules from Governor's Regulatory Review Council approval.
    a. The director must notify the Committee of any proposed rule submitted to the Administrative Register.
13. Specifies the submission of a plan to the EPA does not impair the ability of affected state agencies to challenge the lawfulness of the federal regulation and does not constitute a waiver of claims.

ARIZONA HOUSE OF REPRESENTATIVES
Fifty-second Legislature - First Regular Session

ROLL CALL VOTE

COMMITTEE ON ENERGY, ENVIRONMENT AND NATURAL RESOURCES BILL NO. SB 1007

DATE March 16, 2015 MOTION: dp

	PASS	AYE	NAY	PRESENT	ABSENT
Mrs. Barton		✓			
Mrs. Carter		✓			
Mr. Clark		✓			
Mr. Finchem		✓			
Mr. Leach		✓			
Mr. Saldate		✓			
Ms. Steele		✓			
Mr. Bowers, Vice-Chairman		✓			
Mr. Pratt, Chairman		✓			
		9	0	0	0

Angela Dios
COMMITTEE SECRETARY

APPROVED:
FRANKLIN M. PRATT, Chairman
RUSSELL BOWERS, Vice-Chairman

ATTACHMENT

Attachment 3

ARIZONA CORPORATION COMMISSION

"The final analysis is clear and unequivocal: It is not possible to shut down all coal plants in 2020 without seriously jeopardizing grid reliability, national security and Arizona's resource portfolio planning process. There is simply no way for Arizona to implement a state plan, as is required under EPAs proposal, without irreparable disruption to the state's electric power system. Arizona does not have the flexibility to propose or implement a plan that would even approach compliance with the EPA's proposal."

Arizona Corporation Commission Rule 111d comments Dec. 1, 2014

As part of our analysis of the EPA's proposed rule, the ACC identified four general areas of concern:

I. **Jurisdictional and Legal Authority** – *The Proposed Rule oversteps the EPA's authority under the Clean Air Act ("CAA"), encroaches on State regulatory authority, and upsets the regulatory framework Congress carefully crafted for electric generators.*

a. The Proposed Carbon Rules improperly usurp the role of state public utilities commissions, specifically the ACC, over resource portfolio planning. EPA is claiming *de facto* authority to perform resource portfolio planning, establish Renewable Energy standards, and establish a national Energy Efficiency standard, all of which Congress has reserved to the states.
b. The Proposed Carbon Rules improperly usurp the authority given to, and exercised by, state public utility commissions and federal agencies such as FERC (Federal Energy Regulatory Commission) and NERC (North American Electric Reliability Corporation) to ensure electric system reliability.
c. EPA lacks authority to promulgate these broad sweeping regulations under the Clean Air Act ("CAA"). EPA is barred from regulating CO2 under Section 111(d) of the CAA because it has already issued power plant standards for hazardous air pollutants under Section 112.
d. No reasonable construction of the CAA gives EPA authority over generation dispatch, grid and electric system reliability, national security and resource portfolio planning. EPA's proposal moves EPA into the role of an energy regulator.
e. The underlying assumptions contained in the building blocks, upon which Arizona's goals are calculated, are arbitrary and capricious, unlawful and not based upon any reliable evidence.
f. EPA's Proposed Carbon Rules are unlawful because, as applied to Arizona, they are highly prescriptive, offering the state no flexibility to fashion its own plan, and going well beyond EPA's role under the CAA to establish guidelines and the State's role to develop a State Plan.

II. **Grid Reliability** – *The Proposed Rule, in effect, requires the retirement of all coal plants not located on Tribal lands in Arizona by 2020, resulting in insufficient generation to meet Arizona's summer demand, inadequate electric transmission to meet electrical demand in Arizona, and inadequate pipeline to deliver the necessary quantity of natural gas to all parts of the state.*

a. The Proposed Carbon Rules undermine the reliability of electric service associated with retiring all coal plants in 2-3 years from adoption of a State Plan. Such action upsets years of planning to achieve system diversity and redundancy.
b. The Proposed Carbon Rules are projected by EPA to turn Arizona from a net exporter of electricity to a net importer, which could have many economic and reliability issues. Over half of the Natural Gas Combined Cycle ("NGCC") generation in Arizona is merchant-owned, and not available for in-state consumption.
c. The EPA fails to consider the electric transmission system impacts and the lack of adequate transmission capacity to deliver existing NGCC energy at the levels assumed.
d. The EPA fails to consider the time, cost and environmental implication of building additional natural gas pipeline and electric transmission capacity. Under the EPA's proposed timeline, a state plan would be approved in 2017 or 2018. This gives Arizona only 2-3 years (assuming EPA takes 1 year to approve the

final SIP) to retire all of its coal plants, shift to NGCC generation, restructure its electric transmission lines to accommodate this drastic change, and attempt to get additional natural gas pipeline capacity to the state.

III. **Ratepayer Impact** – *Arizona has one of the youngest (6th newest) coal fleets in the nation. The Proposed Rule will adversely impact ratepayers by stranding $3 Billion of investment in coal plants, creating the need for new electric generation to replace retired coal plants, and resulting in Arizona's diversified generation portfolio becoming overly reliant on natural gas, subjecting ratepayers to the high price volatility of natural gas.*

a. The Proposed Carbon Rules fail to capture many significant costs when projecting the financial impact of the Proposed Rules. For instance, the EPA did not consider "stranded costs" associated with its proposal, which will be tremendous. For Arizona alone, the Proposed Carbon Rules result in approximately $3.0 billion of stranded investment. This does not include costs for Arizona's new electric generation, electric transmission and natural gas pipeline infrastructure that will be necessary under EPA's proposal.
b. The Proposed Carbon Rules fail to consider the remaining useful life of existing electric generating units ("EGUs"), as required under the CAA. Arizona utilities have made large investments in many of their coal plants in recent years to comply with other EPA regulations. Two of the units to be shut down will be less than 20 years old in 2020 and others will have undergone hundreds of millions of dollars in environmental retrofits to comply with other EPA requirements.
c. The Proposed Carbon Rules will significantly increase Arizona's reliance on natural gas fired generation. Arizona has one of the most diversified generation portfolios in the Western States. EPA has not considered the associated price risk and transportation constraints. Such a shift is imprudent from economic, security, and reliability standpoints.

IV. **National Security** – *The Proposed Rule jeopardizes national security by rendering Arizona's energy infrastructure less resilient to natural disasters or terrorist attacks.*

a. Without coal generation, Arizona's electrical generation is highly concentrated in and around the Palo Verde Hub.
b. The electrical transmission pathways delivering power to Arizona customers become increasingly concentrated.
c. Any disruption to either of the two pipelines delivering natural gas to Arizona becomes increasingly debilitating.

Summary of ACC Recommendations

The ACC recommended that EPA **not** proceed with its Proposed Carbon Rule. EPA enforcement of issues the ACC oversees is unprecedented and unlawful. ***If however,*** EPA does proceed to adopt the Proposed Carbon Rules, then at a minimum, the ACC stated the following issues need to be resolved.

A. The EPA must address the disparate treatment of the various states. Arizona, currently in the middle of the states for carbon emissions, was assigned the second highest carbon reduction goal in the country;
B. When more reasonable and realistic assumptions are used for Arizona, its Final Goal should approximate 1,136 lbs CO2/Mwh, rather than 702 lbs CO2/Mwh, as calculated by EPA;
C. EPA should either eliminate the Interim Goal completely or create a "glide-path" giving Arizona the same degree of flexibility that other states have, *and* States should be allowed significant latitude in how they achieve the "glide-path" to reach the end goal in 2030;
D. Remaining "Useful Life" and "Book Life" must be considered by EPA, as required by the CAA, especially given Arizona's younger fleet and recent modifications to the fleet to comply with other EPA requirements;
E. Smaller utilities must be given special consideration. These entities typically do not have the resources or flexibility to deal with the broad sweeping changes envisioned by the Proposed Carbon Rules;
F. The EPA's Proposed Carbon Rules must be structured so they do not impede the ability of state public utility commissions (such as the ACC) to oversee and ensure the reliability of electric service and integrated resource portfolio planning issues; *and*
G. The EPA must address increased national security concerns created by the Proposed Carbon Rules.

ARIZONA CORPORATION COMMISSION

JODI JERICH
Executive Director

BY EMAIL AND WEB SUBMISSION

December 1, 2014

To: Docket ID No. EPA-HQ-OAR-2013-0602

Re: Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule; 79 Fed. Reg. 34830 (June 18, 2014)

To Whom It May Concern:

Attached are the comments of the Arizona Corporation Commission in the above captioned matter.

Sincerely,

Jodi Jerich
Executive Director
Arizona Corporation Commission

BEFORE THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

IN THE MATTER OF PROPOSED CARBON POLLUTION EMISSION GUIDELINES FOR EXISTING STATIONARY SOURCES: ELECTRIC UTILITY GENERATING UNITS	))))))	**Docket No. EPA-HQ-OAR-2013-0602**

COMMENTS OF THE ARIZONA CORPORATION COMMISSION

The Arizona Corporation Commission ("ACC") appreciates the opportunity to comment on the Environmental Protection Agency's ("EPA") proposed Carbon Pollution Emission Guidelines for Existing Sources: Electric Utility Generating Units[1] ("Proposed Carbon Rule") and associated Notice of Data Availability ("NODA").[2] The ACC has significant concerns with EPA's Proposed Carbon Rule. The assumptions that EPA has made about the Arizona energy market are inaccurate and lead to goals for Arizona that are unachievable unless all coal plants are shut down by 2020. It is not possible to shut down all coal plants by 2020 without impacting the reliability of electric service, jeopardizing national security by rendering energy infrastructure less resilient to natural or man-made disasters, and undermining resource portfolio planning. Further, according to a recent National Economic Research Associates ("NERA") analysis, the cost to states to implement the Proposed Carbon Rule is much higher than projected by EPA.[3]

EXECUTIVE SUMMARY

I. SUMMARY OF ACC'S CONCERNS WITH THE PROPOSED CARBON RULE.

The ACC opposes the Proposed Carbon Rule, and urges EPA to terminate this rulemaking and forego the rule's adoption. In the comments that follow, the ACC will discuss

[1] 79 Fed. Reg. 34,830.
[2] 79 Fed. Reg. at 64,543.
[3] http://www.nera.com/publications/archive/2014/potential-impacts-of-the-epa-clean-power-plan.html.

the many deficiencies in EPA's Proposed Carbon Rule. Even if EPA were to adopt mitigating measures, the ACC would still oppose adoption of the Proposed Carbon Rule because it is both technically and legally deficient.

The Proposed Carbon Rule treads in areas that are outside of EPA's statutory authority. Under the Proposed Carbon Rule, EPA's policies on Greenhouse Gas ("GHG") would dictate electric dispatch issues and state renewable and energy efficiency policies in the future. This will have dire consequences on the reliability of electric service, national security and resource portfolio planning. Federal Energy Regulatory Commission ("FERC") Commissioner Tony Clark captured this concern in the following passage:

> Up until this point, utilities have been regulated through the influence of a number of governmental entities. State legislatures, governors, public utility commissions, state energy offices, state departments of environmental quality, EPA and FERC, to name some of the major players, all had a role to play. Any one entity could exert an influence on the process, thus each had their own niche.
>
> EPA's proposed 111(d) regulations would dramatically alter these traditional lines of authority by creating a new paradigm of oversight of net carbon emission from a state. The process that has been envisioned by EPA through its proposed rule leaves the states with many promises of flexibility but an exceptionally difficult choice.
>
> . . . .
>
> What was once a relationship of interacting and cooperating entities will be one in which there is a clear senior partner. In the past, EPA authority extended to specific generating plants or groups of plants, but by a state voluntarily agreeing to seek EPA approval of its overall integrated regulation of the electric industry, it will have entered a comprehensive "mother-may-I?" relationship with the EPA that has never before existed.
>
> After an implementation plan is approved by the EPA, a state will have lost its ability to chart its own course as to how it regulates public utilities and its energy sector as a whole.[4]

EPA utilizes four building blocks that form the basis of its "Best System of Emissions Reduction" ("BSER") designed to reduce carbon emissions in each state.[5] EPA's promise of maximum flexibility for states to structure their own plans falls short, particularly in Arizona's case. Arizona is one of a few states that have absolutely no flexibility under EPA's Proposed Carbon Rule.

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[4] Written Testimony of FERC Commissioner Tony Clark before the Committee on Energy and Commerce Subcommittee on Energy and Power, United Sates House of Representatives, Hearing on FERC Perspective: Questions Concerning EPA's Proposed Clean Power Plan and other Grid Reliability Challenges (July 29, 2014).

[5] 79 Fed. Reg. at 34,855. Note, the ACC's comments apply to EPA's formulation of its principal BSER and its BSER alternative.

Other than Building Block 1 (designed to achieve heat rate improvements at the source) the other building blocks extend beyond the source or "outside the fence."[6] Building Block 2 would require states to substitute high carbon emitting fossil fuel generation with low carbon emitting generation by requiring redispatch to Natural Gas Combined Cycle ("NGCC") facilities up to a 70 percent capacity factor.[7] Building Block 3 would require states to substitute fossil fuel generation with renewable energy ("RE") and nuclear generation.[8] Building Block 4 would require states to use energy efficiency ("EE") measures to reduce generation from fossil fuel plants.[9] Instead of designing measures applied to the source, as in the past, EPA is using what it calls a new "state-wide" approach and a "portfolio" approach to impose requirements on other entities in addition to the source.[10] EPA appears to have structured the Proposed Carbon Rule in this fashion because it recognized that if left to the "source," it could not achieve the 30 percent targeted level of carbon emission rate reductions on a nationwide basis it envisioned under the Proposed Carbon Rule.

The regulation of electric and natural gas companies at the state and federal level is very complex. The states have jurisdiction over resource portfolio planning and share responsibility over electric system reliability with FERC, the North American Electric Reliability Corporation ("NERC") and other entities. State and federal agencies share responsibility for security measures in this area as well. EPA should allow the states to continue to approach these energy sector issues in a measured and reasoned manner, rather than imposing a novel EPA plan where EPA GHG policies would dictate energy policy in a dominant way. EPA's Proposed Carbon Rule will seriously undermine the reliability of electric service.

The four building block methodology EPA proposes in the Proposed Carbon Rule to calculate Arizona's goal is fundamentally flawed. It results in disproportionate and vastly different results on a state by state basis. Arizona ends up with one of the most stringent carbon reduction goals[11] of any state, yet its current contribution to carbon emissions is lower than many

[6] EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 2.
[7] *Id.* at Ch. 3.
[8] *Id.* at Ch. 4.
[9] *Id.* at Ch. 5.
[10] 79 Fed. Reg. at 34,890-892.
[11] The state goals are expressed in adjusted output-weighted-average pounds of CO_2 Per Net MWh from all affected fossil fuel-fired EGUs in a state.

states.[12] EPA's goal calculation methodology rewards states that are contributing significantly more to the national level of CO_2 emissions because they have little or no NGCC generation, and have not yet developed RE and EE programs. On the other hand, EPA's goal calculation methodology puts an unreasonably burdensome goal upon states like Arizona that have developed balanced portfolios of coal, nuclear and natural gas generation and have aggressively implemented RE and EE programs over the past decade. As a result, these states are required to reduce their CO_2 emissions disproportionately to the level of CO_2 emissions they contribute to the national total.

In applying the four building blocks to calculate the state goals, EPA also has made many high level and generalized assumptions about Arizona that do not reflect the actual operation of the electric system, the realities of the state's gas pipeline and electric transmission systems, the ownership of generation, and the progress Arizona has already made in the areas of RE and EE. Specifically, EPA's Proposed Carbon Rule is deficient in the following ways:

- The Proposed Carbon Rule is not "BSER" for Arizona. BSER incorporates a consideration of cost, technical feasibility and other factors. The Rule as applied to Arizona is not technically feasible, has not considered remaining useful life as required by the Clean Air Act, ("CAA"), and would impose tremendous and unnecessary costs upon the state. Further, many significant costs have not been captured by EPA's analysis.

- The Proposed Carbon Rule fails to capture many significant costs when projecting its financial impact. For instance, EPA apparently did not consider "stranded costs" associated with its proposal. For Arizona alone, the Proposed Carbon Rule would result in approximately $3.0 billion of stranded generation investment. There are also costs for Arizona involving all of the new electric transmission and gas pipeline infrastructure that would be necessary under EPA's proposal.

- The Proposed Carbon Rule would change the electric system from one of least cost economic dispatch to an environmentally based dispatch, which will have many unknown implications and costs.

[12] Based upon "2012 Fossil Rate (lbs./MWh)" provide by EPA in 20140602-state-data-summary.xlsx.

- The Proposed Carbon Rule, despite purporting to do so, does not provide Arizona with any flexibility to structure a State Plan that would reduce GHG levels in a reasonable fashion. Under the Proposed Carbon Rule, Arizona must shut down all coal plants by 2020 in order to achieve the interim goal set by EPA of 735 lbs. CO_2/MWh. Thus, instead of flexibility and an interim goal glide-path as promised, Arizona coal units fall off a steep cliff in 2020 and must be replaced by NGCC generation.

- The Proposed Carbon Rule would undermine the reliability of electric service reliability due to retiring all coal plants in 2-3 years from State Plan adoption. Such action would upset years of planning to achieve system diversity and redundancy.

- The Proposed Carbon Rule would create national security concerns in Arizona. Retiring all coal plants in 2020 (while not achievable) would result in a majority of the generation serving load in the state being located in a highly concentrated geographic area, being served primarily from one gas pipeline, over congested electric transmission lines.

- The Proposed Carbon Rule would significantly increase Arizona's reliance on natural gas-fired generation. Arizona has one of the most diversified generation portfolios in the Western States.[13] *See* Exhibit 12. EPA has not considered the associated price risk and transportation constraints. Such a shift would be imprudent from economic, security, and reliability standpoints.

- The Proposed Carbon Rule is projected by EPA to turn Arizona from a net exporter of electricity to a net importer, which could have many economic and reliability issues.

- The Proposed Carbon Rule assigns a final goal to Arizona of 702 lbs. CO_2/MWh and an interim goal of 735 lbs. CO_2/MWh (to be achieved during the timeframe of 2020 through 2029). While Arizona is in the middle of the states as far as carbon emissions, it has the second highest carbon reduction goal in the country.

[13] http://cleanpowerplanmaps.epa.gov/CleanPowerPlan/.

- The Proposed Carbon Rule building blocks suffer from fundamentally flawed underlying assumptions as applied to Arizona:

    - Building Block 1 is unusable by Arizona utilities. It assumes all plants can achieve a national average efficiency improvement of 6 percent. Most of the generating plants owned by a load serving entity ("LSE") have already made these improvements in Arizona and are operating at efficient levels. Further, even if such improvements were possible, they could conceivably subject the LSE to application of EPA's other proposed rule, section 111(b), which may act to discourage any improvements to the extent they could be made.

    - Building Block 2 significantly overstates the amount of NGCC energy and capacity that could displace coal and gas steam generation, especially during peak load periods. It does this by using annual average capacity factors and nameplate ratings to redispatch the system, which is inappropriate.

    - Building Block 2 fails to recognize that over half of the NGCC generation in Arizona is merchant-owned. The load serving utilities in Arizona do not own this generation nor have any long-term rights to use it. Some of this generation is already subject to existing commercial contracts with out-of-state customers. Based on this fact alone, EPA has substantially overstated the amount of coal generation that may be replaced by NGCC generation.

    - Building Block 2 fails to take into account the lack of firm gas pipeline capacity needed to dispatch the NGCCs to the levels assumed in the application of Building Block 2.

    - Building Block 2 fails to consider the electric transmission system impacts and the lack of adequate transmission capacity to deliver the existing NGCC energy at the levels assumed.

    - Building Block 2 fails to consider the time, cost and environmental implication of building additional gas pipeline and electric transmission capacity. Under the EPA's proposed timeline, a State Plan would be approved in 2017 or 2018. This would give Arizona only 2-3 years (assuming EPA takes 1 year to approve the final State Plan) to retire all of its coal plants, shift to NGCC generation, restructure its electric transmission lines to accommodate this drastic change and attempt to get additional gas pipeline capacity to the state.

    - Building Blocks 3 fails to give credit to states with nuclear generation (a zero carbon emitting source) but instead penalizes the 30 states with nuclear reactors by imputing a 5.8 percent "at-risk" component without considering the individual circumstances of each state.

- Building Block 4 penalizes early adopter states such as Arizona that have had EE programs in place for decades.

- The Proposed Carbon Rule's building block approach uses national averages and a "one size fits all" approach on some of its assumptions. This approach fails to recognize state and regional differences. Examples include EPA's erroneous assumption that all coal power plants can achieve a national average efficiency improvement of 6 percent, that all existing nuclear units are at risk, on average, of losing 5.8 percent of their output, and that all states can meet an annual average 1.5 percent energy efficiency goal even if they have had energy efficiency goals in place for many years.

- The Proposed Carbon Rule fails to consider the age of existing electric generating units ("EGUs") and the stranded investment that would result from premature shutdown of coal generation. The costs of approximately $3 billion for stranded generation in Arizona would have significant retail rate implications.[14] Arizona has the sixth youngest coal fleet in the nation and its utilities have made large investments in many of their coal plants in recent years to comply with other EPA regulations. Two of the units to be shut down would be less than 20 years old at that time and others would have undergone hundreds of millions of dollars in environmental retrofits to comply with other EPA requirements.[15]

- The Proposed Carbon Rule improperly usurps the role of state public utilities commissions over resource portfolio planning and requires the state's utilities to become heavily dependent on NGCC. This would be imprudent from a resource portfolio planning perspective.

- The Proposed Carbon Rule improperly usurps the authority given to and exercised by state public utility commissions and federal agencies such as FERC and NERC to ensure electric system reliability.

- The Proposed Carbon Rule's "outside the fence" or "statewide" approach is not a

[14] "Assessment of Clean Power Plan Prepared for: Arizona Utility Group," November 21, 2014, ("PACE Study") at 10.
[15] Operating Year specified in 2012 EIA 860 data.

reasonable interpretation of the CAA.

II. SUMMARY OF ACC RECOMMENDATION IF EPA PROCEEDS WITH THE PROPOSED CARBON RULE.

Although the ACC is submitting extensive comments in this docket, including the many ways EPA must modify the Proposed Carbon Rule if it proceeds in this matter, the ACC submits that EPA does not have the legal authority to promulgate and implement the Proposed Carbon Rule under CAA section 111(d). The ACC does not recommend that EPA proceed with the Proposed Carbon Rule. If, nonetheless, EPA proceeds to adopt the Proposed Carbon Rule, then at a minimum the following issues need to be resolved. The Proposed Carbon Rule must address the disparate treatment of the various states. When more accurate and realistic assumptions are used for Arizona, its final goal should be at a minimum 1,136[16] rather than 702 lbs. CO_2/MWh as calculated by EPA. The ACC recommends that EPA either eliminate the interim goal completely or create a glide-path which gives Arizona the same degree of flexibility that other states have. States should be allowed significant latitude in how they achieve the glide-path to reach the end goal in 2030.

Remaining useful life and book life must be considered by EPA, as required by the CAA. According to EPA, the significant flexibility states have with respect to the other building blocks acts to ameliorate any premature retirements of fossil fuel plants as a result of the Proposed Carbon Rule.[17] However, Arizona has no flexibility and its stringent goals would severely truncate the remaining useful life and book life of many of Arizona's coal plants. The remaining useful lives and book lives of these units must be considered as required by the CAA, especially given Arizona's younger fleet and recent modifications to the fleet to comply with other EPA requirements.

EPA's Proposed Carbon Rule must be structured so that it does not impede the ability of state public utility commissions to oversee and ensure the reliability of electric service and integrated resource portfolio planning issues. Further, increased national security concerns created by the Proposed Carbon Rule must be addressed.

Smaller utilities must be given special consideration. These entities typically do not have

[16] This value is based upon using the maximum monthly 2012 capacity factor for NGCC units in Arizona. The correct way to perform this analysis would be based upon an hourly dispatch of the system, which would result in a higher goal because the monthly capacity factor overstates the amount of NGCC generation that could displace oil/gas steam generation.

[17] 79 Fed. Reg. at 64,544.

the resources or flexibility to deal with the broad sweeping changes envisioned by the Proposed Carbon Rule. Finally, federal enforcement is not appropriate for the "outside the fence" building blocks. The ACC has jurisdiction over many of the issues raised in three of the four building blocks. EPA enforcement of issues that the ACC oversees would be unprecedented and unlawful.

III. SUMMARY OF LEGAL ISSUES RAISED BY THE PROPOSED CARBON RULE.

There are also serious legal issues raised by EPA's proposal. First, EPA lacks authority to promulgate these broad sweeping regulations under the CAA. EPA is barred from regulating CO_2 under section 111(d) of the CAA because it has already issued power plant standards for hazardous air pollutants under section 112. EPA's "outside the fence" approach is not a reasonable interpretation of the CAA. No reasonable construction of the CAA gives the EPA authority over generation dispatch, grid reliability, national security and resource portfolio planning. EPA's interpretation of the CAA is not entitled to deference in light of the regulatory framework that Congress has carefully crafted in this area. The underlying assumptions contained in the building blocks, upon which Arizona's goals are calculated, are arbitrary and capricious, unlawful and not based upon any reliable evidence. EPA's Proposed Carbon Rule is also unlawful because, as applied to Arizona, it is highly prescriptive and gives the state no flexibility to fashion its own plan.

Furthermore, notwithstanding the following discussion, or the ACC's submission of its comments, nothing herein should be construed as a waiver by the ACC of any position asserted in these comments. Further, the ACC specifically reserves the right to take any position or to raise any legal or policy argument to which it may be entitled to under law in pursuing and protecting, without limitation, the public interest of the State of Arizona in this or in any other proceeding, whether before any court or in any administrative proceeding.

DISCUSSION

I. BACKGROUND.

The ACC, created by the Arizona Constitution, regulates public service corporations, including electric and gas companies in Arizona, having been granted the authority to prescribe just and reasonable rates to be collected by public service corporations and to make and enforce reasonable rules, regulations, and orders for the convenience, comfort, and safety of the

employees and patrons of such corporations.[18] As a constitutionally created agency, the ACC is considered the "fourth branch" of Arizona government.[19] The ACC consists of five elected Commissioners who run for office statewide. Arizona courts have found that the ACC has exclusive authority to set rates for public service corporations operating in Arizona, including Arizona Public Service Company ("APS"), Arizona Electric Power Cooperative ("AEPCO"), Tucson Electric Power Company ("TEP") and UNS Electric, Inc. ("UNSE"). The ACC also has authority over the siting of power plants and electric transmission, which includes merchant plant owners and Salt River Project Agricultural Improvement and Power District ("SRP").[20]

The ACC's authority extends to many of the issues raised in Building Block 2 (redispatch from coal fossil fuel plants to NGCC plants), Building Block 3 (Renewable Energy and Nuclear Generation) and Building Block 4 (Energy Efficiency). As discussed in more detail below, the ACC is responsible for resource portfolio planning. The ACC, along with other federal agencies, is also responsible for electric service reliability. Finally, the ACC works with other federal and state agencies to ensure that security concerns are addressed in this area.

The ACC is working with two other Arizona agencies that have a direct and substantial interest in the EPA's Proposed Carbon Rule as well. First, the Arizona Department of Environmental Quality ("ADEQ"), which was established by the Arizona Legislature under the Environmental Quality Act of 1986, has been sponsoring Technical Working Groups on the rules which the ACC Staff has participated in along with the Arizona LSEs to assess the impacts of the Proposed Carbon Rule. ADEQ's Air Quality Division works with EPA in developing state implementation plans ("SIPs") under the CAA. Second, the Residential Utility Consumer Office, ("RUCO") represents residential consumers in proceedings before the ACC with its mission being to protect the residential consumer's interest relating to rates and quality of service. RUCO has participated in various Legal/Policy Group meetings that the ACC has sponsored on the Proposed Carbon Rule.

The costs that Arizona utilities will incur to comply with EPA's Proposed Carbon Rule will have a direct and substantial impact on Arizona ratepayers. According to the U.S. Census

[18] Ariz. Const. art. XV, § 3.

[19] *Stop Exploiting Taxpayers v. Jones*, 211 Ariz. 576, 580, 125 P.3d 396, 400 (App. 2005)([T]he status of the Arizona Corporation Commission as a fourth branch of government, wholly separate from the legislative, executive, and judicial branches).

[20] The ACC does not generally regulate SRP with respect to rates because SRP is a political subdivision of the state.

Bureau, Arizona's median household income and per capita monthly income are both below the national average.[21] Further, the poverty rate and the number of elderly in Arizona are above the national average.[22] The 2010 U.S. Census reported that 1,232,791 individuals between the ages of 60-85 living in Arizona.[23] Of these, 118,278 are between the ages of 80-84 and 103,400 are age 85 years and older.[24]

Another important factor in the overall scheme of electricity production is Arizona's diversity: geographical, geological, and climatological. The southern part of the state experiences very hot summers and the northern half of the state has cold winters. The peak summer temperatures in Phoenix for the last five years beginning in 2010 were 112 degrees (July 10, 2010), 118 degrees (July 2, 2011), 116 degrees (August 9, 2012), 119 degrees (Jun 29, 2013) and 116 degrees (July 24, 2014). On June 26, 1990, the peak temperature was 122 degrees. In contrast, the lowest winter temperatures in Flagstaff for the last five years beginning in 2010 were -9 degrees (December 31, 2010), -18 degrees (January 1, 2011), -3 degrees (December 28, 2012), -8 degrees (January 14, 2013) and 6 degrees (February 3, 2014).

The geographic and geologic makeup of Arizona, the availability of water, as well as the small amount of private land, also factor into the timeframe and location of plant siting. The breakdown of land ownership in Arizona is: 15 percent Private; 12.50 percent State; 44.5 percent Federal; 28 percent Tribal.[25]

II. EPA'S PROPOSED CARBON RULE DOES NOT WORK FOR ARIZONA.

A. EPA's Approach Places An Unequal And Disproportionate Burden On Arizona.

The Proposed Carbon Rule seeks to achieve an approximate 30 percent overall reduction (from 2005 levels) by the power sector in carbon emissions nationwide by 2030.[26] However, EPA's Proposed Carbon Rule is not based upon each state's contribution to total U.S. carbon emissions but rather on how much carbon reduction EPA assumes is achievable by each state.[27]

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[21] Arizona median household income is $47,826; national average is $51,371. http://quickfacts.census.gov/qfd/states/04000.html.
[22] Arizona's poverty rate is 18.7%; national average is 15.9%. http://quickfacts.census.gov/qfd/states/04000.html.
[23] http://quickfacts.census.gov/qfd/states/04000.html.
[24] *Id.*
[25] http://www.blm.gov/az/st/en/prog/maps.html.
[26] 79 Fed. Reg. at 34,832.
[27] *Id.* at 34,892-893.

Under EPA's proposal, the states' goals are based upon the output of a set of four building blocks in which EPA have made certain underlying assumptions about the electric market in each state and the state's ability to achieve carbon reductions through the use of various building blocks, including RE and EE.[28] This building block approach underlies all of EPA's various proposals with respect to carbon reductions.

EPA's building blocks contain underlying assumptions that result in a disproportionate and significantly higher burden being placed on Arizona. While Arizona only accounts for approximately 1.88 percent of the total CO_2 emissions from generation units affected by the proposed rule, it is required to provide approximately 5.16 percent of the reduction by 2029. Exhibits 1 and 2 reflect Arizona's CO_2 emissions rate on a thousands of tons or mass basis and on a per capita basis. Arizona falls in the middle of the states with respect to its carbon emissions. However, as shown in Exhibit 3, Arizona's ratio of percent of reduction to percent of contribution is 2.74, the highest of any state. In Arizona's case, the proposed rule would require a 52 percent reduction in the emission rate from 2012 to 2029. This is the second largest reduction of all the states as shown in Exhibit 4.

While EPA's Proposed Carbon Rule gives some states considerable flexibility to meet their goals, this is not true for Arizona. This lack of flexibility would result in closure of all coal plants in Arizona by 2020, a goal that is simply impossible to meet while maintaining the reliability of the electric system. *See* Exhibit 5.

Through Building Block 2, EPA penalizes states like Arizona that have developed diverse generation portfolios as well as states that have a large amount of jointly owned or merchant generation. EPA wrongly assumes that all of the energy produced in Arizona is available for use within the state to offset higher CO_2 emitting EGUs. In reality, much of this power is delivered outside of the state to other loads. This is one of the fatal flaws in EPA's application of Building Block 2 that results in substantially over stating the amount of coal and oil/gas steam generation that can be displaced by the NGCC generation in Arizona. These errors result in a goal for Arizona that is unjustified. It also deprives Arizona of the flexibility EPA purports to provide to the states in implementing the Proposed Carbon Rule.

Arizona utilities have some of the youngest coal plants in the country. The newer technology utilized in some of these younger plants allows them to operate in a cleaner fashion.

[28] *Id.* at 34,855-854.

In addition, the utilities have all made significant improvements to many of these plants to comply with other EPA pollution control requirements. But none of this is considered by the EPA's building block methodology. Older plants with higher CO_2 emissions in other states could remain in service, while Arizona's newer, cleaner plants would need to be shut down.

EPA also penalizes early adopter states which have achieved significant carbon emission reductions not credited by the Proposed Carbon Rule. For instance, since the mid-1990s, the ACC has approved funding to support utility-sponsored EE initiatives. However, Arizona does not receive credit for EE carbon emission reductions prior to 2012. Arizona's EE goals are also initially set at higher levels than other states which do not have EE programs currently. Another example is Building Block 1, in which Arizona utilities have already achieved many of the efficiency improvements identified by EPA in establishing the 6 percent goal. Because a 2012 base year is used, Arizona utilities get no credit for the efficiency improvements made prior to this time.

In addition, Arizona and 30 other states receive no credit for zero carbon emitting nuclear generation facilities. Instead, Arizona and the other states with nuclear generation are actually penalized by EPA's treatment of these plants. EPA has penalized states with nuclear generation by giving them a more stringent goal as a result of EPA's imputing a 5.8 percent "at risk" nuclear penalty associated with at-risk plants in other states.[29]

In summary, the EPA goal calculation methodology leads to disproportionate and arbitrary results among the states. States with large coal fleets and little or no NGCC or nuclear generation and no RE or EE programs contribute significantly more to the national CO_2 emissions than states with balanced portfolios and aggressive RE and EE programs. Yet, based upon EPA's goal calculation methodology, the states that have little or no NGCC or nuclear and no RE or EE programs are required to make a significantly smaller contribution to the overall 2030 reduction established by EPA. EPA should revise its goal calculation methodology to establish a balanced reduction strategy among the states that has some relationship to each state's contribution to nationwide CO_2 emissions.

B. EPA's Interim And Final Goals Provide Arizona With No Flexibility And Are Unworkable.

Arizona interim and final goals as calculated by EPA are 735 lbs. CO_2/MWh and 702 lbs.

[29] 79 Fed. Reg. at 34,870-871; EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 4, Section 4.4.

CO_2/MWh, respectively.[30] Arizona has no flexibility to shift from one building block to another to meet its rate-based goal under the program as proposed. If even small amounts of coal generation are preserved post 2020 to serve summer peak loads, the interim goal cannot be met. This is true even if Arizona substantially increases reliance on Building Blocks 3 and/or 4 above the levels already assumed by EPA in setting Arizona's goal. If no coal generation remains in 2020, using Building Block 1 will obviously have no effect on Arizona's rate (and it would not in any event). Further, Arizona cannot increase reliance on Building Block 2 because the interim goal effectively requires the maximum redispatch possible.[31]

C. The Major Assumptions Underlying EPA's Building Block Approach For Arizona Are Fundamentally Flawed.

1. Building Block 1 as currently structured significantly overstates the efficiency improvements that can be made at Arizona's coal units.

The goal of Building Block 1, as a component of EPA's BSER, is to achieve carbon reduction through improved efficiency at affected coal units. EPA assumes a 6 percent efficiency (heat rate) improvement which would translate to a 6 percent reduction in lbs. of CO_2 per net MWh.[32] The 6 percent efficiency improvement rate was derived in part from a Sargent and Lundy study, which (according to EPA) shows that the total heat rate improvements would be in a range of 4 to 12 percent if all identified best practices and equipment upgrades at a facility were made. However, the Sargent and Lundy study was a generic study that did not consider the particular circumstances of each state. The EPA also acknowledges that "[its] simplified cost analysis…will represent the costs for some EGUs better than others because of differences in EGUs' individual circumstances."[33]

The coal fleet in Arizona is a relatively young fleet on average compared to other states. *See* Exhibit 6. Arizona's coal fleet has an average age of 31 years.[34] In addition, many of the EGUs have already made upgrades to improve efficiency. As a result, even if Arizona used

[30] 79 Fed. Reg. at 34,895 (Table 8).
[31] This was demonstrated in comments submitted to EPA by ADEQ on August 22, 2014 and November 21, 2014. *See* Exhibit 7, Excel file uploaded as separate attachment. The ACC is an active participant in ADEQ's Technical Working Group, as are the utilities which the ACC regulates.
[32] 79 Fed. Reg. at 34,896 (Step 2); EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 2.5.10.
[33] EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 2.6.2.
[34] Operating Year specified in 2012 EIA 860 data.

Building Block 1 in its compliance plan, the Arizona coal fleet could not on average achieve a 6 percent efficiency improvement. This Building Block as currently structured is unusable for Arizona.

One other point with respect to Building Block 1 deserves comment. If such improvements are possible, they could conceivably subject the LSE to application of EPA's other proposed rule, section 111(b), which may act to discourage any improvements to the extent they could be made.

2. The assumptions underlying Building Block 2 are inaccurate, resulting in goals for Arizona that cannot be met without shutting down all coal plants by 2020.

The goal of Building Block 2, as a component of EPA's BSER, is to reduce carbon emissions by displacing coal generation through increased operation of more expensive existing NGCC generating units, which have lower carbon emission per net MWh.[35] EPA does this by assuming the annual operation of a state's NGCC generation could be increased up to a maximum of a 70 percent capacity factor or until all of the 2012 coal and oil/gas generation MWh from affected units is displaced, whichever is lower, beginning in 2020.[36] In Arizona's case, the application of Building Block 2 accounts for 77 percent of the required reduction in the CO_2 emissions/net-MWh as proposed by EPA.

There are a number of erroneous assumptions in EPA's application of Building Block 2 that result in an overstatement of the amount of coal and gas steam generation in Arizona (and likely other states) that could be displaced by NGCC generation starting in 2020.

EPA's redispatch calculation is erroneously based upon the annual capacity factor of NGCC capacity. Arizona and other states in the desert Southwest are highly summer peaking, and as a result, the NGCC generation is used at much higher capacity factors in the summer than in the non-summer months. By using the annual capacity factor, EPA misses this fact and as a result effectively assumes energy from the non-summer months could be used in summer months to displace coal. The only correct way to determine the amount of coal generation that could be displaced by NGCC capacity is through the use of an hourly or even sub-hourly generation dispatch model which would take into account all of the appropriate generation dispatch constraints such as regulation reserves, spinning reserves, ramp rates, etc.

[35] EPA 20140602tsd-state-goal-data-computation_1.xlsx.
[36] 79 Fed. Reg. at 34,896 (Step 3).

The result of this error leads to EPA's unrealistic assumption that all of Arizona's coal generation could be replaced by NGCC capacity in the summer, and that Arizona's utilities could still meet their load obligations. This assumption is incorrect. An examination of the 2012 actual hourly data of the affected generating units using data from EPA's Clean Air Markets Division in 2012 demonstrates that the NGCC generation is not adequate to displace all of the coal generation. This data also demonstrates that the capacity factor of the NGCC generation in the summer months is about double the annual average of 27 percent used by EPA in its goal setting. *See* Exhibit 8.

The ACC realizes that EPA may not have ready access to hourly data or may lack the capability to perform an hourly dispatch. However, if EPA cannot perform the hourly analysis, then EPA must at least use the maximum monthly capacity factor for NGCC units. Monthly net energy is readily available to EPA to calculate these capacity factors, and EPA's failure to use this readily available data is unreasonable.

EPA uses nameplate capacity to estimate the amount of energy available from NGCC capacity available in the state. Arizona has 11,202 MW of NGCC nameplate capacity.[37] However, nameplate capacity should not be the relevant metric. For example, the maximum capacity and output from an NGCC unit is highly dependent upon air temperature and altitude. In addition, nameplate capacity does not reflect the net output available from a unit as a result of station power loads. Instead of nameplate capacity, the ACC recommends that the EPA should use net capacity, compared to the summer and winter capacity ratings contained in the 2012 U.S. Energy Information Administration's 860 electricity data report[38] for the Arizona affected units. The capacity used by EPA is overstated by 1,255 MW in the winter and 1,897 MW in the summer, resulting in an overestimate by EPA of the amount of energy that can be produced from the NGCC units. This error would apply to all states with NGCC capacity.

In applying Building Block 2 to Arizona, EPA also assumes all of the NGCC capacity is available for dispatch in Arizona. EPA fails to recognize that while large amounts of merchant owned generation are located in Arizona, they deliver energy to another state. In Arizona, Palo Verde is a natural trading hub that developed due to the availability of both electric transmission and gas pipeline infrastructure. Much of the NGCC generation is delivered to California. As a result, the EPA application of Building Block 2 fails to consider existing commercial

[37] EPA document 20140602tsd-state-goal-data-computation_1.xlsx.
[38] www.eia.gov/electricity/data/eia860/.

arrangements for merchant NGCC capacity and assumes the capacity can be used by load serving utilities within Arizona to displace those utilities' coal fired generation even though those utilities do not own or have any long-term rights to the capacity and energy from the merchant NGCC units. In Arizona, this represents approximately 50 percent of the NGCC capacity in 2012 that the EPA assumed would be available for use by Arizona utilities to serve load within the state.[39]

Moreover, EPA's assumption that all coal generation could be replaced by NGCC by 2020 fails to consider the implications for the gas pipeline system in Arizona. The ACC is aware that the merchant NGCC generators frequently use non-firm pipeline capacity because it is generally available in the summer time when they run the most. As explained in greater detail in Exhibit 9, there is very little firm gas pipeline capacity and no storage capacity available at this time in Arizona. Firm gas pipeline capacity would be necessary if the Arizona utilities were forced to rely on the merchant NGCC capacity year round. In addition, there are currently no plans for the addition of new pipeline capacity to serve Arizona. The construction of new pipeline capacity can be a very lengthy process, with the recently completed Transwestern Phoenix expansion a prime example. This pipeline project took close to five years from the initial open season to operation and cost approximately $950 million.[40] As a result, it is almost certain that there would not be adequate firm gas pipeline capacity by 2020 to meet the needs under EPA's assumptions. NERC recently identified the need for natural gas pipeline expansion under EPA's Proposed Carbon Rule and specifically identified Arizona as one of the states in which current and planned infrastructure is inadequate to handle increased natural gas demand due to the Proposed Carbon Rule.[41]

EPA's assumption that the existing NGCC generation could replace all of the coal generation also ignores the electric transmission limitations within Arizona. Currently, the major load pockets (Phoenix and Tucson) are served by transmission lines from the coal plants, which tend to be in the northeastern part of the state, and by transmissions lines from the Palo Verde

[39] 2012 EIA 860 data.

[40] *See* Ex. 9.

[41] NERC Report "Potential Reliability Impacts of EPA's Proposed Clean Power Plan", ("NERC 2014 Report") November 14, 2014, at 14. www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/Potential_Reliability_Impacts_of_EPA_Proposed_CPP_Final.pdf. The ACC has reviewed this NERC report and agrees with all of the concerns NERC has raised and believe they support the concerns raised by the ACC.

hub, which is to the west. The Palo Verde hub is where the Palo Verde nuclear plant, several gas NGCC plants, and a number of large solar plants are interconnected. If all the coal plants are retired, as assumed by EPA in the goal setting, the majority of the energy would then be coming only from the west where the NGCC gas plants and solar plants are located. Reliance will then be primarily upon the electric transmission lines from the west, which currently are not capable of transporting all of the energy needed from the Palo Verde Hub into the Phoenix and Tucson load pockets. *See* Exhibit 10.

It is also unclear whether EPA took into account permit limits (e.g. air) on any of the NGCC units that would constrain their production output to below a 70 percent capacity factor. While the ACC does not have access to that information, EPA would, and should take such limits into account in the application of Building Block 2 for all states.

In calculating state goals under section 111(d), EPA has assigned a more stringent CO_2 emission rate to existing NGCC units (900 lbs./MWh for Arizona) than proposed for new units under section 111(b).[42] The ACC believes that the analysis EPA conducted under its section 111(b) proposal should hold true under the section 111(d) proposal since EPA evaluated all existing units as a basis for establishing the proposed emissions rate limit for new units. In the proposed section 111(b) rule, EPA's proposed CO_2 emissions rate for new units is 1,000 lbs./MWh-gross (approximately 1,031 lbs./net MWh) for NGCC units with a capacity greater than 850 MMBtu/hour. EPA asserts that these emission rates can be met over the lifetime of a modern high efficiency NGCC unit and are representative of the emission rates of the best performing NGCC units in the country. Therefore, in a final rule EPA should use the same CO_2 emission limit proposed for new NGCC units by EPA under section 111(b) in January 2014, as a minimum emission rate assumption for existing NGCC units.

With the necessary changes discussed above, the costs projected by EPA for implementation of the Proposed Carbon Rule must be reevaluated. EPA has significantly understated the costs associated with implementation of the Proposed Carbon Rule in Arizona and other similarly situated states.

D. ACC's Response To NODA On Building Block 2: Glide-Path, Early Credit For CO_2 Emission Reductions, And Book Life Proposals.

In response to comments received after issuing the Proposed Carbon Rule, EPA issued a

[42] EPA document 20140602tsd-state-goal-data-computation_1.xlsx.

supplemental NODA which seeks comment on a number of issues including those related to Building Block 2.

EPA acknowledged concerns expressed by stakeholders that the interim goals, as proposed, do not provide enough flexibility for some states.[43] In Arizona, for example, the application of Building Block 2 makes a disproportionate contribution to the overall required CO_2 reductions. This result would essentially require Arizona to choose redispatch over other measures. Furthermore, the effect of the interim goal severely limits the opportunity to fully take advantage of remaining asset value of existing coal-fired generation.

EPA went on to note that stakeholders had suggested two ways of addressing these concerns: 1) allowing credit for early CO_2 emission reductions that could be used to allow flexibility to defer additional CO_2 emission reductions until later in the 2020-2029 period; and 2) phasing in Building Block 2 over time, just as Building Blocks 3 and 4 are currently phased in.[44] Under the first approach, full accounting of emission reductions begins in 2020 but credit could be received from certain pre-2020 reductions that would be used to reduce the amount of reductions needed during the 2020-2029 period. Under the second approach, states could choose early (pre-2020) implementation of state goal requirements, which would provide states with the ability to achieve the same amount of overall emission reductions, but do so by making some reductions earlier.[45]

If EPA proceeds to a final rule, it should allow states to establish, in their compliance plans, a glide-path over the period 2020 through 2029 to achieve an end goal set in the rule. Further, each state should be allowed significant latitude in how it achieves that glide-path. The ACC believes that both options described in the NODA, credit for early reductions and phasing in of Building Block 2, are options that a state should be able to use in establishing its glide-path.

EPA is also taking comment on phasing-in redispatch changes under Building Block 2. This is in response to stakeholder comments that significant shifts of generation away from coal-fired generators to NGCC units will be difficult for some states to achieve by 2020 due to technical, engineering, infrastructure, and other limitations, and may limit cost-effective options for emission reductions.[46] Phasing-in would be more consistent with Buildings Blocks 3 and 4

[43] 79 Fed. Reg. at 64,544.
[44] *Id.* at 64,545.
[45] *Id.* at 64,545-546.
[46] *Id.*

where increased utilization is phased-in between 2020-2029.

EPA notes that stakeholders have suggested at least two additional ways that a trajectory for a gradual phase-in could be developed to respond to concerns. First, a phase-in schedule could be developed for Building Block 2 on the basis of whether, and to what extent, any additional infrastructure improvements (e.g., natural gas pipeline expansion or electric transmission improvements) are needed to support expanded use of existing natural gas-fired generation.[47] Second, Building Block 2 could be modified to respond to stakeholder concerns about the pace with which generation in some states may need to be shifted from higher-emitting to lower-emitting units. EPA suggests that one way to address these concerns regarding stranded investments is for the agency to take account of the book life of the original assets as well as the book life of any major upgrades to the asset.[48] The ACC strongly agrees with this second approach.

The ACC recommends that EPA establish its goals allowing coal plants to operate for their remaining useful life and book life unless a commitment to closure has already been made to comply with other EPA regulations (such as regional haze). For a unit that has made recent major capital expenditures to comply with other EPA regulations, the remaining useful life would take those investments into consideration. Therefore, although we appreciate EPA's consideration of book life in the NODA, it should not be used as a substitute for the agency's statutory obligation to allow for the consideration of affected units' remaining useful life.

In its NODA, EPA states that due to the flexibility provided by EPA in its approach to establishing state goals, and the flexibility provided to states in developing plans to achieve those goals, its proposal provides states the flexibility to specify appropriate requirements for individual EGUs, including coal-fired EGUs, taking into account the potential for stranded investments and other unit-specific factors.[49] However, Arizona has no flexibility under the building blocks. EPA offers that, to the extent stakeholders are concerned that the tools available are inadequate regarding stranded investments, an additional way to address these concerns may be for the agency to take account of the book life of the original generation asset, as well as the book life of any major upgrades to the asset, such as major pollution control retrofits. EPA requests comment on whether and how book life might be used as part of the basis for the

[47] *Id.*
[48] *Id.* at 64,548-549.
[49] *Id.*

development of an alternative emission glide path, or used to evaluate whether other ways of developing an alternative glide-path would address stakeholder stranded investment concerns.

The ACC believes that the final EPA rule must allow states to consider and use book life and remaining useful life (assuming 40 years) of the original generation asset, as well as consider the impact on book life and remaining useful life of any major upgrades for pollution control equipment to the asset, even if that results in those units operating beyond 2030. Book life and remaining useful life can be used to extend the glide-path or to raise the overall goal. For Arizona, five coal-fired generating units have remaining book lives that would result in their economic operation into the period between 2020 and 2030: Cholla 1, 3, 4 (through 2024), Springerville 1 (through 2025), and Springerville 2 (through 2030). There are also five coal units that have remaining book lives that would result in operation beyond 2030: Apache ST3, Coronado 1 and 2, and Springerville 3 and 4.[50] Absent consideration of book life and remaining useful life, the stranded investment in Arizona could be up to $3 billion.[51]

The ACC also believes that EPA should recognize actions being taken by utilities within the interim period to comply with other CAA programs, such as regional haze, that result in the cessation of coal-firing at affected units. If owners of these coal-fired units have made a commitment either to shut down or convert to natural gas before the date of the final rule, it would be unreasonable to include them for redispatch under Building Block 2 prior to their committed shutdown or conversion date.

EPA's NODA also sought comment on EPA's application of Building Block 2 on a regional basis, under which generation from fossil fuel-fired steam units within a region is shifted to NGCC units within the region. The ACC does not support a regional approach to the application of Building Block 2. As pointed out in the ACC's comments, there are already serious flaws in the EPA's application of Building Block 2 on a state basis, and using a regional basis would simply exacerbate some of those issues. A prime example is the failure of EPA's goal calculation to recognize the impact on gas pipeline and electric transmission system infrastructure needs that would result within a state if coal generation were to be shifted to existing NGCC. Applying Building Block 2 on a regional basis in EPA's goal calculation model would compound this failure by not considering whether the necessary electric transmission and

[50] Operating Year specified in 2012 EIA 860 data.

[51] "Assessment of Clean Power Plan Prepared for: Arizona Utility Group," ("PACE Study") November 21, 2014, at 10.

gas pipeline infrastructure exists to support such interstate energy transfers within whatever region EPA chose to use.

The ACC previously commented that EPA's approach for Building Block 2 ignores the ownership of NGCC units. It simply assumes that the utilities that own fossil steam generation will be able to purchase energy from NGCC merchant generators. Applying Building Block 2 on a regional basis would exacerbate this problem. A regional approach would presume that a state reliant on another state by EPA's calculations could actually procure energy from generators within that other state as one possible compliance option. In bilateral wholesale markets, such as those used in Arizona and other surrounding states, this may not be possible even if the necessary infrastructure were in place. The ACC believes that using the regional approach proposed in the NODA is not appropriate and would in fact reduce a state's compliance flexibility by assuming one state could rely upon NGCC generation in another state in determining its goal when access to that generation may not be available.

E. ACC's Response To NODA On Building Block 2: Disparity In State Goals Proposal.

In its NODA, EPA recognizes concerns as to the disparity in state goals between states with little to no NGCC generating capacity and those with significant amounts of NGCC capacity. To mitigate this concern, EPA seeks comment on whether the final rule should include a requirement for those states with little or no NGCC generation to employ natural gas generation beyond what EPA included in the proposed rule, including construction and/or increased utilization of new NGCC units and additional co-firing of natural gas at existing fossil steam units.

Specifically, the EPA seeks comment on:

> ...how this approach to add a minimum requirement for states that currently have little or no NGCC capacity should be related to the proposed approach that requires states with significant amounts of unused NGCC capacity to utilize up to 70% of that capacity. Note at the outset that the total nationwide amount of NGCC generation assumed under building block 2 is approximately 1,450 terawatt-hours (TWh). Should the minimum generation shifts in states with little or no NGCC capacity be in addition to this total amount? Alternatively should the total level of gas use for purposes of building block 2 be held the same? Under the latter approach, the amount of generation from states with higher amounts of NGCC capacity would be reduced in amounts equal to the additional NGCC generation applied to states with zero or low-NGC capacity states, for building block 2. This

> approach would further reduce the disparities between states with little or no NGCC capacity and those with significant amounts of NGCC capacity.[52]

The ACC believes this approach could help mitigate the significant disparity between state goals as proposed in the rule, but only if EPA reduces the NGCC generation of states with existing higher amounts of NGCC capacity. Note, this may not be true for tribal lands. EPA should not increase the total amount of NGCC generation assumed in the goal calculation, as this would not provide any relief to states with existing high amounts of NGCC. This approach would distribute the burden of switching to more natural gas generation to all states, and allow states to maintain a more appropriate resource mix. The ACC also believes making the corrections to the goal calculations would accomplish a more realistic and balanced approach.

F. Building Block 3 Has Flaws Which Work Against Certain Regions And States.

Under Building Block 3, states and utilities may use an expanded amount of less carbon-intensive generating capacity to lower the net carbon output goal.[53] Low or zero carbon generation would be substituted for more carbon intensive generation at affected EGUs. BSER for Building Block 3 is comprised of three components: renewable energy, nuclear generation at risk, and new nuclear generation.[54] EPA applied the first two components in calculating Arizona's proposed CO_2 emission rate goal. EPA identifies these measures as ways to reduce generation output at affected fossil fuel generating units and includes a forecasted level of renewable energy and nuclear generation at risk in calculating Arizona's goal.[55]

1. EPA's treatment of nuclear generation in Arizona is arbitrary.

EPA recognizes the value of new and preserved nuclear capacity in the following passage:

> Nuclear generating capacity facilitates CO_2 emission reductions at fossil fuel-fired EGUs by providing carbon-free generation that can replace generation at those EGUS. Because of their relatively low variable operating costs, nuclear EGUs that are available to operate typically are dispatched before fossil fuel-fired EGUs. Increasing the amount of nuclear capacity relative to the amount that would otherwise be

[52] 79 Fed. Reg. at 64,550.
[53] EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 4.
[54] *Id.*
[55] 79 Fed. Reg. at 34,866-871.

> available to operate is therefore a technically viable approach to support reducing CO_2 emissions from affected fossil fuel-fired EGUs.[56]

The Palo Verde Nuclear Generating Station, the only nuclear power plant in Arizona, produces about 35 percent of the electric power generated in Arizona. It is the largest nuclear power plant in the United States.[57] The plant is located about 50 miles west of the Phoenix metropolitan area, and serves about 4 million consumers in Southern Arizona and Southern California (Los Angeles and San Diego). The plant became fully operational in 1988 and in 2011 obtained an extension of its operating license to 2047.

Under the Proposed Carbon Rule, Arizona does not receive any credit for this large nuclear facility. Instead the state is actually penalized because EPA, relying on an EIA Annual Energy Outlook report which projects an additional 5.7 GW of capacity reductions to the nuclear fleet nationwide, imputes 5.8 percent of nuclear capacity in Arizona as "at risk".[58]

By treating nuclear power in this way, EPA's proposed "at-risk" provision penalizes Arizona by assigning it a more stringent goal than would be the case if it did not have such generation. There is no evidence whatsoever that the Palo Verde Generating Station is at risk of closing prematurely, certainly not before the expiration of its extended operating licenses in 2047. The effect of EPA's adjustment in the Proposed Carbon Rule is to lower Arizona's lbs. CO_2/netMWH goal by 3 percent. EPA's assumption that the Palo Verde Nuclear Plant is at risk for purposes of goal calculation is arbitrary.

A better way to incent the continued operation of existing nuclear plants is to allow states to include the output from existing nuclear plants above an established threshold as a compliance option in state compliance plans, thereby giving states with existing nuclear generation additional flexibility in developing their compliance plans. One way to do this would be to establish a threshold capacity factor for existing nuclear plants. To the extent the nuclear plant is able to operate above that capacity factor, the incremental generation would be included as a component of Building Block 3. Operation below the threshold capacity factor would have no impact on the state's compliance. The ACC is aware that other parties may be suggesting an

[56] 79 Fed. Reg. at 34,870.

[57] http://www.infoplease.com/ipa/A0004790.

[58] EPA also states that it is aware of six nuclear EGUs at five plants that have retired or whose retirements have been announced since 2012, none of which are in Arizona. 79 Fed. Reg. at 34,870.

approach like this and may include specific recommendations with respect to the threshold to be used.

2. The RE regional goals should be computed based upon all states in the region and reflecting the appropriate Arizona RE goal.

Another component of Building Block 3 would require substitution of higher CO_2 emitting fossil fuel generation with zero emitting RE generation.[59] EPA developed a "best practices" scenario for RE generation based upon Renewable Portfolio Standard ("RPS") requirements established by the states. The best practices consist of a level of renewable resource development for each state (recognizing regional differences) that EPA believes is reasonable. The forecast of RE is based upon what EPA says is an analysis of the potential on a regional basis because the renewable resource potential varies regionally. Thus, EPA divides the country into six regions – East Central, North Central, Northeast, South Central, Southeast and West. Arizona is included in the Western region along with California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. The best practices scenario for each state consists of an annual RE growth factor applied to the state's historical RE generation, subject to a maximum RE generation target. The growth factors and targets were developed separately for each of the six regions.

The EPA used 2012 as the base year for each of the states in the region and summed up the amounts for all states in the region to determine a regional starting level. EPA's approach was to calculate a goal amount of RE for 2029 based upon the average of the 2020 RE standards for each state, excluding from the average states with no state mandated RPS goal, and then calculating the annual growth rate required to reach the 2029 goal from the region's actual 2012 utility scale RE energy. EPA then applied the annual growth rate on a state by state basis to each state's 2012 actual RE energy beginning in 2017 to determine that state's yearly total RE MWh from 2017 through 2029. Each state's RE MWh was limited to its 2020 RPS goal. In Arizona, the total RE energy could not exceed 10 percent. This has the effect of lowering a state's lbs CO2/net MWH goal and accounts for 5 percent of the reduction in Arizona's proposed goal.[60]

In calculating the 2020 effective RE levels to establish the RE level for goal calculation for the Western region of 20.625 percent, EPA left out the states with a zero target. The ACC

[59] EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Ch. 4.
[60] 79 Fed. Reg. at 34,867-868; EPA Technical Support Document GHG Abatement Measures, June 10, 2014, Chapter 4.

believes these states with zero targets should be included in the calculation of the average, which would reduce the average to 16.00 percent.

With respect to the goal of 10 percent in 2020, which was used for Arizona in calculating the average goal for the Western region, EPA's assumptions contain two errors. First, this goal, taken from the ACC's Renewable Energy Standard Tariff ("REST") rules, does not apply to all load in Arizona. The REST is applicable to utilities under the jurisdiction of the ACC. This only accounts for about 60 percent of the load in Arizona. In addition, of the 10 percent goal for 2020 in the ACC's rules, 30 percent must come from distributed generation, which the EPA has not included in its goal calculations. EPA should adjust the goal used for Arizona down to 7 percent to account for these exclusions. Similar adjustments for other states may need to be made.

3. Response to EPA's NODA on Building Block 3.

In its NODA, the EPA also seeks comment on whether states could take credit for renewables developed in other states if they were attributable to state policies such as RPS programs. State targets could be developed by defining regional RE targets, then assigning shares of those regional targets to individual states within the region. EPA's NODA stated that stakeholders have expressed interest in a target-setting methodology that takes into account interstate exchanges of RE in the calculation of state goals. It has been suggested that such an approach would better align with existing state RE policies and potential claims on a given state's RE by parties from other states (such as renewable energy certificates and power purchase agreements).[61] The ACC does not recommend that EPA change the approach used to estimate a state's RE for goal setting, other than making the refinements in the methodology described previously in these comments. With respect to accounting for RE in compliance, the ACC recommends that the only way the states and EPA can ensure that double counting is avoided is to rely on certified renewable energy certificates ("REC") for compliance, whether they are bundled or unbundled from the energy. This approach comports with the Federal Trade Commission Part 260 Guides for the Use of Environmental Marketing Claims.[62]

EPA also notes that some stakeholders have raised concerns that each state's goal is not consistent in its application of the BSER for Building Block 2, as compared with Building

[61] 79 Fed. Reg. at 64,551-552.

[62] http://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-issues-revised-green-guides/greenguides.pdf.

Blocks 3 and 4.[63] The goal calculation for Building Block 2 not only reflects an increase in less carbon-intensive generation, but also applies an equal downward adjustment to each state's total existing fossil steam generation level in 2012, reflecting a generation shift away from higher-emitting fossil steam generation and toward lower-emitting NGCC generation. The result is that total generation is held constant, with only the mix of more and less carbon-intensive generation changing. In contrast, the approach in the proposal for incorporating Building Blocks 3 and 4 in the goal calculations does not reflect shifting generation away from fossil units, because the total amount of generation is increased without any offsetting decrease in generation from 2012 fossil generation levels. The ACC believes that EPA's approach to including Building Blocks 3 and 4 in the goal calculation as proposed on June 18, 2014, is more appropriate than the alternatives proposed in the NODA. As EPA indicates, its original approach allows states to use EE and RE to offset load growth that may result in increased usage of the affected EGUs. In Arizona, which is a growing state with population expected to grow by 36 percent from 2012 to 2030, accounting for such growth is important.[64] Since EPA has not provided for any other allowance for load growth in the goal calculation, the ACC believes that EPA's original approach at least provides for some level of growth in the goal setting.

G. EPA Has Erroneously Assumed That Arizona Utilities Can Continue To Achieve A 1.5 Percent Reduction In Load Each Year Under Building Block 4.

EPA includes Building Block 4 as a component of BSER on the basis that the resulting reduction in load will reduce the demand for generation from the affected fossil generating units.[65] EPA projects a level of EE for each state based upon a forecast of load at the state level and an assumed EE level increase of 1.5 percent of load each year beginning in 2017. For Arizona, this results in a cumulative level of EE MWh in 2029 equal to 11.42 percent of Arizona's 2012 load. This component of BSER has the effect of lowering a state's lbs. CO2/net MWh goal and accounts for 15 percent of the reduction in Arizona.[66]

While the ACC finds that the methodology used by EPA to estimate net cumulative savings as a percent of electricity sales is not unreasonable, the ACC does take exception to the

[63] 79 Fed. Reg. at 64,547-548.
[64] https://population.az.gov/population-projections.
[65] 79 Fed. Reg. at 34,871.
[66] EPA document 20140602tsd-state-goal-data-computation_1.xlsx.

assumed 1.5 percent per year level of EE used for Arizona and other states that have had energy efficiency requirements in effect for a number of years. Although the ACC's current EE rules have only been in effect since 2011, Arizona has promoted EE and other DSM programs since the early 1990's. By 2008, Arizona's largest utility had avoided 455,773 tons of carbon dioxide emissions through the sale of Compact Florescent Light ("CFL") bulbs alone. Additionally, the EPA has assumed that Arizona's EE Standards encompass the entire state when in reality there are a number of electric service entities throughout Arizona that do not fall under the ACC's purview and are not required to adhere to the EE rules. Of the fifteen electric utilities regulated by the ACC, only nine are required to participate in the EE Standard; out of the nine electric companies required to participate in the EE Standard, only one is currently meeting the energy efficiency trajectory incorporated in the rule.

The ACC believes the EPA's current approach to EE penalizes Arizona and other states that are leaders in EE. While Arizona historically has achieved 1.5 percent per year, the ACC does not believe continued performance at this level through 2030, as assumed by EPA, is a reasonable expectation. The ACC believes EE savings become more difficult to sustain as program lives increase. As EE and DSM programs age, there are fewer and fewer cost-effective and impactful measures to be utilized, thus leaving only increasingly expensive incremental EE measures. Given that Arizona has already implemented many of the "easy to obtain" measures, Arizona utilities are left with the increasingly difficult task of getting consumers to invest in higher priced EE measures that offer lower short-term returns.

In 2013, 61 percent of APS's total residential EE savings came from CFLs.[67] With the incandescent lighting phase-out, soon households will have already converted to higher efficiency lighting and utilities will no longer be able to take advantage of this relatively cost-effective and "easily obtained" EE measure. Given the large percentage that EE lighting contributes to the overall goal, and the inability for utilities to realize energy savings derived from EE lighting more than once, it is unrealistic to believe 1.5 percent EE savings can be sustained long term.

While the utilities in Arizona continue to pursue additional measures and programs, they become harder, and more costly to achieve, making a 1.5 percent per year increase less realistic. EPA relied on 12 state studies to set its expanded annual program target savings improvement

[67] http://images.edocket.azcc.gov/docketpdf/0000152867.pdf.

rate at 1.5 percent per year. Out of the 12 studies, 11 contain multiple scenarios with different sets of assumptions to demonstrate wide ranges of what is achievable under alternative financial, technological, and behavioral environments. However, there is no documentation on how each study's respective average annual improvement rate was calculated. Considering that EPA used these studies as the foundation for its 1.5 percent annual improvement rate, the ACC has a serious concern with whether or not 1.5 percent is an appropriate estimation for an achievable and sustainable annual improvement rate over a 13-year period.

Further, the ACC believes it impractical to assume that EE will outpace load growth. EPA used a load growth percentage of 1.3 percent to calculate future system load while assuming year over year EE growth based off of system load at 1.5 percent. The ACC believes the percentage used to calculate load growth is within reason; however, assuming that EE will grow faster than electricity demand beyond 2017 has very complex implications. If this EE growth cannot be sustained, more carbon reduction measures would be required under the Proposed Carbon Rule. Considering that under the current Proposed Carbon Rule, Arizona is already required to discontinue all coal generation, Arizona would be required to shut down existing NGCC to meet the carbon goal. However, due to the discrepancy between load growth and EE savings, Arizona would be shutting down old NGCC plants to meet carbon goals while building new NGCC to meet demand. Construction of this new replacement capacity, as well as related infrastructure, would take time to plan, permit, finance, and build. Additionally, if Arizona could not identify the discrepancy between load growth and EE growth at an early enough stage, grid reliability or CO_2 emission goals could be compromised.

In NERC's November 2014 Report, NERC collected EE program data which was embedded in load forecasts for each assessment area. The annual EE growth provided by utilities to NERC as a portion of total internal demand since 2011 ranged from 0.12 to 0.15 percent. As noted by EPA in Chapter 5 of its GHG Abatement Measures Technical Support Document (page 5-23), a 2009 Electric Power Research Institute ("EPRI") study determined an achievable annualized potential range for EE of 0.20-0.40 percent per year, which was classified as realistically achievable and maximum achievable potential, respectively, through 2030 at the national level. This study was later updated by EPRI in 2014 using a conventional bottom-up engineering approach. The study concluded an average achievable annualized potential of 0.50-

0.60 percent per year, (which was classified as achievable and high achievable).[68]

Based upon the above discussion, the ACC believes that a 1.5 percent EE growth rate is unsustainable for purposes of the Proposed Carbon Rule. Thus, for the purpose of goal setting, Arizona proposes that EPA lower the efficiency reduction level to 0.6 percent per year for those states with EE programs already in effect. If the carbon goal is set using a realistically achievable EE percentage, then there is more flexibility for states to actually utilize Building Block 4 as a carbon abatement measure. The current Proposed Carbon Rule with EE savings of 1.5 percent per year presents challenges for states with existing EE programs and in essence creates a de-facto requirement effectively eliminating all flexibility related to Building Block 4.

The ACC believes that if EPA decides to base the goals in its final rule on the inclusion of Building Block 4, it should do so based upon an EE goal of 0.60 percent per year, rather than 1.5 percent per year.

H. Severability.

Finally, EPA states that the building blocks are severable, because they can be implemented independently of one another. Thus, if any of the building blocks are found to be an invalid basis for BSER, EPA asserts that the goals would be read just to reflect the emissions reductions from the remaining building blocks.[69] The ACC would be very concerned if under this approach, one or more of the building blocks were determined to be invalid and EPA either proceeded to enforce the goals using the remaining building blocks or recalculated and applied new goals without going through a new notice and comment process. The ACC believes this would be unlawful, arbitrary and capricious.

I. The Proposed Carbon Rule Will Undermine The Provision of Reliable Electric Service.

EPA's building blocks, as applied to Arizona, result in a goal that provides Arizona no flexibility, and that would require Arizona to shut down all coal plants by 2020 in order to comply. However, such a compliance requirement is not possible without jeopardizing grid reliability and the reliability of electric service.

Arizona utilities would need to construct or acquire other non-coal resources in order to reliably serve their loads.[70] Based upon an analysis completed by the Arizona utilities, they

[68] EPRI 2014 Study (April 2014).
[69] 79 Fed. Reg. at 34,892.
[70] "Assessment of Clean Power Plan Prepared for: Arizona Utility Group," ("PACE Study") at 7

would need to acquire over 2,000 MW of additional generation capacity at a cost of over $2 billion by 2020 to meet their firm load obligations if they stopped use of all coal units.[71] In addition, the fuel and purchase power costs would increase by over $17 billion through 2030.[72] While the Arizona utilities might be able to meet some of these needs through acquisitions or power purchase agreements with existing NGCC generators, not all of these needs can be met without new capacity being built. However, the ability to develop sufficient new capacity by 2020 is not possible. Given that a state will not know until 2017, at the earliest, if its plan is approved, there will not be adequate time to develop, site and construct new generation, electric transmission and associated gas pipelines if the new generation is gas fired. NERC acknowledged these same concerns in its November 2014 Report when it concluded that more time would be necessary to implement the Proposed Carbon Rule to accommodate reliability enhancements, pointing out that areas that experience a large shift in resource mix are expected to require electric transmission enhancements to maintain reliability.[73]

In Arizona, the geographic distribution of the non-coal-fired generation assets gives rise to several concerns when the coal plants are shut down. It limits the transmission access to the largest load pockets. As a consequence, the grid becomes immediately less robust in the event of transmission disruption. This is not a concern that can be quickly mitigated by new-build generation or transmission projects. It would be difficult, and costly, to site new NGCC generation at several of the existing coal generation locations to take advantage of existing power transmission, because of the altitude impact on NGCC output and because gas transmission pipelines do not run near these locations.

There may also be significant transmission reliability issues that will need to be addressed if all, or even substantial amounts, of Arizona's coal generation must be shut down. A recent study completed by the Southwest Area Transmission ("SWAT") Sub-regional Planning Group, attached as Exhibit 11, evaluated different levels of coal shutdowns under different resource replacement scenarios in 2019 for the Arizona-New Mexico-Southern Nevada foot-print. This analysis found that, under a scenario in which about 4,800 MW of coal generation was shut down and replaced with about 3,900 MW of renewable resources and 900 MW of

(November 21, 2014).
[71] *Id.*
[72] *Id.* at 10.
[73] NERC 2014 Report at 2.

reduced flow to California, there was inadequate inertia and dynamic reactive capability, leading to instability in the electric system under certain contingencies. As indicated, this was a preliminary "book ends" study, and the only conclusion that can really be made is that there could be potential problems that will need to be addressed, and that more detailed study is needed. A broader geographic area should be considered in order to identify impacts on the broader Western Interconnection.

Since 2000, the ACC has completed Biennial Transmission Assessments ("BTA") for the Arizona Transmission System in accordance with A.R.S. § 40-360.02.G. The purpose of the BTA is to ensure the adequacy of the existing and planned transmission facilities in Arizona to meet the present and future electrical energy needs in a reliable manner. The BTA is completed based upon ten year transmission plans filed annually in accordance with A.R.S § 40-360.02.A by any entity anticipating the construction of transmission within the next ten years in Arizona. In addition, the BTA contains specific studies such as the Ten Year Snapshot and Extreme Contingency Analysis, both of which look at the aggregate impact of all planned transmission. Over the years, BTAs have also directed the Arizona utilities to perform additional studies to address concerns raised in the BTA process. For example, the ACC has requested assessments of transmission that would enhance the access to renewable resources. In the most recent BTA approved in October 2014, the utilities have been directed to assess the potential impact on the reliability of the electric system in Arizona of a significant reduction in coal generation.[74] However, the ACC stresses that issues of this magnitude take time to examine and resolve.

Arizona, along with other western states, has worked to create a reliable, flexible grid that will be impacted, possibly severely, by a shift in the planned resource mix and location that is anticipated as a result of the Proposed Carbon Rule. More time is necessary to further study the impacts of these possible changes.

The electric system is an interconnected grid and reliability issues in one state can have impacts that reach well beyond its borders. For example, the impact on system stability and dynamic reactive capacity of retiring large amounts of coal could impact the entire Western Interconnect as demonstrated in the SWAT study discussed above. Setting state goals that require shutting down coal by 2020 does not allow adequate time for system planning and implementation of the necessary changes that would be required to correct identified issues.

[74] http://images.edocket.azcc.gov/docketpdf/0000157574.pdf.

The nature of Arizona's climate leads to substantial load peaking in the summer months. As described earlier, to serve load in Arizona during peak summer months requires full use of all NGCC *as well as* all coal-fired generation. But as explained above, continued usage beyond 2020 of any coal jeopardizes compliance with both the interim goal and the final goal, barring unrealistic advances in the installation and adoption of Building Blocks 3 and 4 measures.[75] The realistic outcome is that shuttering coal fired generation by 2020 to comply with the interim goal will result in an inadequate amount of resources to meet load during peak periods in the summer. Due to the need for power for cooling, and Arizona's attractiveness as a destination state for elderly, fixed income citizens, reliance on Building Block 2, as the proposed Arizona compliance targets require, will cause a clear health and safety problem.

Each spring, electric utilities and major gas pipeline companies present to the ACC an update on their preparedness to meet the needs of consumers for quality and reliability of service during the peak summer season. The utilities include assessments about their resource and transmission system adequacy to meet projected peak demands. They also discuss emergency plans that are in place to respond to extreme outage events, extreme system conditions, and events of natural disaster, including storms or wild fires. The major gas pipeline companies also discuss the readiness of the gas pipeline system to meet the demand of the gas fired generation in the state. The process allows the ACC to monitor and assess the readiness of the utilities to provide reliable electric service for the upcoming summer peak load period.

Annually, each fall, Arizona's gas utilities and gas pipeline companies present an update on their preparedness to meet the needs of consumers for quality and reliability of service during the winter season. These utilities include assessments on the adequacy of their supply contracts to meet projected peak demands. The major gas pipelines also discuss the readiness of the gas pipeline system to meet the projected demand as well as their operational readiness and plans for addressing emergency situations. The process allows the ACC to monitor and assess the readiness of the utilities and pipelines to provide reliable gas service for the upcoming winter period.

The EPA's Proposed Carbon Rule threatens to overtake well thought out existing state processes designed to ensure reliable electric service to consumers with a hastily devised program where the rules of the game have not yet been developed.

[75] However, it should be noted RE and EE are not adequate substitutes for baseload generation. RE is not always available and EE is not dispatchable as are other energy sources.

J. The Proposed Carbon Rule Will Jeopardize National Security.

Due to the location of affected EGUs in Arizona, the effect of applying the Proposed Carbon Rule also adversely affects national security with respect to critical energy infrastructure facilities by rendering that infrastructure less resilient to natural or man-made disasters. Protection of critical energy infrastructure is important both for national security and economic reasons. FERC recognizes the significance of such assets and has an express carve out from its obligations under the Freedom of Information Act ("FOIA") to protect information relating to such assets.[76] NERC, too, requires utilities to plan in such a way as to maintain consistently robust and reliable electric systems.[77]

EPA's assumption that existing NGCC generation could replace all of the coal generation also creates an energy security concern for Arizona.[78] As explained above, the majority of the NGCC and solar capacity, as well as the Palo Verde nuclear plant, are located west of Phoenix and are connected to the Palo Verde Hub. Even if adequate gas pipeline and electric transmission existed or could be constructed by 2020, use of all of the NGCC capacity at Palo Verde to serve Arizona load exposes Arizona to significant risk. A major disruption or outage of the facilities there would likely black out Arizona and other portions of the Western interconnection.

The application of Building Block 2 will also result in a major shift in the fuel source that EPA assumes could be used to serve Arizona electric load. There will be a shift to natural gas, away from the current more optimal mix of generation sources. EPA however, has failed to consider that Arizona has only two major natural gas pipeline systems serving the state and no in-state natural gas storage. As a result, adoption of EPA's plan puts Arizona at significant risk from natural gas supply disruptions, as well as price increases.[79]

EPA's assumption that the existing NGCC generation could replace all of the coal generation ignores the transmission limitations within Arizona. Currently, the major load pockets (Phoenix and Tucson) are served over transmission from coal plants (which tend to be in the northeastern part of the state), from the Palo Verde hub (which is to the west) as well as some

[76] http://www.ferc.gov/legal/ceii-foia/foia/basics.asp.
[77] http://www.nerc.com/AboutNERC/Pages/default.aspx.
[78] PACE Study at 13.
[79] Note, this issue ignores the fact that the existing gas pipeline is not adequate to supply the increased natural gas usage that would result from the use of the existing NGCC units in base load/intermediate operation mode.

generation located within the load pockets. The Palo Verde hub is where the Palo Verde nuclear plant, several thousand MW of gas NGCC plants, and a number of large solar plants are interconnected. If all the coal plants are retired, as assumed by EPA in the goal setting, the majority of the energy would then be coming only from the Palo Verde Hub to the west of the load pockets. This reliance on congested transmission from the Palo Verde Hub into the load pockets creates a security and reliability issue.[80]

K. The Proposed Carbon Rule Is Contrary To Sound Resource Portfolio Planning.

Arizona currently has a model resource portfolio: 27.3 percent natural gas, 28.8 percent nuclear, 36.2 percent coal, 6.1 percent hydro and 1.4 percent renewable. *See* Exhibit 12. This diversification protects consumers by ensuring adequate baseload and peaking capacity and by minimizing exposure to market fluctuations in any one fuel type as well as fuel disruptions.

The ACC requires Arizona's electric utilities to engage in Integrated Resource Planning ("IRP"), a practice which provides a forward-looking approach to energy planning. Through these rules, each utility must demonstrate how it will meet its future energy requirements in an efficient, cost-effective, and responsible manner.

The ACC conducted its first IRP in 1989 and originally did it on a 3 year schedule with a 10-year forecasting plan. Currently, the rules require that every two years, Arizona's public utilities file a 15-year plan describing how they will fulfill the energy needs of their customers. The companies must identify the sources of the energy they will generate and what percentage of each source will be employed. In the odd years, utilities still submit data, but the full study is conducted every other year.

The IRP rule includes requirements for utilities to identify how they will comply with demand response, EE, and RE Standards. Additionally, the ACC has approved amendments to the IRP rules that would enhance consideration of other elements such as how much water electric companies use in the generation of energy and the level of harmful emissions and by-products such as coal ash that are created through generation. These rules establish utility reporting requirements to facilitate the ACC's review of the utilities' long-range plans.

Adoption of the Proposed Carbon Rule will result in a resource portfolio that is

[80] Note, this issue ignores the fact that the existing transmission system is not adequate for the existing NGCC generation at Palo Verde to serve the additional load now handled by the coal units.

unreasonably leveraged toward natural gas-fired generation. Such a shift would be imprudent from economic, security, and reliability standpoints.

Further, EPA must recognize that RE sources are not replacements for baseload generation. Renewable sources, such as wind and solar, are variable in nature and, as a result, are less reliable in providing energy and grid reliability services such as voltage support, frequency response, and contingency support. Nuclear units, coal units and other forms of baseload capacity provide these necessary services that are crucial for grid reliability, without which any power system cannot operate safely and reliably.

EPA's proposal to substantially reduce Arizona's use of coal resources in a very short time is counter to good resource planning and resource portfolio management, and in essence, would make Arizona hostage to the vagaries of the gas market in the future. It will result in increased exposure to natural gas price fluctuations and disruptions.

The diversification of Arizona utilities' resource portfolios not only affects reliability but directly impacts rate base. A large portion of a utility's rate base is its resource portfolio. In addition, purchased power agreements, as part of a resource portfolio, can have a great impact on a utility's expenses. Therefore, the rates that ratepayers ultimately pay include the utilities' costs to provide service.

L. EPA's Proposed Carbon Rule Does Not Consider Remaining Useful Life, Underestimates Costs And Is Likely To Result In High Rate Increases And Rate Shock For Arizona Consumers.

1. EPA's Proposed Carbon Rule does not allow the state to consider remaining useful life as required by section 111(d).

EPA did not consider remaining useful life as required under the CAA, nor does its proposal allow the states to consider it. EPA relies upon the purported flexibility afforded states under its Proposed Carbon Rule, as somehow excusing its failure to consider the remaining useful life concept.[81] However, as already discussed, not all states have the same degree of flexibility under the Proposed Carbon Rule. As previously demonstrated, Arizona has virtually no flexibility at all.

Arizona has a younger coal fleet and Arizona utilities have made large investments in their coal plants in recent years to comply with EPA regulations. Two coal plants were placed in service less than ten years ago. Failure to consider the age of coal generating units will result in

[81] 79 Fed. Reg. at 34,925.

stranded investment from premature closure of coal plants, which will have significant retail rate implications and reliability implications.

EPA's NODA requests comment on the use of book life to address concerns about the pace with which generation in some states may need to be shifted from higher-emitting to lower-emitting units. EPA suggests that one way to address these concerns regarding stranded investments is for the agency to take account of the book life of the original assets as well as the book life of any major upgrades to the asset.[82] The ACC strongly agrees with this approach.

As the economic regulator in Arizona, the ACC requires utilities to demonstrate that the costs they incur to provide service are "prudent" before they are allowed in rate base and their costs are collected from customers. All else being equal, the ACC would typically not find it prudent if a utility decided to retire an EGU well before the end of its remaining useful life and book life. Such retirements would result in significant stranded costs to ratepayers in Arizona. The ACC is also concerned because NERA estimates the costs of implementation of the Proposed Carbon Rule to be much higher than EPA projects.[83] As noted above, the Arizona median household income is $47,826.00 as compared to the national average household income of $51,371.00. Arizona's poverty rate is 18.7 percent compared to a national average of 15.9 percent.

2. EPA's illustrative IPM results are not supportable.

In addition to the modeling EPA performed to create the compliance targets, EPA also used its integrated planning model ("IPM") to demonstrate the cost/benefit impacts of adoption of the Proposed Carbon Rule.[84] While the IPM suggests that the Proposed Carbon Rule produces a net positive outcome for Arizona, it uses incorrect assumptions and does not provide the level of detailed system modeling to identify the power system reliability issues and gas pipeline constraints that would arise within Arizona. The IPM's analysis of positive cost/benefit impacts is flawed in several ways. It does not consider all costs associated with the Proposed Rule's implementation and some of its underlying assumptions are inaccurate.

For example, in reviewing the results for Arizona, EPA assumes that coal units can be shut down in one year and then brought back on line in future years. This assumption is totally

[82] 79 Fed. Reg. at 64,549.
[83] http://www.nera.com/publications/archive/2014/potential-impacts-of-the-epa-clean-power-plan.html.
[84] 79 Fed. Reg. at 34,839.

unreasonable. EPA also assumes that certain coal units can be operated as cycling/peaking units, an assumption that is not true for the coal units in Arizona. Finally, the import capacity into Arizona from New Mexico, while taken by EPA from a Western Electricity Coordinating Council ("WECC") report, is overstated by over 3,000 MW.[85] In EPA's modeling about 90 percent of the imports to Arizona come from New Mexico, which would be substantially reduced if the proper import capability were used.[86]

Another example is EPA's apparent failure to consider the cost of "stranded assets" in its analysis. In Arizona, this alone could amount to $3.0 billion.[87] Further, it does not appear that EPA contemplated all of the electric transmission and gas pipeline constraints within Arizona with adoption of its Proposed Carbon Rule. Thus, the EPA would have to also factor in the costs associated with building additional transmission lines and pipelines in Arizona when the coal plants are shut down. These costs are likely to be very significant. In addition, some of the existing transmission lines within Arizona may no longer be necessary leading to their retirement before the end of their useful lives. This is another cost associated with EPA's proposal that needs to be considered for Arizona.

In addition, EPA's Proposed Carbon Rule is projected in the IPM analysis to turn Arizona from a net exporter of electricity to a net importer. This would be a drastic change for the state which could have serious consequences for resource diversity, grid reliability and the rates ultimately paid by Arizona consumers.

Finally, the inputs in the model differ from the assumptions made in the emission targets. This creates a disparate result in that EPA is using the IPM to backstop the 111(d) emission targets; however, the two are using a completely different set of assumptions and inputs to do so.

In summary, EPA's illustrative IPM results are not supportable.

M. The Proposed Carbon Rule Does Not Recognize The Significant Efforts Already Made And Being Made In Arizona To Reduce CO_2 Emissions.

Arizona utilities are already achieving significant reductions to their coal portfolios and the state's carbon emission rate as evidenced through the ACC's IRP process. An EPA enforcement overlay in areas not traditionally subject to EPA's regulatory oversight is not necessary or appropriate.

[85] WECC 2014 Power Supply Assessment, https://www.wecc.biz/Reliability/2014PSA_draft.pdf.
[86] EPA IPM analysis results.
[87] PACE Study at 10.

The ACC's renewable initiatives go back to 1996 or earlier when the ACC rules provided for a solar portfolio standard, which set a goal of 0.2 percent from solar energy by 1999 and 1 percent by 2003. Subsequently, the ACC approved an Environmental Portfolio Standard, ("EPS') which required regulated utilities to generate 0.4 percent of their power form renewables in 2002, increasing to 1.1 percent in 2007-2012. Solar power was to make up 50 percent of the total renewables in 2001, increasing to 60 percent in 2004-2012. In 2003, the ACC began its REST rulemaking proceedings. In 2006, the ACC approved the REST, which requires regulated utilities to produce at least 15 percent of their retail sales from renewable resources by 2025.[88] The intent of the REST rules was to "increase renewable energy resources for diversity of the fuel supply, to enhance system reliability and safety in a post 9/11 era, and to mitigate against volatility in non-renewable fuel prices."[89]

The ACC also has a long history promoting EE. Since the mid-1990's, the ACC has approved funding to support utility-sponsored EE initiatives. By 2008, Arizona's largest electric utility company had already avoided 911,545,684 pounds of carbon emissions due to its EE programs alone. In addition, in 2011, the ACC adopted the Electric Energy Efficiency Rules,[90] which concern electric energy efficiency and demand-side management ("DSM") programs and measures. The rules require utilities to obtain 2.2 percent energy efficiency savings by 2020.

In the 2014 IRPs filed with the ACC, three of the four LSEs that file biennial IRPs under the ACC's IRP rules include plans to retire, convert to natural gas, or reduce ownership in coal-fired power plants:[91]

- Arizona Public Service Company ("APS")
  - Retiring Cholla Units 1, 2 and 3 (647 megawatts)
- Tucson Electric Power Company ("TEP")
  - Reducing ownership in Springerville 1 by 197 megawatts
  - Reducing ownership in San Juan by 170 megawatts
  - Converting Sundt Unit 4 from coal to natural gas (125 megawatts)
- Arizona Electric Power Cooperative, Inc. ("AEPCO")
  - Converting Apache ST2 from coal to natural gas (175 megawatts)

[88] A.A.C. R14-2-1801-1816.
[89] http://images.edocket.azcc.gov/docketpdf/0000041234.pdf, (ACC Decision No. 68566).
[90] http://images.edocket.azcc.gov/docketpdf/0000116125.pdf, (ACC Decision No. 71819).
[91] http://images.edocket.azcc.gov/docketpdf/00001576585.pdf.

The remaining LSE that files biennial IRPs (UNS Electric, Inc.) has no ownership in coal-fired generation.

In total, APS, TEP and AEPCO have announced plans to reduce their existing coal fleets by 1,314 megawatts through retirements, reductions in ownership and conversions to natural gas. In addition, these three LSEs and UNS Electric, Inc. ("UNSE") plan to add significant amounts of renewable resources, energy efficiency programs and natural gas-fired resources in future years. As a result, while today the four LSE's depend on coal to produce 47 percent of the electric energy supplied to their customers, by 2028, the four LSE's will utilize coal for only 30 percent of the electric energy supplied to their customers. See Exhibit 12.

The ACC's IRP process allows for evaluation of the various resource portfolio options being considered by the LSEs in Arizona. It is an important state level process that takes into account many factors to ensure that the portfolios of the Arizona LSEs reflect a careful balancing of competing considerations to ensure reliable and affordable electric service in Arizona.

III. THE ACC DOES NOT RECOMMEND THAT THE EPA ADOPT THE PROPOSED CARBON RULE, HOWEVER, IF THE EPA ELECTS TO PROCEED WITH THE RULE, THE ACC RECOMMENDS THE FOLLOWING REVISIONS.

A. EPA Must Revise Arizona's Final Goal So That It Is Based Upon Realistic And Accurate Assumptions.

1. The final goal for Arizona must recognize that some fundamental changes to the building blocks are necessary.

a. Building Block 1.

Based upon the ACC's comments in Section II above, a 6 percent improvement in coal plant heat rates is not reasonable for Arizona's plants. The ACC recommends that EPA reduce Building Block 1 to 1 percent.

b. Building Block 2.

Based upon the ACC's comments on Building Block 2 in Section II above, the ACC recommends the following changes in applying Building Block 2.

First, the ACC recommends that EPA consider how the system is actually operated in redispatching NGCC generation to displace coal and oil/gas steam. Reliance on an annual capacity factor is not appropriate. Instead, the ACC recommends that the EPA perform an hourly dispatch of the system. However, to be conservative, the ACC has used the maximum monthly

capacity factor for the NGCC generation in performing its analyses contained herein. For Arizona, this would be 49.4 percent, which is comparable to the 70 percent maximum capacity factor.[92]

Second, the ACC recommends that EPA use the same CO_2 emission limit proposed for new NGCC units by EPA under 111(b) in January 2014, as a minimum emission rate assumption for existing NGCC units when setting the states' goals. That rate would be 1,031 lbs./MWh-net for NGCC units with a capacity greater than 850 MMBtu/hour.

Third, the ACC recommends that EPA use the average seasonal capacity for NGCC generation rather than the nameplate capacity when redispatching the NGCC generation. For Arizona, this would be 9,626 MW.[93]

Fourth, the ACC recommends that EPA take into account the fact that a significant amount of the merchant owned generation located in Arizona is delivered out of state. This represents approximately 50 percent of the NGCC capacity in 2012 that the EPA assumed would be available for use by Arizona utilities to serve load within the state.[94]

Fifth, based upon the ACC's comments on the need to consider the coal units' remaining useful lives, the EPA's final rules should include any coal units whose remaining useful life and book life extends beyond 2030 as continuing to operate in setting state goals. This should also include coal units that have made recent major investments for prior EPA mandated emissions reductions.

c. Building Block 3.

Based upon the ACC's comments on Building Block 3 in Section II above, the ACC recommends three changes in the calculation of RE for use in Building Block 3.

First, the ACC recommends that EPA revise the calculation of the Western regional goal so that all states, even those with no established state RE rules and hence a zero target now, are included at zero.

Second, the ACC recommends that EPA correct the Arizona goal to exclude the distributed generation portion of the goal.

Third, the ACC recommends that EPA remove the 5.8 percent at-risk nuclear component from states with nuclear generating facilities whose units are not "at-risk".

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[92] EIA 2012 Form 923.
[93] EIA 2012 860 data.
[94] *Id.*

Fourth, the ACC recommends that EPA allow states in their State Plans to establish a threshold capacity factor for existing nuclear plants. To the extent that the nuclear plant is able to operate above that capacity factor, the incremental generation would be included as a component of Building Block 3. Operation below the threshold capacity factor would have no impact on the state's compliance. The ACC is aware that other parties may be suggesting an approach like this may include specific recommendations with respect to the threshold to be used.

d. Building Block 4.

Based upon the ACC's comments on Building Block 4 in Section II above, the ACC recommends that EPA reduce the target annual EE goal to 0.6 percent per year.

2. Arizona's final goal must be recalculated based upon these changes.

If the EPA retains its building block methodology for establishing state goals, the ACC believes that making the corrections to the goal calculations discussed previously in the ACC's comments would accomplish a more realistic and balanced approach.

These changes are summarized below:

1. Use the maximum 2012 monthly capacity factor of 49.4 percent for Arizona as the base when redispatching NGCC generation up to 70 percent capacity factor.[95]

2. Use the average seasonal rating of 9,626 MW for Arizona NGCC units when redispatching to displace coal.[96]

3. Use the 1031 lbs. CO2/Net MWh for NGCC units as allowed in section 111(b) for new NGCC units.

4. Allow coal units to operate through their remaining useful lives and book lives assuming a book life of 40 years, and allow for an additional 20 year life for older plants where major costs have been incurred for EPA required upgrades or retrofits. (Apache ST3, Coronado 1 & 2, Springerville 3 & 4 in service burning coal to beyond 2030).

5. Remove the at-risk nuclear component of Building Block 3.

6. Reduce the Building Block 1 efficiency improvement to 1 percent.

7. Include states without RE requirements and Arizona at 7 percent in determining the regional 2020 average RE goal of 16.00 percent for the

[95] EPA document 20140602tsd-state-goal-data-computation_1.xlsx.
[96] EIA 2012 860 data.

Western Region.

8. Reduce the EE goal to 0.6 percent per year for states that had EE goals in place in 2012.

All of the modifications proposed by the ACC to EPA's goal calculation methodology could easily be applied to all similarly situated states. For Arizona, these changes will result in the following goals as shown in the table below:

Goal Calculations Reflecting ACC Recommended Changes		
Cumulative Changes Reflecting ACC Proposed Changes	**Cumulative Effect of ACC Recommended Changes on Final Goal (2030 and thereafter) lbs. CO2/MWh[97]**	**Percent Reduction from 2012 Actual lbs. CO2/MWh**
1. EPA Goal Calculation	702	52%
2. Use Maximum Monthly Capacity Factor	794	45%
3. All Prior Changes Plus Use of Seasonal Ratings	846	42%
4. All Prior Changes plus use 1,031 lbs. CO2/Net MWh emissions for NGCC units	932	36%
5. All Prior Changes plus allow coal units to operate through their remaining useful life and book life	982	32%
6. All Prior Changes plus remove at risk Nuclear component from Building Block 3	1,009	31%
7. All Prior Changes plus reduce efficiency improvements in Building Block 1 to 1%	1,028	29%

[97] These values shown for the recommended ACC changes are based upon using the maximum monthly 2012 capacity factor for NGCC units in Arizona. As noted in the ACC's comments, the correct way to perform this analysis would be based upon an hourly dispatch of the system. This would result in a higher goal than shown as even using the monthly capacity factor overstates the amount of NGCC generation that could displace coal and oil/gas steam generation.

Goal Calculations Reflecting ACC Recommended Changes		
Cumulative Changes Reflecting ACC Proposed Changes	**Cumulative Effect of ACC Recommended Changes on Final Goal (2030 and thereafter) lbs. CO2/MWh[97]**	**Percent Reduction from 2012 Actual lbs. CO2/MWh**
8.All Prior Changes plus include states with no RE goal in the calculation of the regional average RE goal and adjust Arizona RE goal to 7%	1,042	28%
9. All Prior Changes plus reduce EE goal to 0.6% per year for states with EE programs in place in 2012	1,136	22%

Finally, the Proposed Carbon Rule provides that once the final and interim goals are set for a state, the goals cannot be changed. The ACC recommends that EPA reconsider this finding and instead allow states an opportunity to file for relief and for a change to the final or interim goals if necessary, based upon changed circumstances or good cause shown.

B. EPA Must Also Revise The Interim Goal For Arizona, Eliminate It, Or Allow The States To Establish Interim Compliance Targets And A Glide-Path.

The EPA should allow states to establish interim compliance targets and a glide-path as a part of the state's State Plan filed for approval with EPA. No interim goal should be established by EPA. EPA has repeatedly stated that its goal is to give states flexibility. As explained in the ACC's comments, the goals set for Arizona do not provide that flexibility; in fact, they provide Arizona with no flexibility as 90 percent of the goal must be achieved by 2020 in order for Arizona to meet the proposed interim goal. Removing the interim goal could restore some flexibility for Arizona.

The timing of the application of Building Block 2 should be moved beyond 2020 to allow adequate time and flexibility for states to use all of the building blocks to comply with the end goal in 2030. By applying Building Block 2 fully in 2020, EPA has not reflected the remaining useful life of coal units, allowed time for replacement resources, or for potential gas pipeline and electric transmission infrastructure improvements that might be needed to increase the use

of NGCC generation.

In addition, and as discussed previously, electric transmission system upgrades would be required if increased generation from the existing NGCC plants located west of the load pockets in Arizona are relied upon as compliance options. By applying Building Block 2 fully in 2020, EPA has not allowed adequate time for the development and construction of such transmission, or for natural gas pipelines, which can take five or more years to develop, permit and construct.

EPA's final rule should also allow the states complete flexibility in identification and inclusion of methods of compliance. In the Proposed Carbon Rule, EPA claims that states are not limited solely to Building Blocks 1 through 4 as a means of compliance. Rather, states may identify and include other compliance methods. EPA should give some indication as to what would qualify as allowable compliance methods in addition to Building Blocks 1 through 4. For example, transmission and distribution projects that reduce system losses should be allowed as an option for compliance. The EPA should include this flexibility as part of the final rule.

There are two options for providing true flexibility when creating the State Plans. The best option is the elimination of the interim goal. The State Plan already requires biennial reporting,[98] which will provide the EPA with an updated measure of how the states are progressing. There is no legitimate reason to force a state into having a pre-requirement when it already has a final goal to meet. In order to meet the goal, states will need to reduce emissions over time. Allowing states to determine the best path to do that will be in the best interest of the states and the ratepayers who ultimately may have to fund these changes.

The second option is to establish a glide-path towards the goal that will allow states to more effectively reach the target than if they had to abruptly comply with a majority of the goal 10 years prior to the final goal. This would also allow states to take into consideration the remaining useful lives and book lives of coal plants that would reach the end of their book lives during the 2020-2030 time period. The best option is to eliminate the interim goal, allowing a glide-path towards the end goal with biennial check-ins as required by the State Plan.

C. EPA Must Take Steps to Ensure that the ACC's (and Other States') Role in Ensuring the Provision of Reliable Electric Service, Monitoring National Security Concerns and Overseeing Resource Portfolio Planning Will Not be Adversely Impacted by the Proposed Carbon Rule.

FERC, NERC and the state public utility commissions must be able to continue to ensure

[98] Proposed Carbon Rule at 46.

the reliability of electric service. Furthermore, the Proposed Carbon Rule will usurp the responsibility of State Public Utility Commissions to oversee resource portfolio planning. EPA needs to ensure that long existing state and federal processes are not displaced by a hastily devised plan to reduce carbon emissions in the states. Ensuring the reliability of electric service is a complex undertaking involving a myriad of state and federal agencies. Further, the provision of retail electric service in the states varies. Some states have retail electric competition with multiple providers of service and some states participate in Independent System Operators or Regional Transmission Organizations. Arizona, and other states like Arizona, do not have either of these, but rather its utilities are vertically integrated and participate in bilateral power markets. Resource decisions are made and ultimately approved by the ACC through traditional resource planning and ratemaking processes, not through centralized markets as in some RTOs.

In its November 2014 Report, NERC points out that NERC Reliability Standards and Regional Entity criteria must be met at all times to ensure reliable operation and planning of the Bulk Power System.[99] Arizona supports these standards and expects all the electric market participants in Arizona to comply with any standards applicable to them. NERC also notes that stakeholders have expressed to NERC staff their concerns regarding the need for additional time to mitigate the impacts of the Proposed Carbon Rule.[100] Comments expressed to NERC reflect many of the same concerns the ACC has expressed in these comments: that EPA's proposed time line does not provide adequate time to develop sufficient resources to ensure continued reliable operation of the electric grid by 2020. NERC points out that to attempt to do so would increase the use of controlled load shedding and potential for wide-scale, uncontrolled outages.[101] The ACC supports NERC's recommendation that the EPA, FERC, the DOE, and state utility regulators employ the array of tools within their respective regulatory authorities to develop a reliability assurance mechanism, such as a "reliability back-stop." These mechanisms should include timing adjustments and granting extensions where there is a demonstrated reliability need.

D. The ACC Recommends That Smaller Utilities Be Given Special Consideration.

The ACC endorses others' comments that EPA should exercise its authority in this

[99] NERC 2014 Report at 22.
[100] *Id.*
[101] *Id.*

rulemaking to set out a separate category for small public and cooperative electric generating units to limit the impact of the Proposed Carbon Rule on these power providers. Establishing this subcategory would allow these unique utilities to comply with the Proposed Carbon Rule, while lessening the financial impact on them and their unique customer load.

Electric power cooperatives have dramatically different organizational structures and their customer bases are unique in certain respects as well. Cooperatives are member owned, not for profit entities. Arizona's largest electric generation cooperative, Arizona Electric Power Cooperative, Inc. ("AEPCO") owns and operates one generating station, and provides wholesale power to six rural electric cooperatives, which are not for profit systems that serve end use customers.

The end use customers served by the six rural cooperatives are also unique. They serve approximately 150,000 customers (some of which are located in California and New Mexico). Their customers are mostly residential, and have incomes that are approximately 33 percent below the federal poverty level. They include members of seven Native American tribes. Electric power service is extremely vital to the economies and life-styles of the rural communities in which these customers live, and the costs that the proposed rule would impose on AEPCO and the other cooperatives would result in increased rates to the end use customers. Indeed, it is not certain that power could be sustained if AEPCO were to comply with the Proposed Carbon Rule.

Under each of the scenarios that AEPCO has run, its Apache Generating Station, the only generation that it owns and operates, would have to be shut down. It appears, based on AEPCO's evaluation of the carbon emission goal that EPA set for Arizona, that EPA contemplated replacement of AEPCO's coal-fired sources by other existing NGCC generation. There are several problems with these assumptions.

First, it is not clear that gas generation capacity actually exists. EPA may have overstated the amount of capacity available to AEPCO, particularly considering the amount of available capacity in Arizona and the southwest, and considering that other Arizona providers will also be forced to convert to natural gas from coal to comply with the Proposed Carbon Rule. Second, similar to its analysis for other, larger providers, it is not clear that the gas capacity will be available during peak periods when it is most needed, and coal-fired units cannot be used interchangeably for peaking purposes. Third, the cost of acquiring the capacity, even if it is available, would be prohibitively expensive to AEPCO, as it estimates that the cost of natural gas

would be roughly double that of the cost of coal. Thus, the increase in the cost of fuel alone could result in a substantial rise in cost for the end use customers. Fourth, it is not clear that, even if it were able to switch to natural gas units, the required carbon intensity could be achieved, in part due to the design and elevation of the Apache station. AEPCO may then be forced to rely on EE and RE for compliance with the Proposed Carbon Rule. However, AEPCO does not directly participate in EE programs and RE; only its members do.

In summary, EPA has mistakenly assumed that AEPCO can shift its energy mix, in a short period of time, without considering transmission availability, generation limitations, natural gas availability, gas transportation infrastructure, and other factors that are unique to small providers like AEPCO and its member cooperatives.

EPA either did not know, or did not consider the correspondingly limited financial base and resources of AEPCO. AEPCO's capital, for example, unlike the financial capital of larger electric providers, is patronage capital. It is basically earnings contributed by its members that are legally required to be returned to the members in the future. Together with its limited operating revenues and debts, AEPCO's financial resources are extremely limited, precluding, for example, any opportunity to purchase any additional generation at a reasonable cost.

EPA has assured AEPCO that it, like other electric providers, has wide flexibility to comply with the Proposed Carbon Rule. Without repeating the foregoing comments, it is clear that AEPCO, in reality, has no flexibility to comply with the Proposed Carbon Rule unless it shuts down the Apache Generating Station, with the resulting devastating effects, discussed above, to its end use customers.

At pages 16-19 of its September 29, 2014, comments to the EPA, AEPCO ably detailed what the ACC submits are thoughtful and reasonable alternative measures for small public and cooperative utilities to comply with the Proposed Carbon Rule if EPA exercises its authority to create a small public and cooperative category for compliance with the Proposed Carbon Rule. Instead of "escaping" compliance altogether, AEPCO points out that its proposal, while providing it the ability to continue to serve its end users, would provide for reasonable reductions in the carbon emission rate.

Among other things, the proposal would require reductions in the emissions rate, require certain redispatching to gas units, and require the shutdown of all small public or cooperative units at the earlier the end of their remaining useful lives or December 31, 2039.

In conclusion, considering the size of the small public and cooperative utilities, their

limited financial resources, the proportional amount of the emissions from their facilities, and the potential impact of the Proposed Carbon Rule on their unique customer base, the ACC supports AEPCO's proposal for the creation of a small public and cooperative utility category for purposes of the Proposed Carbon Rule.

E. Federal Enforcement Is Not Appropriate For The "Outside the Fence" Building Blocks.

1. Building Block 2.

Because of the importance of the underlying issues in Building Block 2 to reliable electric service, national security and resource portfolio planning, Building Block 2 should not be subject to federal enforcement. In addition, EPA enforcement is not possible where EPA lacks authority over non-source entities.

2. Building Blocks 3 and 4.

Similarly, a federal enforcement scheme is not appropriate for Building Blocks 3 and 4. For many years, the ACC has had RE and EE requirements in place for electric utilities. The ACC's rules require the utilities to obtain ACC approval for many aspects of these programs on at least a yearly basis. The evolving nature of both programs, including approval of various EE measures and RE projects, makes inclusion of these programs under a federal enforcement scheme highly problematic. If state plans are forced to contain specific requirements on renewables and energy efficiency, the ACC's ability to make appropriate changes to these programs and properly discharge its constitutional authority would be adversely impacted.

3. The final performance period.

The Proposed Carbon Rule defines the final performance period as 2030 and thereafter, when the state must meet the final emission performance level specified in Section 60.5740(a)(3) on a 3 year calendar year rolling average starting January 1, 2030.[102] Defining the final performance period as 2030 and thereafter for the State Plan is unreasonable. Especially for Building Blocks 2, 3, and 4, an EPA enforcement overlay into perpetuity is arbitrary and capricious and is not necessary or appropriate.

F. States Should Be Given Credit For Early Adoption Of Measures Resulting In Reduced Carbon Emission Rates, Rather Than Being Penalized.

As discussed earlier, the ACC has had RE and EE standards in place for many years.

[102] 79 Fed. Reg. at 34,953. Once the final goal is reached a continued EPA enforcement overlay is unreasonable.

Arizona has also taken other actions which had the result of reducing GHGs but has not been given any credit for these actions. Through its IRP process, the ACC has also worked with the electric utilities in Arizona to achieve and ensure a balanced energy portfolio that is not too reliant on any one particular energy source. Further, the Arizona utilities have already taken measures to improve operation efficiencies at their plants. All of these actions have led to reductions in GHGs, but the Proposed Carbon Rule appears to penalize Arizona and its utilities for these actions, rather than reward them.

In the Proposed Carbon Rule, EPA requested comment on proposed alternatives for inclusion of allowing credit for early actions related to EE and other state initiated carbon reduction actions (as early as 2005), or allowing for credit for reductions achieved prior to the performance period. The ACC encourages EPA to give the broadest favorable treatment for state actions taken to reduce CO_2 emissions, and supports a 2005 baseline to facilitate this. Allowing credit for early action will provide a state with increased flexibility in developing its State Plan. Two examples where this would be appropriate are Building Blocks 1 and 4.

G. The Disparate And Unequal Treatment Of The States Needs To Be Remedied.

The Proposed Carbon Rule may accomplish a 30 percent reduction to carbon emissions however, it exacts much greater emission reductions in some states than others and the reductions have no relationship to existing CO_2 state emission levels. This application imposes a heavier burden on some states as opposed to others. Using Arizona as an example, the state has a well-balanced energy portfolio and fairly young fleet of EGUs. However, some states which have a less balanced and more polluting energy mix face significantly less reductions than Arizona. The result is that states like Arizona are being forced to carry a more significant burden than other states because of its diverse energy mix and early implementation of RE and EE. As the ACC has shown, the EPA goal calculation methodology leads to disproportionate and unequal results among the states. States with large coal fleets and little or no NGCC or nuclear generation contribute significantly more to the national CO2 emissions than states with balanced portfolios and aggressive RE and EE programs. Yet, based upon EPA goal calculation methodology, those states contribute significantly less to the overall 2030 reduction established by EPA. The ACC recommends that the EPA revise its goal calculation methodology to establish a balanced reduction strategy among the states that at least has some relationship to the state's contribution to nationwide CO2 emissions.

IV. THERE ARE SERIOUS LEGAL ISSUES RAISED BY THE EPA'S PROPOSAL.

The ACC has submitted extensive comments, discussing in detail many ways in which EPA can modify the Proposed Carbon Rule pursuant to which Arizona may continue its progress in reducing GHGs through the proper exercise of its constitutional authority and responsibility. However, although it has submitted extensive comments, the ACC submits that the EPA does not have the legal authority to promulgate and implement the Proposed Carbon Rule under CAA section 111(d) for all of the reasons discussed in its comments in the following section.

A. <u>EPA Does Not Have The Authority To Promulgate These Broad Sweeping Regulations Under The Clean Air Act.</u>

1. EPA is barred from regulating CO_2 under section 111(d) of the CAA because it has already regulated power plant pollutants under section 112.

Section 111(d) of the CAA requires states to submit plans to EPA imposing "standards of performance" for pollutants emitted by existing stationary sources. This section 111(d) mandate is narrow, however, and applies only when the pollutant: (1) is neither covered by a National Ambient Air Quality Standard nor listed as a "hazardous air pollutant" under section 112; and (2) would be regulated under a new source performance standard under section 111(b) if the existing source were a new source.

Section 111(d)(1) provides, in pertinent part:

> The Administrator shall prescribe regulations which shall establish a procedure similar to that provided by section 7410 [110] of this title under which each State shall submit to the Administrator a plan which (A) establishes standards of performance for any existing source for any air pollutant (i) for which air quality criteria have not been issued or which is not included on a list published under section 7408(a) [108(a)] of this title or emitted from a source category which is regulated under section 7412 [112] of this title but (ii) to which a standard of performance under this section would apply if such existing source were a new source, and (B) provides for the implementation and enforcement of such standards of performance.[103]

Under section 111(d), EPA clearly may not regulate CO_2 when it is emitted from a source category that is regulated under section 112. EPA acknowledges this when it says that the "Section 112 Exclusion appears by its terms to preclude from Section 111(d) any pollutant if it

[103] 42 U.S.C.A. § 7411.

is emitted from a source category that is regulated under Section 112."[104] EPA also acknowledges that the U.S. Code's version of section 111(d) can be read as not to encompass GHGs, because GHGs are emitted from EGUs, which are a source category regulated under section 112.[105]

Despite the clear language of the statute, EPA concludes that its GHG regulations for existing EGUs are legally authorized under section 111(d).[106] EPA concludes that, because of Congress' failure to reconcile two conflicting 1990 amendments (one passed by the House, the other by the Senate), section 111(d) authorizes EPA to establish section 111(d) guidelines for GHG emissions from EGUs, even though EGUs are a source category regulated under Section 112 (*Id.*, page 22), (Section III).[107]

Under the House amendment, section 111(d) standards of performance are barred for air pollutants "emitted from a source category . . . regulated under section 112.[108] Because fossil-fuel power plants are a source category regulated under section 112, the House amendment restricts EPA from regulating GHG emissions from existing EGUs. The Senate amendment, on the other hand, places off limits only "air pollutants." Arguably, there is a conflict between the two amendments.

Both amendments appear in the Statutes at Large, but only the first was incorporated in the U.S. Code; the other was merely a clerical error. Nonetheless, EPA argues that the second entry, despite being a clerical error, creates ambiguity and thus, it is entitled to deference under *Chevron.*[109] EPA's position is incorrect. The "Code of Laws of the United States current at any time shall...establish prima facie the laws of the United States...." 1 U.S.C. section 204(a). The statute on its face is clear. There is no need to resort to legislative history but, even if one does, there is no inconsistency or ambiguity.

EPA is barred from regulating CO_2 under section 111(d) of the CAA because it has already regulated power plants under section 112.

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[104] 79 Fed. Reg. at 34,853, Legal Memorandum for Proposed Carbon Pollution Emission Guidelines for Existing Electric Utility Generating Units ("Legal Memorandum") at 22.
[105] 79 Fed. Reg. at 34,853.
[106] *Id.*
[107] EPA categorized power plants as part of a "source category" under section 112 in 2000. *See* 65 Fed. Reg. at 79,825, 79,830 (Dec. 20, 2000). In 2012, EPA also imposed section 112 restrictions on coal-fired power plants. *See* 77 Fed. Reg. at 9,304 (Feb. 16, 2012).
[108] Legal Memorandum at 24-25.
[109] *Chevron U.S.A. Inc. v. Nat'l Res. Def. Council*, 467 U.S. 837 (1984).

2. EPA's "outside the fence" approach is an unreasonable interpretation of the CAA and is not entitled to *Chevron* deference.

CAA section 111(d)(1) provides in relevant part that "The Administrator shall prescribe regulations which shall establish a procedure similar to that provided by section 110 under which each state shall submit to the Administrator a plan which (A) establishes standards of performance for any existing source for any air pollutant. . . .."[110]

An "existing source" is any stationary source other than a new source.[111] And a "stationary source" is any building, structure, facility or installation that emits or may emit any air pollutant."[112] Clearly, the Proposed Carbon Rule may only apply to specific existing EGUs.[113]

EPA has long been deprived of the ability to set plant-wide new source performance standards. In *ASARCO, Inc. v. EPA,* the Sierra Club argued that the CAA defines a "source" as an individual facility, as distinguished from a combination of facilities, such as a plant. EPA argued that the "broad" statutory definition of stationary source gave it discretion to define a stationary source as either a single facility or a combination of facilities. The court disagreed with EPA's position. "We find this response unpersuasive. The regulations plainly indicate that EPA has attempted to change the basic unit to which the new source performance standards ("NSPSs") apply from a single building...or installation (the unit prescribed in the statute) to a combination of units. The agency has no authority to rewrite the statute in this fashion."[114] EPA may not define the stationary source for section 111 purposes as an entire plant, much less an entire state or entities over which it has no authority. It is also notable that nowhere in its 104 page Legal Memorandum does EPA attempt to justify its decision to treat non-source entities

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[110] Under section 111(a)(1), the term 'standard of performance' means "a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the **best system of emission reduction** which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." (Emphasis added). 79 Fed. Reg. at 34,844.

[111] 42 U.S.C. § 7411(a)(6).

[112] *Id.* at 7411(a)(3).

[113] The EPA's novel interpretation of the CAA is contrary to the 10th Amendment to the U.S. Constitution which does not provide federal agencies the authority to "commandeer the legislative processes of the States." *New York v. U.S.*, 505 U.S. 144, 161 (1992), *citing Hodel v. Virginia Surface Mining & Reclamation Assn., Inc.*, 452 U.S. 264, 288 (1981).

[114] *ASARCO Inc. v. Envtl. Prot. Agency*, 578 F.2d 319, 327 (D.C. Cir. 1978).

(including the state itself) over which it has no authority as stationary sources, or to square the Proposed Carbon Rule's definition with the definition in the CAA. In fact, *ASARCO* and section 111(a)(3) are not cited in the Legal Memorandum.

Despite the CAA's definition of "stationary source," EPA interprets **"best system of emission reduction"** to give it authority to promulgate state-wide application under the Proposed Carbon Rule and to encompass entities not subject to the EPA's authority.[115] EPA defines "system" by giving the term its ordinary, everyday meaning: "a set of things working together as parts of a mechanism or interconnecting network; a complex whole."[116] EPA then argues that the term as defined is very broad with no constraints other than "best" and "adequately demonstrated." Thus, according to EPA, the "system of emission reduction" may include anything that reduces emissions, including the measures in Building Blocks 2, 3, and 4 because they are part of the interconnected electricity sector and result in reduced utilization, and therefore, reduced emissions from the higher emitting fossil fuel-fired power plants.[117]

EPA argues that its reading of its authority under CAA section 111(d) is entitled to *Chevron* deference because of the ambiguity and breadth of the term "system" in the context in which it is found. However, even if CAA section 111(d) is ambiguous – and we believe it is not - as EPA argues, EPA's "outside the fence" approach is not entitled to *Chevron* deference because it is not a reasonable interpretation. A court gives deference to the agency's interpretation only if that interpretation is not arbitrary, capricious or contrary to its proposed reading.[118] Even under *Chevron's* deferential framework, agencies must operate within the bounds of reasonable interpretation. Defining "system" as applying to entities other than the source would extend EPA's reach far beyond any reasonable interpretation.

Further, EPA must consider the statutory provision, viewing the statute as a whole, so that all provisions are considered together and, to the extent possible, reconciled and harmonized.[119] Reasonable statutory interpretation by an agency must account for both the specific context in which language is used and the broader context of the statute as a whole.[120] A statutory provision that, to an agency, may seem ambiguous in isolation is often clarified by the

[115] 79 Fed. Reg. at 34,852.
[116] Legal Memorandum at 51.
[117] 79 Fed. Reg. at 34,852.
[118] *Chevron U.S.A. Inc.*, 467 US 837 (1984).
[119] *Utility Air Regulatory Group v. Envtl. Prot. Agency*, 134 S.Ct. 2427, 2441-442 (2014).
[120] *United Savings Assoc. v. Timbers of Inwood Forest Assoc., Ltd.*, 484 U.S. 365, 371 (1988).

remainder of the statutory scheme because only one of the permissible meanings produces a substantive effect that is compatible with the rest of the law. EPA's new "outside the fence" approach is inconsistent with the CAA's provisions when viewed as a whole.

Nothing in the CAA, including the provisions relied upon by EPA, can be construed to give EPA the broad authority it has assumed. Tellingly, EPA does not rely on any case law to support its position. It relies instead upon several treatises and law review articles to support its position. EPA also relies upon the fact that several states agreed to include EE and RE measures in plans filed with EPA. However, it is one thing to obtain a state's agreement to a plan and quite another to require states to put measures in their plans over which EPA has no authority.

Over the last forty years, EPA has regulated only four pollutants, from five source categories, under section 111(d) (i.e., phosphate fertilizer plants (fluorides) [in 1977], sulfuric acid plants (acid mist) [also in 1977], primary aluminum plants (fluorides) [in 1980], Kraft pulp plants (total reduced sulfur) [in 1979], and municipal solid waste landfills (landfill gases) [in 1996]. *See*, EPA Legal Memorandum at 9-10. This limited history-imposing technology-based limits for a few specific emission points within narrowly based industry categories that emit otherwise unregulated pollutants significantly emitted by few industries-is consistent with EPA's limited use of section 111(d). In contrast, EPA will now use section 111(d) in a manner and scope that is unprecedented. For example, up until now, EPA has set performance standards, which section 111(d) requires for an actual source of emissions, for a stationary source, such as an EGU. And, never before has EPA issued regulations that include a statewide approach that goes "beyond the fence line," outside the area occupied by the actual source of emissions, and thereby, in effect, attempting to regulate an entire state under section 111(d).

In *Utility Air Group v. EPA*, 134 S.Ct. 2427 (2014), the Supreme Court, in an opinion by Justice Scalia, cautioned against the EPA's bold use of the CAA in its regulation of GHGs. In rejecting EPA's conclusion that the Act compels GHG to be treated as a trigger to its stationary source permitting programs, **Justice Scalia warned against finding big programs in small nondescript packages.**

> **EPA's interpretation is also unreasonable because it would bring about an enormous and transformative expansion in EPA's regulatory authority without clear congressional authorization. When an agency claims to discover in a long-extant statute an unheralded power to regulate a significant portion of the American economy, ...we typically greet its announcement with a measure of skepticism.** We expect Congress to speak clearly if it wishes to assign to an Agency

> decisions of vast economic and political significance.... The power to require permits for the construction and modification of tens of thousands, and the operation or millions, of small sources nationwide falls comfortably within the class of authorizations that we have been reluctant to read into ambiguous text. An agency has no power to tailor legislation to bureaucratic goals by rewriting unambiguous statutory terms. (Emphasis added).[121]

The only measure that EPA has authority to implement under a reasonable reading of the CAA is Building Block 1. EPA is without any authority to require the employment of Building Blocks 2, 3 or 4 for any purpose, particularly when those purposes may actually contradict the goals prompting a given state's adoption of the state requirements on which the building blocks depend.

B. EPA's Interpretation Is Not Reasonable In Light Of The Regulatory Framework Congress Has Carefully Crafted For EGUs.

Moreover, even if EPA's interpretation of section 111(d) was an acceptable interpretation of the CAA standing alone, it would not be a reasonable interpretation in light of the federal regulatory framework that Congress has carefully established for EGUs over the past one hundred years. The reasonableness of EPA's interpretation of section 111(d) cannot be assessed in a vacuum. In this case, EPA's statutory interpretation is not reasonable because the practical consequence of EPA's proposed rule is that EPA will engage in oversight of activities that Congress has, heretofore, either given to other federal entities, principally the FERC in partnership with the NERC and/or reserved to the states.[122]

An otherwise acceptable interpretation of a statute is not entitled to *Chevron* deference if it is not a reasonable interpretation of the statute in light of external factors. For example, a statute is not entitled to *Chevron* deference if it raises serious constitutional issues.[123]

In the Proposed Carbon Rule, EPA is claiming de facto authority to perform resource portfolio planning (Building Block 2), establish RE standards (Building Block 3), and establish a national EE standard (Building Block 4). These are all policy decisions that Congress has heretofore reserved to the states. Moreover, if Congress ever acts to federalize these types of

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[121] *Utility Air*, 134 S.Ct. at 2445.

[122] 16 U.S.C. § 824.

[123] *See Solid Waste Agency of Northern Cook Cty. v. Army Corps of Engineers*, 531 U.S. 159 (2001) (declining to extend *Chevron* deference to EPA's Migratory Bird Rule due to the serious constitutional and federalism questions created thereby).

energy policy decisions, surely it will do so under the Federal Power Act, not the CAA. It is not reasonable to believe that Congress gave EPA this authority under the CAA when it otherwise has given FERC such extensive authority in energy policy.[124]

The ACC also notes that, by including Building Blocks 3 and 4, the Proposed Carbon Rule inappropriately extends EPA's authority into areas that are unquestionably beyond what has been approved by Congress. Building Blocks 3 and 4 substantially do not involve resources that generate air emissions. Generally, Building Blocks 3 and 4 encompass nuclear, solar, and wind generation and EE programs. Consequently, they are not covered by any permitting authority EPA has with respect to air emissions. Building Block 3 encompasses both renewable generation and nuclear generation, neither of which produces CO_2 or any other noxious emission covered by the CAA. Building Block 4 involves an assortment of measures as varied as building code changes for residential construction to demand reduction programs and conservation education to replacing incandescent light bulbs with CFL and LED light bulbs.

Because EPA maintains that it has the authority to implement a federal plan in the event that the state does not produce a compliant plan within the proposed rule's timeframe,[125] and because compliance with both the Arizona interim and final goals is impossible without resort to not only Building Block 2 but also Building Blocks 3 and 4, any plan produced by EPA utilizing the stated compliance targets will necessarily require EPA to venture into regulating renewables, demand side management, and resource portfolio planning. None of these measures involve the emission of any sort of air pollutant and are, therefore, beyond EPA's authority to regulate under the CAA.

At present, ignoring cost and time constraints and the impact on reliability of electric service and on national security, Arizona can only meet the compliance targets under one of two scenarios. Either Arizona completely retires all coal generation in 2020, replaces that lost generation with NGCC production and continues aggressive adoption of RE and EE through 2030, or Arizona maintains some small degree of coal-fired generation with an elevated degree of NGCC generation[126] and radically increases the adoption of RE and EE programs. Each of the respective scenarios, assuming technical feasibility, which is doubtful in light of difficulties in

[124] 16 U.S.C. § 824.
[125] 79 Fed. Reg. at 34,951.
[126] As noted above, the ACC does not believe either of these approaches is achievable without jeopardizing the reliability of electric service and national security.

increasing NGCC output and EE discussed elsewhere, still results in a upheaval of the Arizona energy mix.

Under the first scenario, the Arizona statewide resource mix results in an imprudent over commitment to natural gas-fired generation. Under the second scenario, the influx of renewables, which have intermittency issues that will most likely be met with natural gas peaking facilities, still results in a resource portfolio that is highly leveraged toward natural gas (an undesirable result considering the ongoing debate of hydraulic fracturing and the attendant impact on natural gas production cost). Therefore, the Proposed Carbon Rule places EPA in the position of adjusting portfolio requirements toward economically ill-advised standards, as well as the aforementioned security and reliability problems that will immediately be realized by trying to comply. Resource planning selections are not within EPA's authority to determine.

Since the adoption of the CAA, EPA has been the enforcement authority, in connection with state and other local governmental units, as the principal regulator of the nation's clean air. Its proposal under section 111(d) of the CAA would move the EPA to the role of an energy regulator. The regulation of energy, including the transmission and delivery of electric power, has traditionally belonged to the states and other federal agencies, now, principally, the FERC.[127] Under EPA's proposal, the dispatch of power from EGUs, both interstate and intrastate, rather than being on a cost, reliability, and national security basis, would be based on an environmental function. This would imperil a regulatory system that Arizona, FERC, and the other 49 states have historically carried out in an efficient and necessary way. Moreover, section 215 of the Federal Power Act gives states the authority over their electric systems regarding safety, adequacy, and reliability of electric service within the state.[128]

Federal authorities also recognize the lack of analysis that EPA employed. In testimony before the House Subcommittee on Energy and Power, FERC Commissioner Tony Clark noted that FERC, an economic and reliability regulatory responsibilities under the Federal Power Act, is in conflict with the broad responsibilities EPA proposes to assume under its Proposed Carbon Rule. As Commissioner Clark aptly put it, EPA's self-determined role as an environmental dispatcher of energy in a wholesale energy marketplace has placed FERC and EPA on track for a jurisdictional "train wreck" absent Congressional intervention. EPA clearly does not have the jurisdiction to perform the economic and reliability regulation it is engaged in.

[127] 16 U.S.C. § 824.
[128] *See id.*

The conflict does not end at the FERC because state utility commissions also bear responsibility for the intrastate operations of the same utilities. The jurisdictional conflict is the same between EPA and state commissions, as state commissions like the ACC are the economic, safety, reliability, and adequacy regulators of the utilities and their transactions with consumers.

Many of these traditionally state functions are supported by parallel federal regulatory bodies where federal regulation has been found to be appropriate. For instance, FERC and, by extension NERC, participate in ongoing evaluations of transmission reliability and the attendant national security considerations that come from a highly integrated grid. The consequences of poor decisions made with regard to the issues of grid reliability, economic feasibility, resource planning and national security are obvious and stark.

Meeting the projected compliance targets, even with full utilization of Building Blocks 1 and 2, will still necessitate the shuttering of all coal-fired generation by 2020 *and* the accelerated construction of new renewable generation, as well as associated new natural gas peaking facilities, to provide standby power and associated support infrastructure. Not only does this place EPA in the position of setting requirements for RE and EE programs that it has no jurisdiction to regulate, it also interferes with state authority to adequately plan for prudently diversified resource portfolios.

C. The Proposed Carbon Rule And The Four Building Blocks Are Not "BSER" For Arizona.

According to the CAA, an emission limitation is "a requirement established [foremost] by the state or [if a state fails to submit a plan] Administrator which limits the quantity, rate or concentration of emissions of air pollutants on a continuous basis."[129] EPA is given broad authority in determining the appropriate level for the emission standards, but must use "the best system of emission reduction...adequately demonstrated."[130]

The BSERs in the Proposed Carbon Rule do not meet any of these standards as set forth in *Ruckelshaus*.[131] The emission standards must be achievable, or technically feasible. EPA "may make a projection based on existing technology, though that projection is subject to the restraints of reasonableness."[132] However, EPA may not direct the specific means by which a

[129] 42 U.S.C. § 7602.
[130] 42 U.S.C. §7411(a)(1).
[131] *See, e.g., Essex Chemical Corp. v. Ruckelshaus*, 486 F.2d 427, 433 (D.C.Cir. 1973).
[132] *Id.*

state is to achieve its emission standards.[133] To be "adequately demonstrated," the "system of emission reduction" must be "reasonably reliable, reasonably efficient, and reasonably expected to serve the interests of pollution control without becoming exorbitantly costly in an economic and environmental way."[134]

The ACC agrees, as set forth in ADEQ's comments filed on November 21, 2014, that strict application of Building Block 2 to Arizona by 2020 would not constitute BSER for four reasons:[135]

> First, requiring the retirement of Arizona's entire coal fleet by 2020, which would be the effect of imposing BB2 as a stand-alone requirement, would impose unreasonable costs in the form of stranded investments.
>
> Second, EPA modeling of the cost impacts of redispatch pursuant to BB2 appears to be flawed.
>
> Third, the assumption of a 2020 implementation date for BB2 fails to adequately account for the need to develop the infrastructure required for redispatch.
>
> Finally, ... full imposition of BB2 by 2020 or even 2030 could jeopardize the reliability of Arizona's grid and would be inconsistent with EPA's obligation to consider "energy requirements."[136]

However, the problems with the building blocks extend beyond the interim goal. With respect to the final goal, EPA has not considered remaining useful life or book life. In addition, its cost analysis is lacking because it did not consider many costs associated with implementation of the Proposed Carbon Rule in Arizona. In addition, the EPA lacks authority with respect to the subject matter of Building Blocks 2-4 and, therefore, they are an invalid basis for BSER. Application of the building blocks to Arizona does not constitute BSER adequately demonstrated.

D. The Underlying Assumptions Contained In The Building Blocks, Upon Which The State Goals Are Calculated, Are Arbitrary And Capricious, Unlawful And Not Based Upon Any Evidence In The Record.

Under the Administrative Procedures Act ("APA") an agency's actions must not be

[133] *Commonwealth of Virginia v. U.S. Evnt'l Prot. Agency*, 108 F.3d 1397, 1413 (D.C.Cir. 1997).
[134] *Ruckelshaus*, 486 F.2d at 433 (D.C.Cir. 1973).
[135] Arizona Department of Environmental Quality November 21, 2014 Comments on Building Block 2, EPA-HQ- OAR-2013-0602.
[136] *Id.* at 8.

arbitrary and capricious, unlawful or otherwise not based upon substantial evidence. As outlined above, the assumptions underpinning the Proposed Carbon Rule's compliance targets for Arizona are based on flatly incorrect assumptions. Moreover, the Proposed Carbon Rule produces inconsistent goals across the many states with contradictory results from the asserted goals that motivated its issuance. Finally, EPA's promises of flexibility under the Proposed Carbon Rule is contradicted by the unrealistic interim and final goals for Arizona which effectively mandate certain measures in order to comply with the rule.

1. State goals.

EPA employed flawed assumptions in the modeling that produced the individual state compliance targets. Enforcing requirements on the basis of a demonstrably flawed analysis is *per se* arbitrary and capricious.

The basis for the individual state compliance targets is premised on the EPA's assumptions of what measures can be taken within the state in order to reduce per kWh carbon output. EPA set the compliance targets based upon its understanding of the potential viability of each of the building blocks in each state. However, in determining the efficacy of each building block, EPA utilized averages without considering the actual potential improvements possible for each state. For example, with respect to Building Block 1, EPA determined an average heat rate improvement at existing coal facilities and assumed that all states can achieve that goal. The rationale unravels in its application because not all coal-fired generation is of equal vintage or efficiency. Consequently, the EPA assumption that an average degree of improvement is possible is wholly without support and untenable. A newer coal power plant or a plant that has made improvements will simply not have much opportunity to improve efficiency.

As discussed extensively throughout this document, EPA's Building Block 2 does not apply adequate analysis to determine the feasibility of altering operational profiles for dispatch of lower carbon emitting resources. EPA did not consider the ownership of such facilities, existing contracts for output, or access to adequate fuel supplies in order to operate at a higher capacity factor. Furthermore, EPA did not consider whether the type of gas generator operates efficiently at the necessary capacity factors to offset the lost coal generating units that will be shut down for environmental dispatch. All of these issues directly impact the viability of Building Block 2 as a compliance measure.

The credit for at-risk nuclear generation is similarly unsupported as a basis for compliance and for the establishment of a compliance target. EPA's modeling adopted the

blanket assumption that *all* nuclear generation is at risk for shut down during the compliance term and that all nuclear operators can obtain operating license extensions as an offset. As with coal generation, not all nuclear facilities are of an equal vintage and not all are facing the same risk for shut down. EPA's failure to isolate the risk for each installation penalizes facilities that are not exposed to this risk.

With respect to both RE generation and EE programs, EPA also made unjustified assumptions about the viability of such measures for attaining compliance with the interim and final goals. First, many states have rules or statutes that require the adoption of some amount of RE or installation of a set degree of EE. However, these requirements also establish timeframes for compliance and sunset thereafter. In crafting the goals, state utility commissions considered that program adoption would likely favor "low hanging fruit" in the earlier stages and then gradually dissipate as diminishing returns set in. EPA's conclusions regarding Building Blocks 3 and 4 make the arbitrary assumption that new programs can perpetually impact the energy grid to a set degree, well beyond the horizons carefully planned for by state utility commissions. EPA has supplied no analysis to corroborate this assumption. To the extent that many state requirements will sunset at some point, there is no basis for the assumption that investments in RE and EE programs will continue apace.

Further exacerbating matters is EPA's modeling, which effectively penalizes states for pre-existing RE and EE. The same is true for EPA's assumptions regarding the viability of lower emission natural gas generation supplanting coal-fired generation under Building Block 2. States that have substantially *more* coal generation in their energy mix, and *higher* carbon output per kWh, are nonetheless given lower compliance targets under the EPA rule than states with more balanced energy portfolios. Under the Proposed Carbon Rule, this outcome is driven by the rationale that states that have not diversified their energy mix do not have ready means to reduce their carbon output. Effectively, this penalizes states that have already diversified their resource mix to include lower carbon emitting resources such as NGCC, hydro, nuclear, renewables and energy efficiency. Consequently, the Proposed Carbon Rule punishes states that have developed diversified resource portfolios and regulatory processes that encourage the same low-carbon emitting resources that EPA asserts should be promoted under the proposed rule.

As a result, the Proposed Carbon Rule applies inconsistently among states. EPA may suggest that there is a rationale; nonetheless, to the extent that better prepared states may shoulder a greater burden even though they already emit less carbon per MWh than the less

diversified states, the rule is arbitrary. As explained above, the modeling that EPA performed to substantiate its rationale is inherently flawed. Persisting in the issuance of the Proposed Carbon Rule without adjusting the proposed compliance targets, in light of the erroneous assumptions, is arbitrary and unlawful.

Finally, EPA's reliance on state authority to require the implementation of Building Blocks 2, 3 and 4 to support the viability of these options under the Proposed Carbon Rule is without legal merit. EPA suggests that Building Blocks 2, 3 and 4 are suitable measures for the reduction of carbon emission intensity insofar as they displace or avoid the need for generation because the electricity grid is integrated, and electricity and electricity services are fungible.[137] However, many states that have adopted requirements regarding Building Blocks 2, 3 and 4 did so for economic reasons in order to mitigate over- reliance on a limited variety of fuel sources and the consequent vulnerability to fuel price fluctuations. EPA's co-opting of these measures for environmental purposes conflicts with the bases on which such provisions were adopted. For example, Building Block 2 as applied in developing the Arizona compliance target is used as a basis for the complete elimination of coal generation and substitution with gas generation, thereby doubling the exposure of the Arizona electric grid to fluctuations in natural gas prices.

Many states issued EE and RE requirements under their power to economically regulate utilities. Use of these provisions in the fashion that EPA suggests through the Building Blocks 2, 3 and 4 actually run counter to the ends that drove the issuance of those state requirements (i.e. by fostering greater dependencies on a more limited range of fuel sources). EPA would have states imprudently utilize prudently issued state rules to cause the very resource mix imbalances that their RE and EE requirements were designed to combat. Therefore, such uses of these provisions would likely not survive scrutiny for arbitrariness and capriciousness.

More troubling is EPA's recognition in its Legal Memorandum that it could not order the utilization of Building Blocks 2, 3 and 4 in the way it suggests.[138] Rather, it postulates that since states may require the use of such measures, (even if it would be contrary to the objectives of the state requirements), state compliance can involve a mix of such measures to attain compliance.[139]

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[137] 79 Fed. Reg. at 34,852.

[138] Legal Memorandum at 14.

[139] EPA cannot force the states to do what it lacks the power to do under the guise of an illusory notion of flexibility, especially in light of the cooperative federalism intended by Congress under section 111(d).

2. Arizona goals.

Arizona's compliance goals illustrate the logical shortcomings in EPA's formulation of compliance targets for states and its misuse of state provisions regarding RE generation and EE. Likewise, Arizona's example illustrates that it is one of the states that is penalized even though it has already undertaken to implement EE and RE generation requirements.

Arizona has one of the youngest coal fleets in the United States, currently, the sixth youngest out of all the states. The blanket assumption that Arizona could attain the same degree of heat rate improvement as the older, less efficient plants in other states is clearly untenable. Likewise, Arizona has the largest and one of the newest and most efficient nuclear generating facilities in the United States. The only reactor unit to be subject to potential lapsing of its operating license has already obtained a license renewal from the NRC. Consequently, EPA's failure to consider the particulars of Arizona's nuclear fleet improperly overlooks the significance of this measure as an attainable means for compliance.

One of the most troubling aspects of EPA's proposal is EPA's complete disregard for the specifics of Arizona's natural gas fired generation for purposes of evaluating the viability and impact of Building Block 2. EPA made no evaluation about how the natural gas facilities in Arizona are used to meet existing loads or the seasonal nature of Arizona's loads. EPA failed to consider whether there is access to sufficient gas transportation to operate all facilities to the degree EPA modeled for purposes of establishing the compliance targets, or whether Arizona utilities even have the legal right to use the power generated by all of the facilities considered. In fact, many of the natural gas generators in Arizona are merchant facilities that sell most of their power into California. Likewise, due to the severe seasonal peaking issues faced by Arizona, nearly all available natural gas *and* coal-fired generation is required to meet peak demands during the summer months. EPA's failure to account for these constraints undermines the appropriateness of compliance targets adopted on the basis of such faulty modeling.

As a final point, while the ACC certainly does not suggest that other states should be penalized more severely with more stringent goals, ACC would note that Arizona already has one of the lowest per capita rates of carbon emission. Arizona also has a quickly growing population. By contrast, many states with less stringent goals have older coal generation, declining populations and consequently *higher* per capita generation of carbon emissions. Plainly, Arizona is contributing significantly less GHG emissions than many other states. Under such circumstances, placing more burdensome compliance targets on Arizona is illogical,

unreasonable, arbitrary and capricious.

For instance, Arizona is already a net exporter of renewable energy and is an exporter of natural gas-fired generation.[140] As discussed above, in the EPA's IPM analysis, it projects Arizona could instead be a net energy importer. Natural gas-fired combined cycle generation produces higher carbon emissions than the compliance rates (interim and final) permit (approximately 900 lbs. per MWh). To the extent that other states rely on Arizona gas-fired generation to already meet their goal requirements, the Proposed Carbon Rule conceals the export of pollution into Arizona by states importing power from Arizona. EPA's failure to recognize this deficiency in the modeling that shaped the compliance goals is inappropriate.

Moreover, the EPA's inclusion of a 5.8 percent "at risk" estimate for states with nuclear generating stations was derived in an arbitrary and capricious manner, contrary to the most fundamental administrative law tenants for valid rulemaking: EPA assumes that the Proposed Carbon Rule will save 5.8 percent of existing nuclear capacity that is "at risk," and that states can increase generation from renewables. EPA's method of deriving the 5.8 percent at-risk estimate credits each state (with a nuclear power mix) with similar reductions associated with saving the at-risk nuclear plants in each state. This "one-size fits all" methodology makes no sense given the unique orientation of each state. The Palo Verde Nuclear Generating Station is not at risk, and in fact, just received an extension of its operating license to 2047. The inclusion of at-risk nuclear in the baseline emission rate calculation is unique: it is the only part of the baseline equation that projects future activity (i.e., loss of nuclear power capacity). Thus, if states do not maintain their existing nuclear generation, their emission rates will increase (all else being equal). The at-risk nuclear generation apparently lowered the (unadjusted) baselines in some states by as much as 7 percent, thus having a stronger impact than Building Block 1.

Finally, with respect to the state authority that EPA would rely upon for purposes of establishing compliance targets, EPA did not account for the fact that in Arizona's case, the REST as well as the EE Rules both have finite durations and actually terminate coincident with the interim compliance target set in the proposed rule. It would be exceedingly premature for EPA to presume that Arizona will perpetuate, much less surpass the standards set for 2020 by Arizona's rules for purposes of setting either an interim compliance target or a final target.

For instance, with regard to RE, Arizona has experienced numerous challenges that may

[140] http://www.eia.gov/state/?sid=AZ.

impact the ongoing development of renewable generation in the state. The interaction of residential DG solar with the ACC's net-metering rules and the resulting cost-shifting debate has triggered substantial controversy and ongoing discussions regarding revised rate designs for electric utilities. It is the ACC's impression that other states are facing similar issues.

Likewise, the utility scale renewable generation that would generate power in sufficient quantity to affect the average MWh to carbon emission ratio in Arizona is also facing an uncertain future. Utility scale solar projects with outputs appropriate for consideration in this regard are likely to be concentrating solar thermal generators rather than PV. Climate constraints are a significant factor in the viability of such technologies, even in a sun-rich environment such as Arizona. For solar thermal facilities to be cost effective in a hot desert environment, they require water cooling to optimize operating efficiency. However, Arizona is a water-constrained state. Solar thermal projects have already tapered substantially due to cooling water access issues. Such was the case for the Hualapai concentrating solar thermal facility that was approved to be constructed in the vicinity of Kingman, Arizona, but was never constructed because of cooling water limitations.

EPA's assumption in Arizona's case that the future of renewable generation is invariably aimed toward unfettered expansion is, therefore, entirely unsupportable and is contradicted by the emerging regulatory challenges that have already been experienced. For all these reasons, the Proposed Carbon Rule sets compliance targets on faulty bases and should be revised to account for these issues.

If EPA were granted legislative authority by Congress to preempt state regulation of these matters, the method of implementation presented within the Proposed Carbon Rule would be deficient because it thrusts the burden of regulation back upon the states.[141]

E. EPA's Proposed Rule Is Unlawful Because As Applied To Arizona, It Is Highly Prescriptive And Give Arizona No Flexibility To Fashion A Plan Of Its Own.

1. The EPA's Proposed Carbon Rule violates the CAA because it does not allow the state to consider remaining useful life as required by section 111(d).

[141] *See, e.g., New York v. U.S.*, 505 U.S. 144, 161 (1992)(States are not compelled to enforce a federal standard, expend state funds or participate in a federal regulatory program and may thereby leave the burden of enforcement on the Federal Government)(quoting *Hodel v. Virginia Surface Mining & Reclamation Assn., Inc.*, 452 U.S. 264, 288 (1981)).

Section 111(d)(1) requires that "Regulations of the Administrator under this paragraph shall permit the State in applying a standard of performance to any particular source under a plan submitted under this paragraph to take into consideration, among other factors, the remaining useful life of the existing source to which such standard applies."

EPA has communicated extensively that there is sufficient flexibility in establishing a State Plan to allow states to meet the required goals. However, EPA did not consider remaining useful life as required under the CAA, nor does its proposal allow the states to consider it.[142] EPA, instead, cites to the vast flexibility afforded states under its Proposed Carbon Rule.[143] However, not all states have the same degree of flexibility under the Proposed Carbon Rule. As previously demonstrated, Arizona has virtually no flexibility under the Proposed Carbon Rule.

2. The cliff effect and the lack of flexibility for Arizona are inconsistent with the state's role to develop a state plan.

EPA has indicated the states will be required to submit a State Plan in order to demonstrate a state's compliance with section 111(d) of the CAA. However, the prescriptive nature of the Proposed Carbon Rule and general lack of flexibility is inconsistent with the state authority granted to states under the CAA to develop those State Plans. Additionally, the State Plan differs significantly from the more familiar SIP outlined in CAA section 110.

In the Legal Memorandum, the State Plan is listed as the vehicle by which the states will outline how they will achieve the requested emission performance.[144] As the framework to establish the State Plans, the EPA relies on the CAA sections 111(d)(1), and 111(a)1:

> 111(d)(1): The Administrator shall prescribe regulations which shall establish a procedure similar to that provided by section 7410 of this title under which each State shall submit to the Administrator a plan which (A) establishes standards of performance for any existing source for any air pollutant (i) for which air quality criteria have not been issued or which is not included on a list published under section 7408(a) of this title or emitted from a source category which is regulated under section 7412 of this title but (ii) to which a standard of performance under this section would apply if such existing source were a new source, and (B) provides for the implementation and enforcement of such standards of performance. Regulations of the Administrator under this paragraph shall permit the State in applying a standard of performance to any particular source under a plan submitted under this paragraph to take into consideration, among other factors, the

[142] While in the NODA, the EPA asks for comment on the use of book life, it has not yet adopted any changes in this regard.
[143] 79 Fed. Reg. at 34,925.
[144] Legal Memorandum at 93-94.

remaining useful life of the existing source to which such standard applies.[145]

While EPA indicates it has modeled to some extent the State Plans for section 111(d) on the SIP from section 110, the EPA points out that the two are not the same. EPA addresses the differences between the two in the following passage:

> A CAA section 110 SIP must be designed to meet the NAAQS for a criteria air pollutant for a particular area - not for a source category - within a timeframe specified in the CAA. The NAAQS itself is based on the current body of scientific evidence and, by law, does not reflect consideration of cost. By contrast, a CAA section 111(d) state plan must be designed to achieve a specific level of emission performance that has been established for a particular source category within a timeframe determined by the Administrator and, to some extent, by each state. Moreover, the emission levels for the source category reflect a determination of BSER, which incorporates consideration of cost, technical feasibility and other factors.[146]

It is important to recognize that a section 111(d) State Plan must be designed to reflect a specific level of emission performance that reflects a determination of BSER that incorporates considerations of cost and technical feasibility. A consideration of cost and technical feasibility clearly does not apply to the EPA analysis done for Arizona. As noted in the technical analysis of these comments, BSER as defined by EPA is not technically feasible given the goals that Arizona has been assigned. Even if the goal assigned were technically feasible, the costs to the providers and the ratepayers would outweigh the benefits produced because EPA has failed to consider significant costs that Arizona would incur to implement the Proposed Carbon Rule.

In addition, EPA is to establish a procedure under section 111(d) for states to submit plans. But, if a State Plan is not satisfactory, the EPA may step in and impose a plan. The states are given the ability under the CAA to consider remaining useful life and other factors in devising their plans. Under the Proposed Carbon Rule, all of Arizona's decisions have been effectively made by EPA. This is clearly contrary to the intent of the CAA.

3. Section 111(b)'s dual applicability is impermissible.

EPA's 111(b) proposal has major implications for its section 111(d) proposal. Primarily, an EGU that was initially governed by section 111(d), which later becomes subject to section 111(b) criteria, would be governed by both standards instead of just section 111(b).[147] Further, the ACC does not support EPA's contention that a "reconstructed facility" is still an existing

[145] 42 U.S.C. § 7411
[146] 79 Fed. Reg. at 34,834.
[147] *Id.* at 34,974.

facility.

A "new source" is defined as "any stationary source, the construction or modification of which is commenced after the publication of regulations (or, if earlier, proposed regulations) prescribing a standard of performance under this section which will be applicable to such source."[148] An "existing source" is "any stationary source other than a new source."[149]

Ultimately, there should be an election made between the New Source Performance Standards and Existing Source Performance Standards. If a facility owner elects to incur the expense of modifying or reconstructing an EGU, then it should be entitled to the benefit of such an election.

The EPA proposes in section 111(b) that "all existing sources that become modified or reconstructed sources and which are subject to a CAA section 111(d) plan at the time of the modification or reconstruction, will remain in the CAA section 111(d) plan and remain subject to any applicable regulatory requirements in the plan, in addition to being subject to regulatory requirements under CAA section 111(b)."[150] In section 111(b), the EPA has proposed a limit that is more stringent than BSER by forcing an EGU to comply with both sections 111(b) and 111(d). With no relief provided on 111(d) for the modification/reconstruction of an existing source, the economics of doing so become even more difficult. Ultimately, such a standard will only cause the ratepayers to incur even higher costs.

Further, should conflicts arise between sections 111(b) and 111(d), EPA has provided no indication of which standard would take precedence, just as EPA has provided no support for applying both standards.

CONCLUSION

For all the above reasons, the EPA should not proceed with this rulemaking. If EPA proceeds with this rulemaking contrary to the ACC's position, EPA should at a minimum, modify the rule as set forth herein and Arizona's final goal should be no lower than 1,136 lbs. of CO_2 per MWh. Even though the ACC is submitting extensive comments, including the many ways the EPA must modify the Proposed Carbon Rule, if it proceeds in this matter, the ACC submits that the EPA does not have the legal authority to promulgate and implement the Proposed Carbon Rule under the CAA section 111(d).

[148] 42 U.S.C § 7411(a)(2).
[149] *Id.* at 7411(a)(6).
[150] Fed. Reg. 34,963, col. 1.

EXHIBIT 1

2012 CO2 Emissions from Affected Generation by State
Thousands of Tons

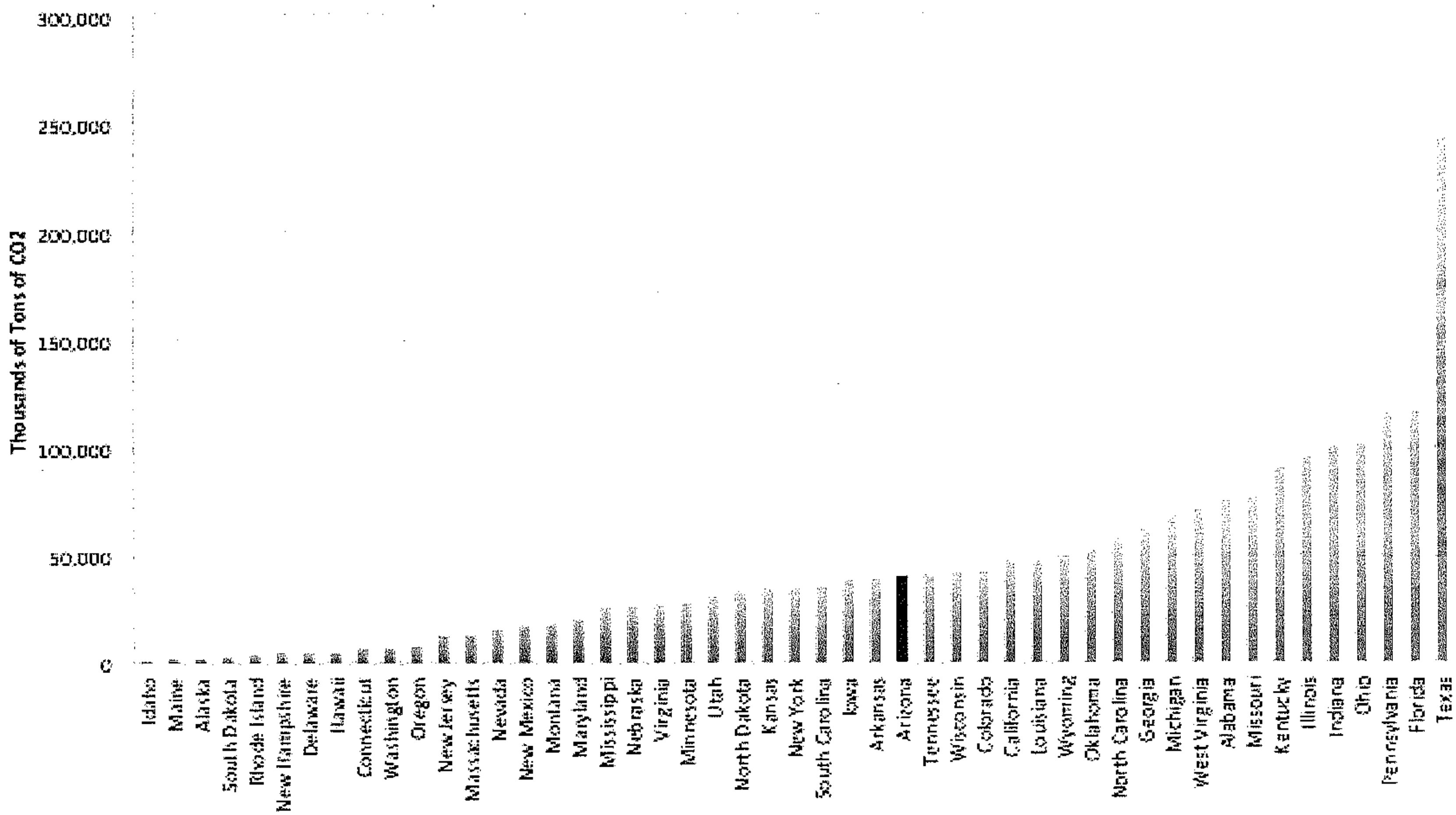


EXHIBIT 2

2012 CO2 Emissions from Affected Generation by State
Tons of CO2 Per Capita

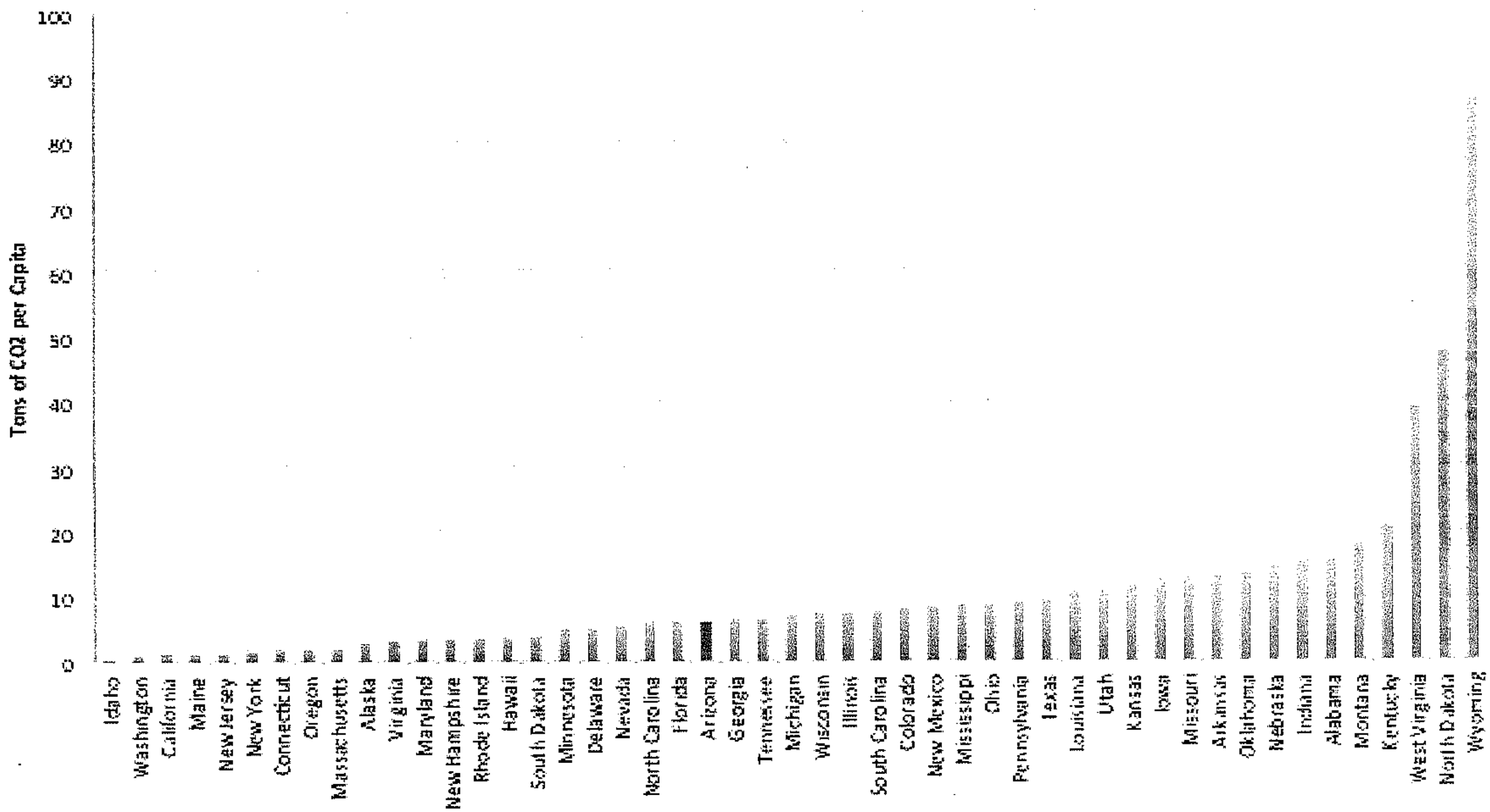


EXHIBIT 3

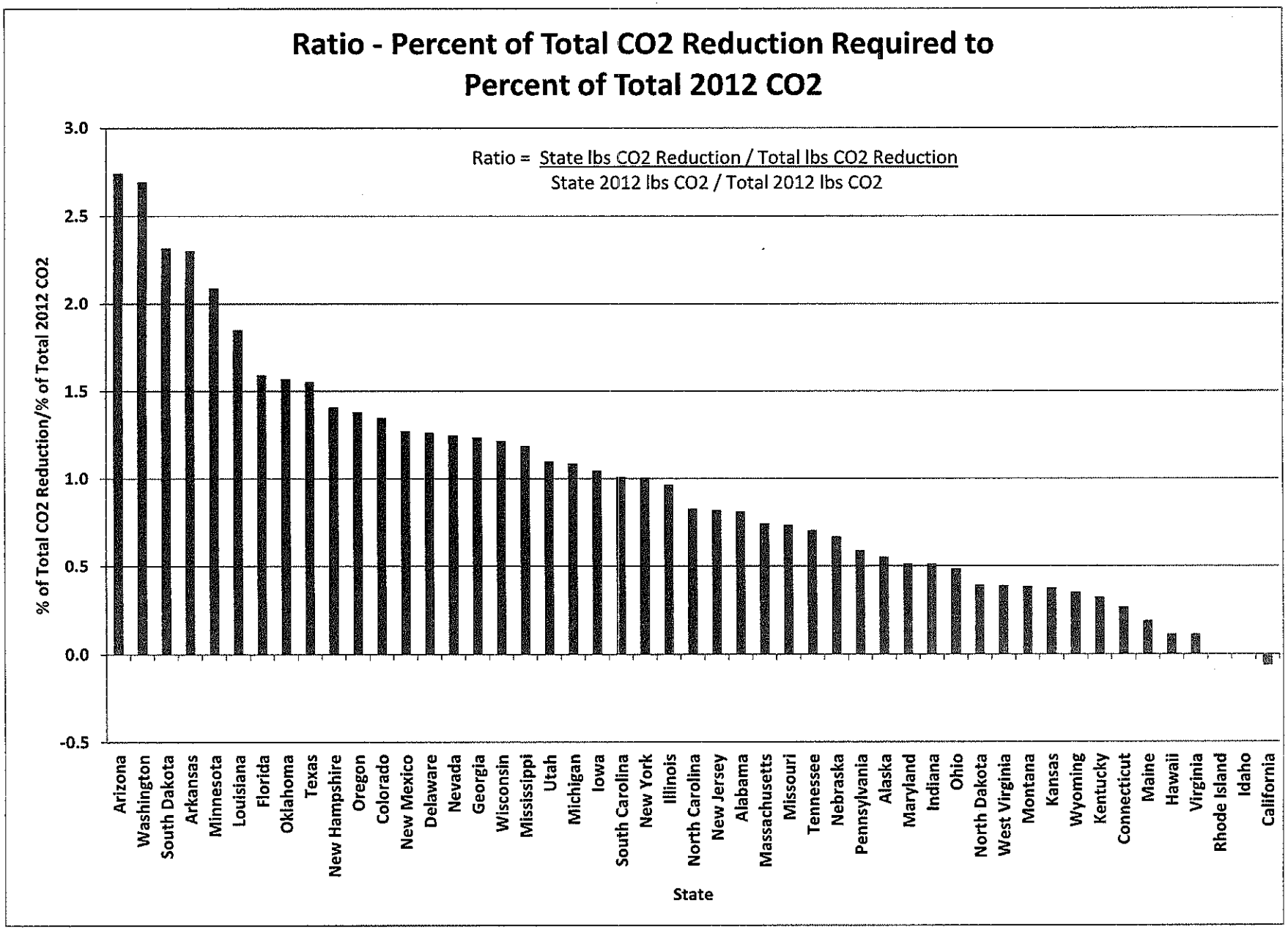

Ratio - Percent of Total CO2 Reduction Required to Percent of Total 2012 CO2
Ratio = State lbs CO2 Reduction / Total lbs CO2 Reduction
State 2012 lbs CO2 / Total 2012 lbs CO2
% of Total CO2 Reduction/% of Total 2012 CO2
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
Arizona
Washington
South Dakota
Arkansas
Minnesota
Louisiana
Florida
Oklahoma
Texas
New Hampshire
Oregon
Colorado
New Mexico
Delaware
Nevada
Georgia
Wisconsin
Mississippi
Utah
Michigan
Iowa
South Carolina
New York
Illinois
North Carolina
New Jersey
Alabama
Massachusetts
Missouri
Tennessee
Nebraska
Pennsylvania
Alaska
Maryland
Indiana
Ohio
North Dakota
West Virginia
Montana
Kansas
Wyoming
Kentucky
Connecticut
Maine
Hawaii
Virginia
Rhode Island
Idaho
California
State

EXHIBIT 4

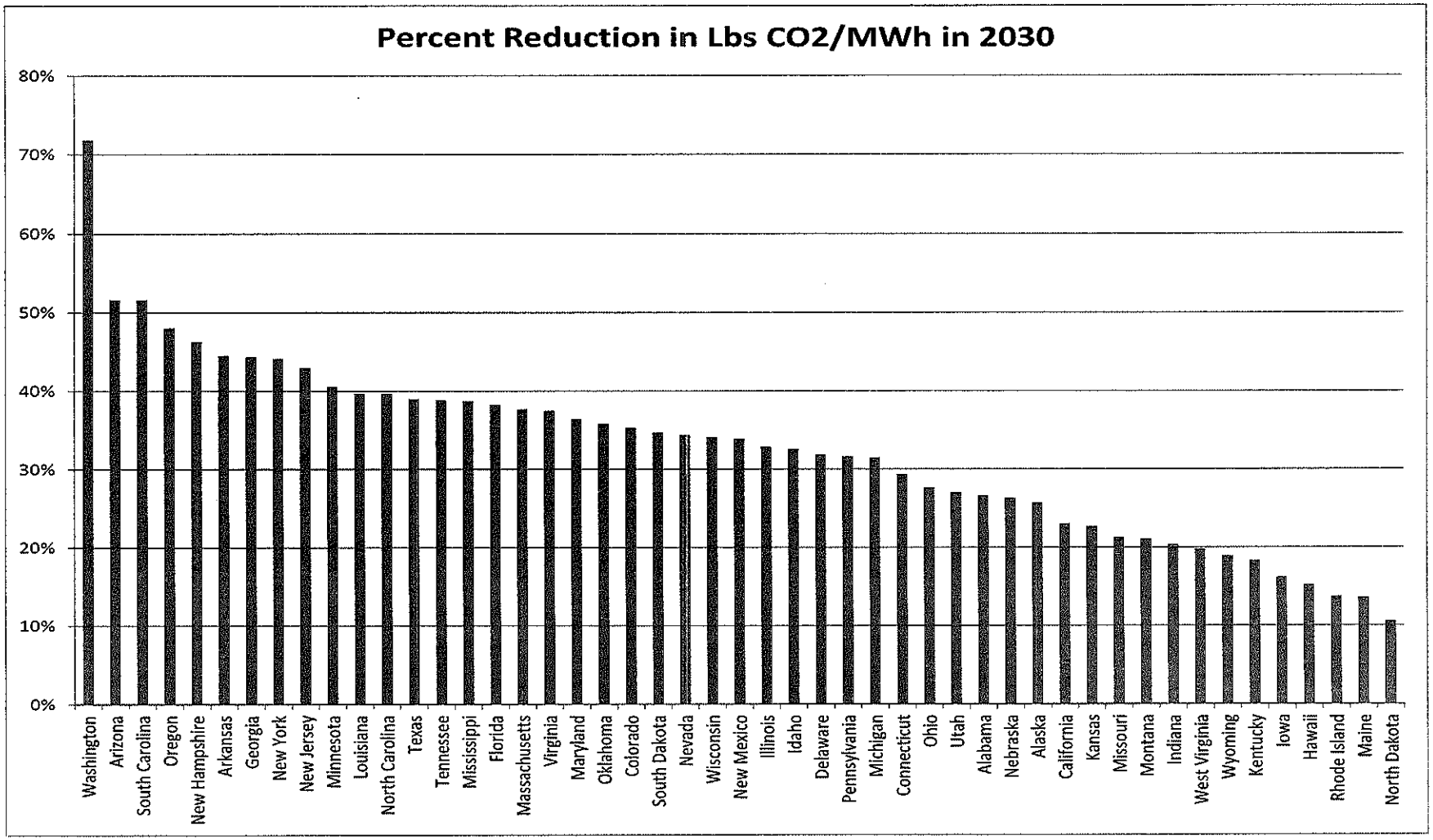

Percent Reduction in Lbs CO2/MWh in 2030
80%
70%
60%
50%
40%
30%
20%
10%
0%
Washington
Arizona
South Carolina
Oregon
New Hampshire
Arkansas
Georgia
New York
New Jersey
Minnesota
Louisiana
North Carolina
Texas
Tennessee
Mississippi
Florida
Massachusetts
Virginia
Maryland
Oklahoma
Colorado
South Dakota
Nevada
Wisconsin
New Mexico
Illinois
Idaho
Delaware
Pennsylvania
Michigan
Connecticut
Ohio
Utah
Alabama
Nebraska
Alaska
California
Kansas
Missouri
Montana
Indiana
West Virginia
Wyoming
Kentucky
Iowa
Hawaii
Rhode Island
Maine
North Dakota

EXHIBIT 5

EPA Proposed CO_2 Emissions Rates for Arizona Existing Generation Units

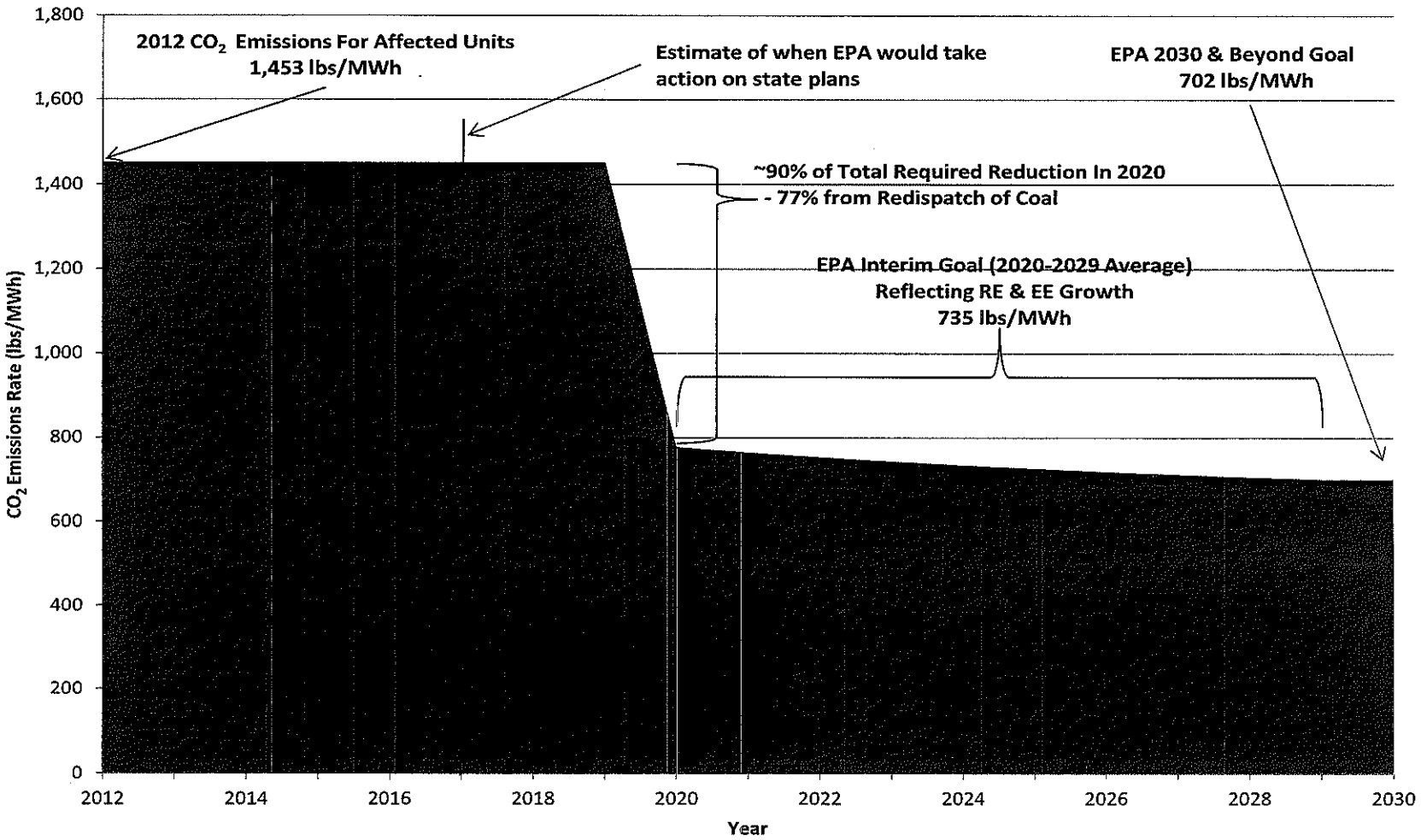


EXHIBIT 6

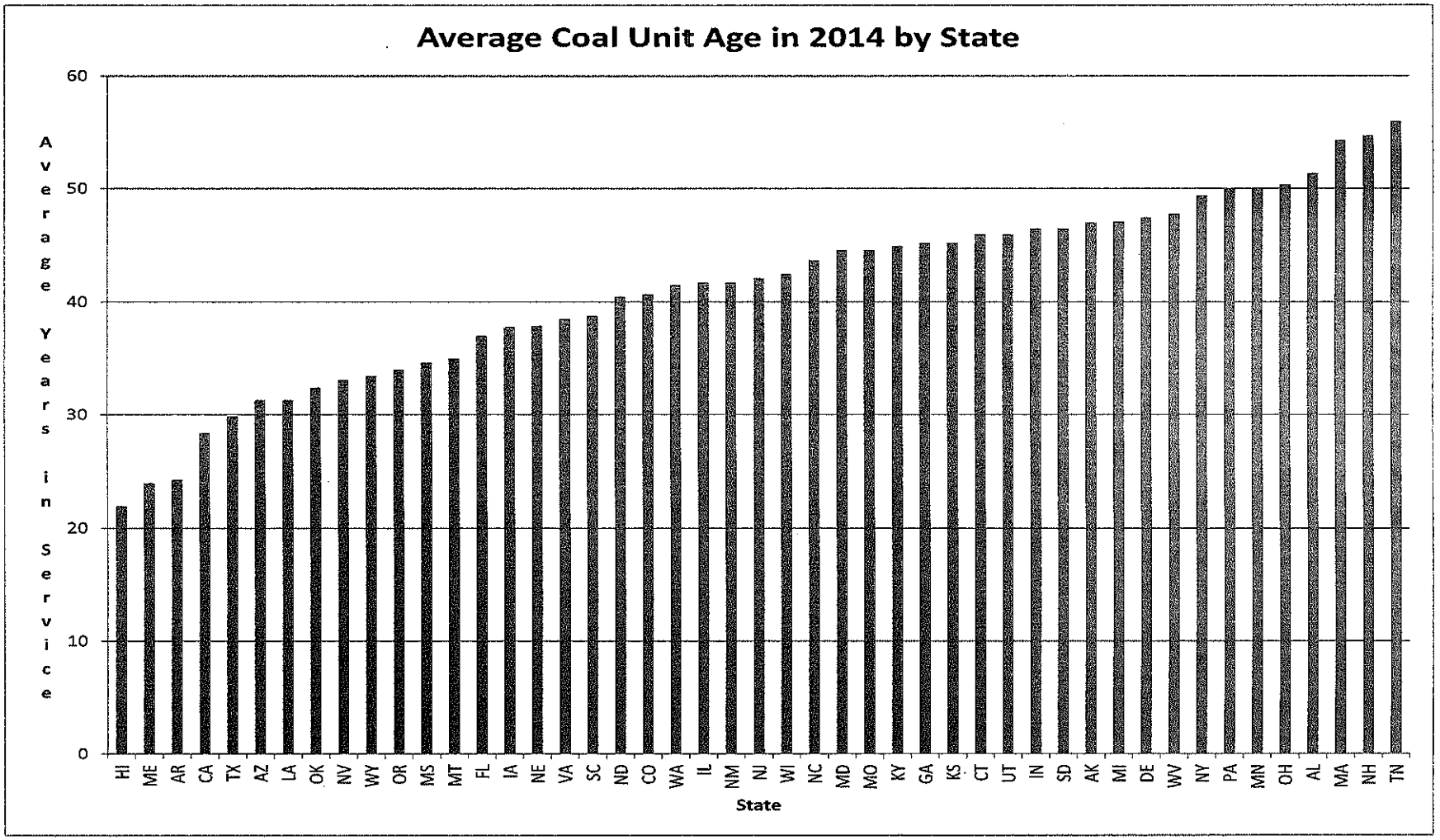

Average Coal Unit Age in 2014 by State
Average Years in Service
60
50
40
30
20
10
0
HI ME AR CA TX AZ LA OK NV WY OR MS MT FL IA NE VA SC ND CO WA IL NM NJ WI NC MD MO KY GA KS CT UT IN SD AK MI DE WV NY PA MN OH AL MA NH TN
State

EXHIBIT 7

Excel files, uploaded separately

EXHIBIT 8

Problems Associated with Environmental Re-dispatch in Arizona

Introduction and Background

In the proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (Rule), the Environmental Protection Agency (EPA) applied its newly developed best system of emission reduction (BSER) for existing fossil fuel electric generating units (EGUs) to determine carbon emission rate reductions for each state. Based on EPA's methodology, the largest carbon emission rate reduction for Arizona is based on the re-dispatch of coal-fired generation to natural gas combined-cycle (NGCC). Arizona Public Service Company (APS) analyzed the re-dispatch of coal-fired generation to NGCC in Arizona, as envisioned by the EPA, and the following provides APS' assessment of re-dispatch in Arizona.

This paper examines the base assumptions and the EPA's application of generation re-dispatch in determining Arizona's carbon emission rate reduction goals. Several real-world operational limitations overlooked by the EPA led to unrealistic policy targets that must be addressed prior to developing intensity targets. A number of these physical limitations relative to the existing electric system in Arizona are discussed in addition to the reliability requirements to serve customers in the State.

On June 18, 2014 the EPA published the proposed Rule under section 111(d) of the federal Clean Air Act (CAA) to regulate carbon dioxide emissions from existing EGUs. The Rule identifies state-specific carbon emission rate goals based on the application of the EPA proposed BSER for existing EGUs. Each state is responsible for developing a compliance plan to achieve the proposed carbon emission rate goals individually or as part of a multi-state assembly. The EPA's proposal and subsequent discussions have been clear that when developing compliance plans, the states may use either the same methodology used by the EPA to develop the state-specific carbon emission rate goals, or other methods that achieve compliance with the proposed goals.

The newly developed BSER for existing EGUs consists of four "building blocks," that include heat rate improvements at existing coal-fired plants, re-dispatch of coal generation to NGCC, and the implementation of renewable energy (RE) and demand-side energy efficiency (EE) standards. Based on the application of these building blocks, the EPA proposed state-specific interim carbon emission rate reduction goals for the 10-year period beginning in 2020 and lasting through 2029 with a final emission rate goal commencing in 2030 and continuing thereafter.

The EPA used 2012 as the baseline year for determining the carbon emission rate goals. Based on the application of the building blocks to the performance of the existing EGUs in Arizona during 2012, the EPA proposed an interim goal of 735 lb/MWh, averaged over the 2020-2029 period, and a final goal of 702 lb/MWh commencing in 2030. The final carbon goal represents a 52% reduction from the adjusted 2012 average carbon emission rate of the affected EGUs in Arizona. A preponderance of the carbon emission rate reduction is based on the re-dispatch of coal-fired generation to NGCC located within the state. In fact, the proposed EPA goals are based on 100% of the coal generation within Arizona being re-

dispatched to NGCC. The analysis below shows that using nameplate capacity along with an annualized re-dispatch assumption, rather than seasonal, monthly, or hourly data, removes resources from service that are necessary for reliability reasons.

Analysis

The method the EPA used to determine the NGCC availability for re-dispatch was based on annual capacity factor of 70%. Further, the EPA determined the annual capacity factor for NGCC located in Arizona during 2012 was 27%. Accordingly, the EPA analysis suggested that NGCC could be re-dispatched to replace all of the existing coal fired generation which would result in the NGCC annual capacity factor of approximately 53%. Therefore, the EPA determined NGCC generation re-dispatch was a viable option for setting Arizona's carbon emission rate goals and can be implemented commencing in 2020.

There are a number of challenges created by the assumptions used by the EPA in its re-dispatch analysis that are discussed in more detail below. First, the potential generation capacity of NGCC located within Arizona used the generator nameplate rating of the units rather than the net output. Net available capacity output is influenced by a number of factors, such as turbine rating, site elevation, humidity, and ambient temperatures and can differ a great deal from the nameplate rating. Generator ratings are often higher than the turbine ratings, so the unit is limited by the turbine output. Also, in Arizona, peak electrical demand occurs at the same time as peak ambient temperatures which has a net negative effect on output ratings. For example, when the temperature and electrical demand is at its highest, the units' capacity is most limited due to ambient conditions. Table 1 below shows the difference between the generation capacities of NGCC located within Arizona assumed by the EPA compared to the actual available capacities of these units. The EPA's failure to account for this situation reduces net NGCC generation capacity by nearly 2,000 MW relative to the nameplate ratings that are actually available during peak demand periods.

Table 1

	Nameplate	Summer	Winter
	MW	MW	MW
West Phoenix CC 1-3	396	255	276
West Phoenix CC 4	136	107	120
West Phoenix CC 5	570	490	506
Redhawk CC 1-2	1,140	934	1,007
Gila River CC 1	619	515	553
Gila River CC 2	619	515	553
Gila River CC 3	619	515	553

Gila River CC 4	**619**	**515**	**553**
Arlington CC	**713**	**579**	**579**
Santan CC	**1,326**	**1,227**	**1,339**
Kyrene CC	**292**	**254**	**277**
Desert Basin CC	**646**	**577**	**625**
Mesquite CC 1	**692**	**536**	**594**
Mesquite CC 2	**692**	**538**	**588**
Apache	**82**	**72**	**72**
Yuma Cogeneration Associates	**63**	**52**	**54**
Griffith Energy LLC	**654**	**570**	**570**
Harquahala CC 1-3	**1,325**	**1,054**	**1,128**
Total	**11,202**	**9,305**	**9,947**
Seasonal Net Rating Change	**-**	**1,897**	**1,255**

Source: EIA

Second, the EPA assumes the use of an annual capacity factor to determine the margin of additional energy output that can be generated by NGCC in Arizona. In doing this, the EPA must have assumed the annual capacity factor for NGCC in Arizona is a rather flat line (i.e. units are operated at a consistent level over all seasons), when in reality there is a significant difference between the electrical demands in the summer and non-summer months. For most years, the average summer demand is more than twice the average demand for the remainder of the year.

In Arizona, the most critical period for utilization of generation capacity is the period from June through September. For illustration purposes, the 16th hour of August 7th was used to show that the dispatch of all Arizona coal and gas steam units as envisioned by the EPA is physically not possible. Using data from EPA's Clean Air Markets Division[1], APS plotted the historical output from the NGCCs located in Arizona.

[1] EPA provides gross hourly generation for generators 25 MW and larger. For this analysis these values were converted to net generation using the following net generation to gross generation ratios: Coal - 0.90, NGCC 0.97, Gas Steam 0.91.

Figure 1 below shows that on August 7th, hour 16, 2012, Arizona NGCCs were generating 8,455 MW (net) and the coal and gas steam units were generating 4,098 MW (net). In order to re-dispatch all coal and gas steam with NGCC generation as assumed by the EPA, the NGCCs would have to be operating at 12,553 MW (8,455 MW + 4,098 MW). The maximum capacity assuming all units are fully available, however, is only 9,305 MW, a difference of 3,248 MW. Thus, only 850 MW of the 4,098MW of required capacity is available for re-dispatched in this hour, leaving 3,248 MW of demand that would still need to be met. This suggests that when calculating Arizona's emission goal, portions of coal and gas steam cannot be re-dispatched to NGCC and must be factored into the carbon rate goal.

Figure 1

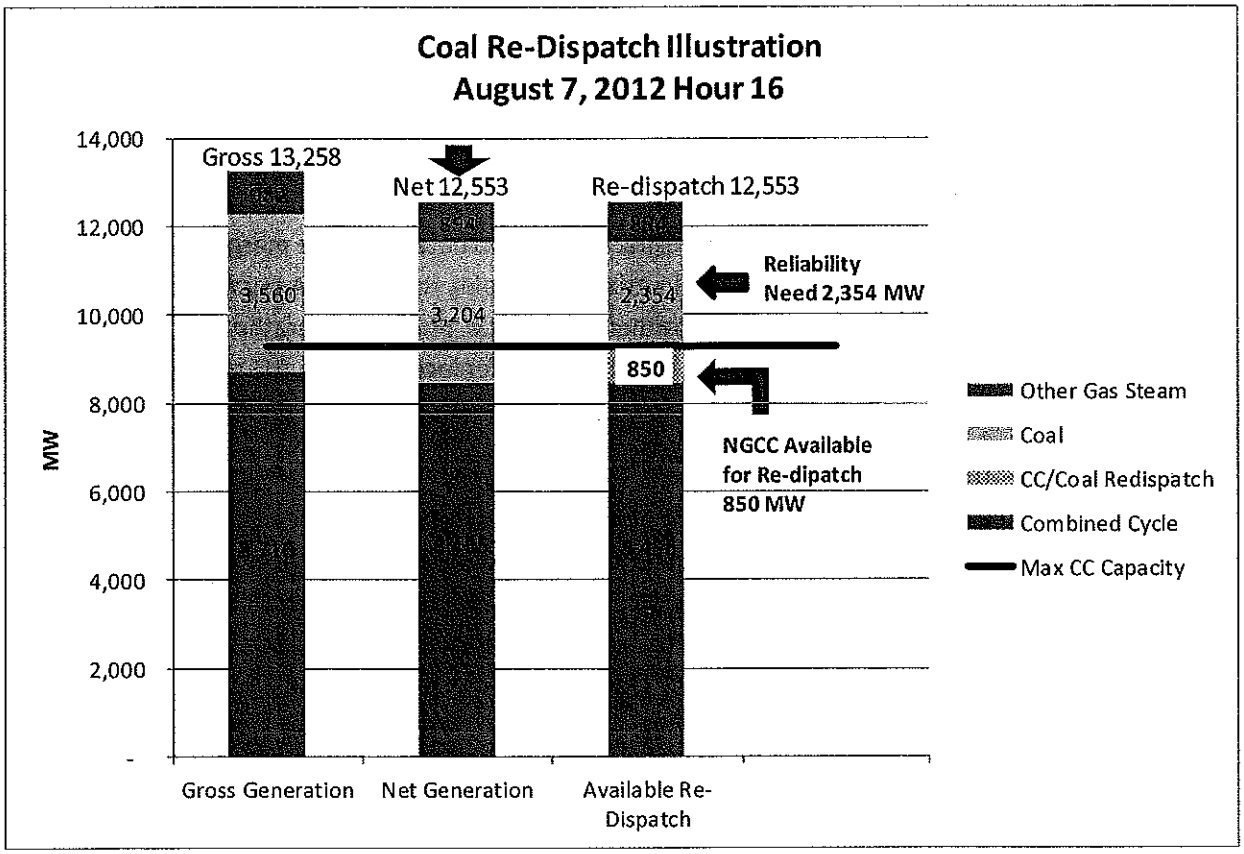
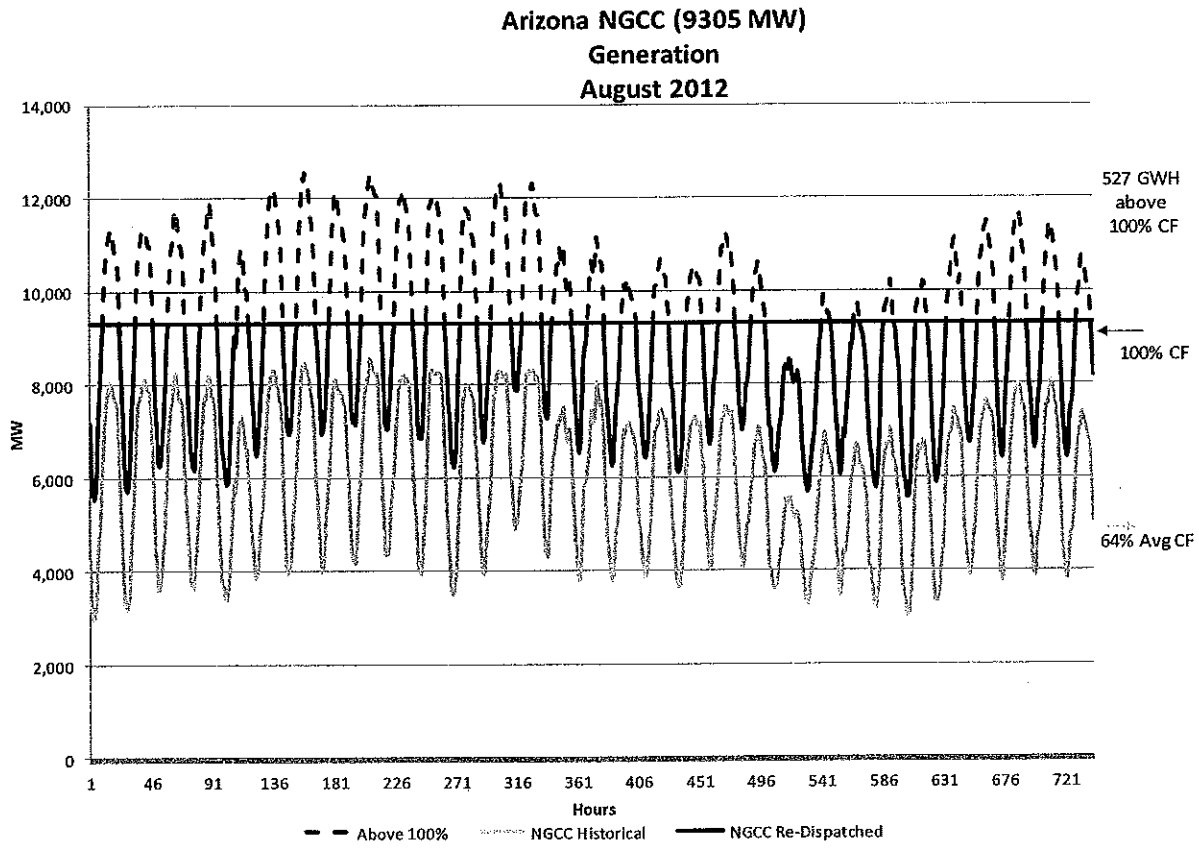


Figure 2 shows the results of this analysis for the month of August (744 hours). Actual hourly generation values for the Arizona NGCCs are indicated by the green line. Additional generation that would be required by NGCCs due to the re-dispatch of coal and natural gas steam-fired generation during the same period was added to the NGCC generation to replicate the re-dispatch as proposed by the EPA. These values are indicated by the red line. The figure also shows the maximum possible generation of the NGCCs during the summer months (100% capacity factor). As indicated by the dashed red line, nearly half of the time during August 2012 the demand that would normally be provided by coal and gas steam-fired generation exceeds the capacity of all NGCC in Arizona. This means that additional capacity is required to serve load beyond the existing NGCCs. August contains the largest number of occurrences when re-dispatch would require additional capacity; however, the same phenomenon occurs during the months of May through October. As a result, if all coal units were retired as modeled by the EPA, Arizona could face serious reliability issues in a significant number of hours throughout the year.

Figure 2



The same analysis was performed for all hours of 2012 and is summarized in Table 2. Table 2 shows that nearly 800 hours throughout the year could not meet the NGCC re-dispatch requirement envisioned by the EPA.

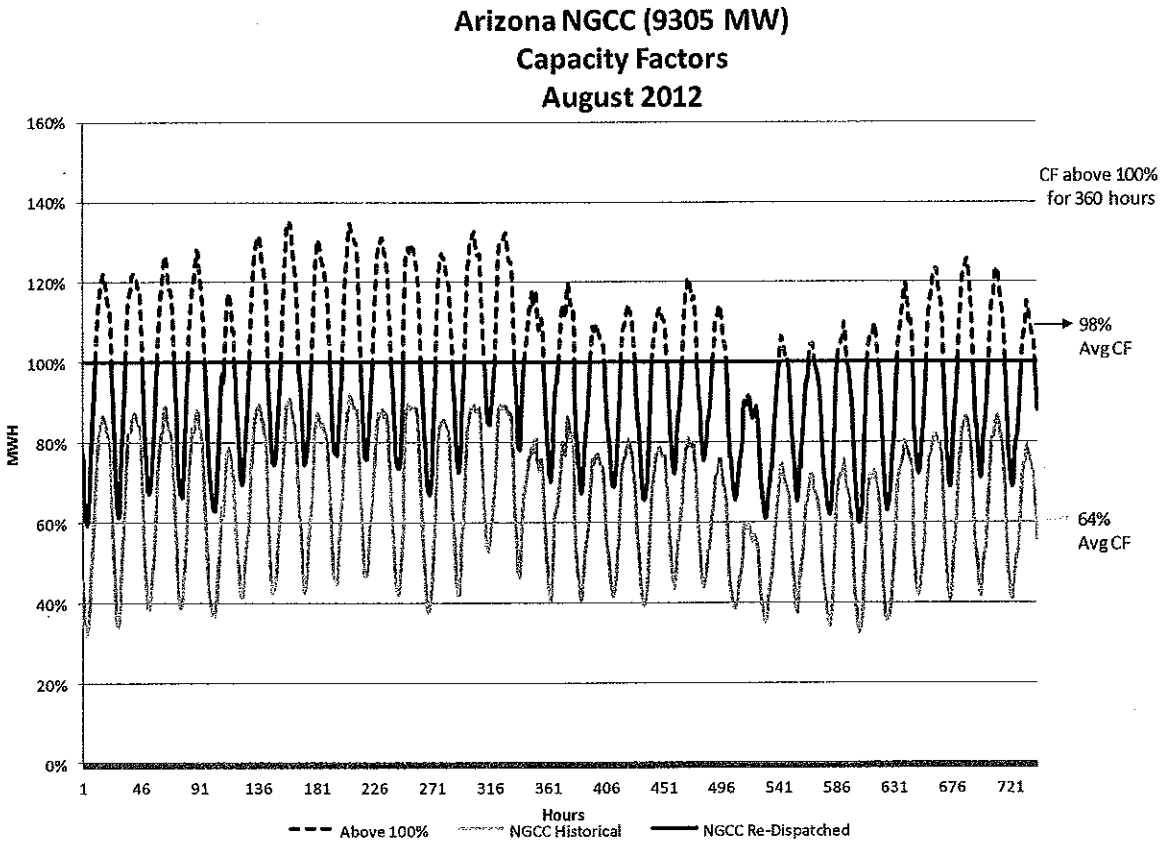
Table 2

Excess Demand

Month	GWH	Hours
January	0	0
February	0	0
March	0	0
April	0	0
May	3,147	6
June	138,369	145
July	212,637	235
August	526,832	361
September	51,529	92
October	20,313	22
November	0	0
December	0	0

Figure 3 provides a similar illustration. The green line in Figure 3 represents the actual capacity factor during the month of August 2012 for NGCC located in Arizona. The red line shows the increase in the capacity factor of NGCC with the re-dispatch of the state's coal generation. The re-dispatch capacity factor shows over 360 hours during the month where the demanded generation exceeded the available generation. During this period, the average capacity factor for all NGCC in Arizona would have to increase from 64% to 98%, which far exceeds the 70% cap proposed by the EPA. Because of the substantial increase in electrical demand in Arizona during peak times, the annual average capacity factor of NGCC cannot be used as a basis for determining the additional capacity NGCC can supply during peak demand periods.

Figure 3



Additional Concerns with EPA Plan

This analysis does not include a myriad of other considerations that must be made by the utilities that have the ultimate responsibility for ensuring that a reliable supply of energy is available to meet customer demands. For example, utilities must maintain a generation capacity reserve margin in order to supply energy in the event existing operating capacity is lost. The policy target envisioned will negatively impact existing capacity and potentially require new dispatchable units to maintain reliability and reserve margin targets.

Also, NGCCs are complex mechanical systems that malfunction even under the best of readiness and preventive maintenance programs. It is naïve and unrealistic to assume there will not be forced outages due to mechanical issues with NGCC from time to time. The EPA must consider both unit availability and the increased potential for outage with additional wear and tear on the existing fleet of NGCCs prior to developing policy targets.

There are other serious technical issues associated with the re-dispatch of coal-fired generation to NGCC. For example, the existing electrical transmission system in Arizona is designed to balance the flow of energy within the state. Because in Arizona coal-fired generation is predominantly in the eastern part of the state and the NGCC fleet is located in the western part of the state, the total re-dispatch of all coal-fired generation to NGCC will create an imbalance in the state's electrical transmission system. This imbalance can cause overloading of transmission lines, overheating of the lines, and failure of the transmission system. Without the coal plants in service, maximum load serving capability (MLSC) of the Phoenix load pocket would be significantly reduced, seriously compromising the reliability of meeting Phoenix area loads. This loss in MLSC could potentially be restored by implementing several transmission upgrade projects. These projects would come at a cost of hundreds of millions of dollars, and may not be able to be completed by 2020, the date at which the EPA assumes re-dispatch of all of Arizona's coal units.

Additionally, the natural gas capacity in Arizona to supply the re-dispatch is also questionable. Arizona has limited natural gas capacity and some of the existing capacity is now being supplied to Mexico. These issues are currently being studied by the state's utilities to determine the specific impacts and potential resolutions. While it is not known at this time what the specific resolutions may be, it most likely will involve adding new generation, transmission, natural gas capacity, or a combination thereof. All of these potential solutions are costly, take many years to implement, and are not consistent with the statutory intent behind BSER.

As stated above, APS understands that the EPA has not mandated the total re-dispatch of coal-fired generation to NGCC. APS has heard EPA's comments regarding the "flexibility" provided to the states in developing compliance plans. However, it is impossible to see how Arizona could meet the proposed carbon goals without re-dispatching virtually all coal-fired generation to NGCC, which was EPA's assumption when it calculated the state's "goals." Accordingly, any so-called flexibility touted by the EPA rings hollow.

The EPA has stated that Arizona may use other means of achieving the state goals in lieu of the re-dispatch of coal-fired generation to NGCC. For example the state may employ more renewable energy (RE) and energy efficiency (EE) requirements, EPA explains. However, Arizona analyzed increasing RE and EE standards to allow for the continued operation of a portion of the coal-fired fleet in Arizona and, in fact, these actions would have the opposite effect. By increasing the RE and EE requirements to allow for the continued operation of some coal-fired generation in meeting the final goal, the state actually moves further away from achieving compliance with the state's interim goal proposed by the EPA. On the other hand, if Arizona designs its program to comply with the interim goal, the end result is a rate that is far lower than necessary to comply with the final goal, and a far smaller portion of the state's existing coal-fired fleet is preserved.

The EPA has also suggested that the state's utilities could just operate coal-fired generation during peak demand periods, but this is not a viable option. The coal-fired power plants in Arizona are large, complex units. Typically, such units are not designed and engineered to sit idle for extended periods of time and cycle. Such practices would challenge reliable operation of the units. Moreover, the staffing and maintenance to support such a scenario would not be economically justifiable.

Ramifications of EPA's Proposal

Arizona will face a difficult dilemma as a result of the flawed assumptions used by the EPA when it evaluated the re-dispatch of coal-fired generation to NGCC. The most likely outcome of the proposed policy is that the state's utilities will be left with the difficult decision of whether to jeopardize electric reliability in Arizona, risk noncompliance with the proposed carbon reduction goals, or spend exorbitant amounts of money to offset flawed assumptions.

Electric utility companies have a responsibility to reliably supply the energy demanded by customers. In Arizona this responsibility is most critical during peak energy demand periods. Such times are generally associated with elevated temperatures, and ensuring a reliable supply of energy during such period is an important human health issue. To assure utilities can meet this responsibility, they must have reliable sources of energy generation and a reliable electric grid.

Conclusion

Complying with Arizona's carbon emission rate goals proposed by the EPA will significantly challenge the reliability of the electrical system or will lead to noncompliance with the proposed goals. Since creating an unreliable electrical system in Arizona is presumably not the EPA's intention or desired outcome, EPA must develop a workable solution for Arizona including a sensible final carbon rate target for the state.

Another method to provide some relief is the elimination of interim goals. The only real purpose for the interim goals is to measure progress towards the final goal. Because the states must submit periodic reports to the EPA, the Agency will have this information and can press the states if reasonable progress

is not being achieved. At the very least, the state should be allowed to set interim goals that provide a logical compliance trajectory for the state.

The currently proposed interim goals for Arizona are too heavily weighted toward the early years and cannot be achieved through the re-dispatch of all coal generation in the state to NGCC. Though a specific resolution is not known at this time, Arizona would have to add new generation, transmission, natural gas capacity or combination thereof, which could not be achieved by 2020, the date at which the EPA assumes re-dispatch of all of Arizona's coal units. Arizona's utilities need a more reasonable trajectory that provides additional time to fully understand the implications of the proposed rule and to assist the state to develop and implement an appropriate plan.

EXHIBIT 9

NEED FOR ADDITIONAL MAINLINE PIPELINE CAPACITY

Arizona's natural gas needs are met via deliveries on the Kinder Morgan's El Paso Natural Gas ("El Paso") and Transwestern Pipeline ("Transwestern") interstate pipeline systems delivering natural gas from the San Juan supply basin in New Mexico and the Permian supply basin in west Texas. El Paso's system is reticulated, but primarily consists of a northern system of mainline pipes that comes across northern Arizona and a set of southern mainline pipes that runs through southern Arizona, with several pipes connecting the northern and southern systems. Transwestern has a mainline system that runs across northern Arizona, with the recently constructed Phoenix Expansion line coming down into central Arizona. As discussed below in detail, there is little or no available pipeline capacity on the El Paso and Transwestern pipeline systems in Arizona to meet a sudden and large growth in natural gas requirements, with the likelihood of additional regional demand as exports to Mexico through southern Arizona continue to grow.

El Paso and Transwestern post information on available pipeline capacity on their bulletin boards. For El Paso, information at the Cornudas West point on the southern line is indicative of available south system capacity and information on the Valve City to Topock segment is indicative of available north system capacity. Data taken from the pipelines' bulletin boards in late August 2014 indicates as of August 2014, there was no unsubscribed pipeline capacity on the southern system and that El Paso's southern system pipeline capacity is fully subscribed, with El Paso's northern system having a small amount of unsubscribed pipeline capacity (approximately 195 million cubic feet/day (MMCF/day)). The lack of pipeline capacity available on El Paso's southern system is particularly telling, given that this is where most Arizona gas-fired generation is located.

Similarly, on the Transwestern northern system the Thoreau West point is indicative of mainline capacity available across northern Arizona. For August 2014, Transwestern's bulletin board indicated there was no unsubscribed capacity at the Thoreau West point. On Transwestern's Phoenix Expansion lateral (which is fed off of Transwestern's northern system) there was a limited amount of pipeline capacity available at East of Gila River Point Group (approximately 134,000 dekatherms) and the Phoenix Point Group locations (91,000 dekatherms).

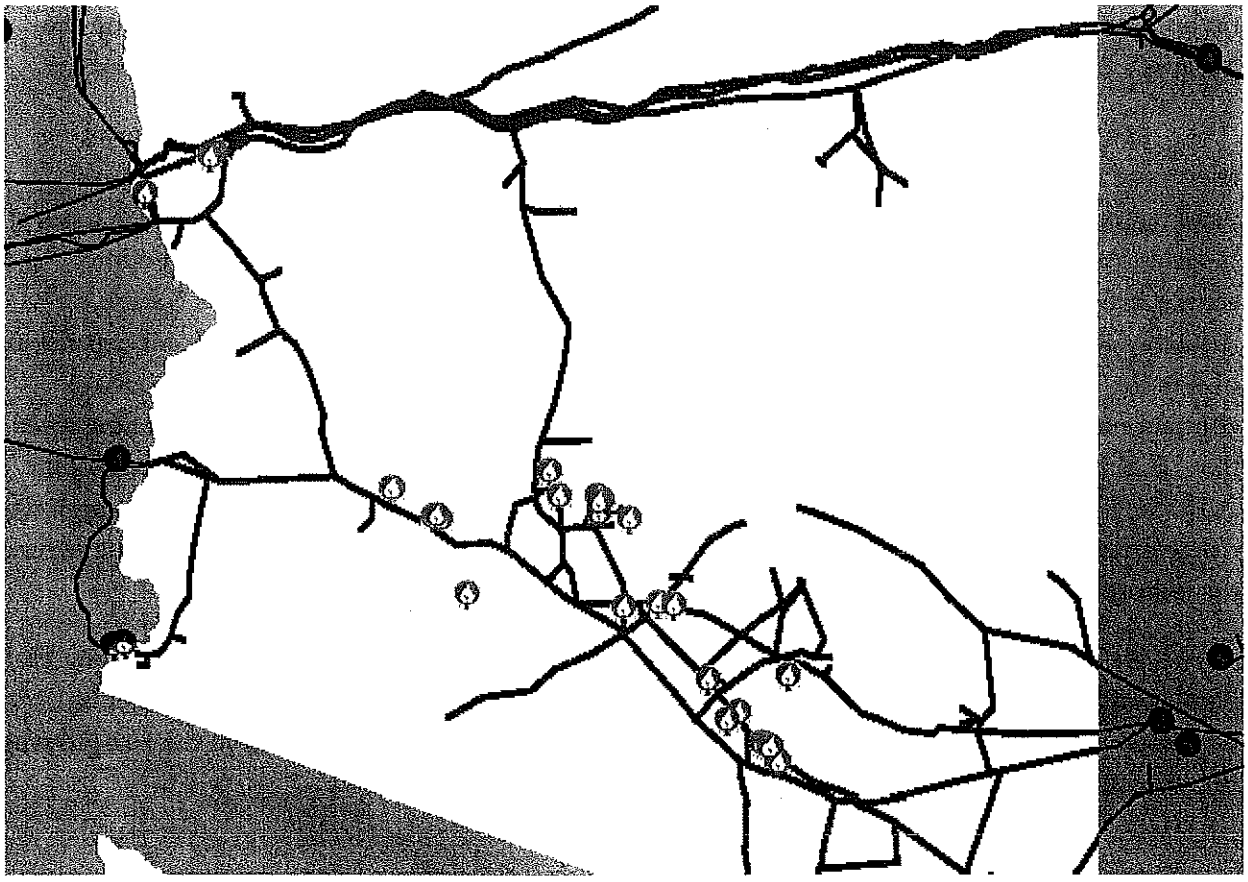
In summary, there is no available pipeline capacity on El Paso's southern system or Transwestern's northern system, and very limited pipeline capacity available on El Paso's northern system and Transwestern's Phoenix Expansion line. While pipeline capacity availability varies from month to month and year to year, there is no reason to believe significant pipeline capacity on existing pipeline systems service Arizona will materialize in the near term future.

El Paso's system has two crossover pipes in Arizona where natural gas can be moved from the northern system to the southern system or from the southern system to the northern system. These is the Maricopa Lateral (coming down to Phoenix in central Arizona) and the Havasu Crossover (coming south from near the California border in western Arizona). However, capacity

on both of these lines is in demand and as of August 2014, there was no capacity available on the Maricopa Lateral and only approximately 139,000 dekatherms available on the Havasu Crossover.

A further factor putting additional pressure on pipeline capacity availability is the growing exports of natural gas off of El Paso's southern system to Mexico, via a number of current and pending pipelines. Existing Mexican exports leave Arizona via the Wilcox Lateral as well as pipes at Nogales, Arizona and Douglas, Arizona. El Paso's new Sierrita pipeline is expected to go into service in September 2014 and will provide additional export capacity to Mexico near Sasabe, Arizona. The Sierrita pipeline is being constructed in a manner that allows for significant expansion of it in the future. Additional exports to Mexico are likely in the future as demand in Mexico continues to outstrip local production. For example, the Energy Information Administration noted that "U.S. natural gas exports to Mexico grew by 24% to 1.69 billion cubic feet per day (Bcf/d) in 2012, the highest level since the data collection began in 1973" and that "Natural gas consumption is rising faster in Mexico than natural gas production, and as a result, Mexico is relying more on natural gas imports from the United States."[i]

As shown on the map below, most Arizona natural gas-fired generation is located along El Paso's southern system, with a handful of plants also having access to Transwestern's Phoenix Expansion pipeline. This corresponds with the increase in demand for electricity in the fast-growing Phoenix and Tucson metro areas in recent decades.



Source: Energy Information Administration

The lack of existing pipeline capacity, in combination with growing Mexican demand via southern Arizona, indicates that if significant additional natural gas supplies need to enter central and/or southern Arizona to meet gas-generation demand increases caused by the closure of coal plants, the construction of significant new mainline pipeline facilities will be required. The construction of such new facilities involves significant planning, cost, and time.

The recent construction of Transwestern's Phoenix Expansion pipeline is a good example of a major pipeline project in the desert southwest. This project involved some upgrades to Transwestern's system coming out of the San Juan production basin in northwest New Mexico, the use of then available mainline capacity across northern New Mexico and Arizona, and construction of a new pipeline from near Ash Fork, Arizona south to the west side of the Phoenix metro area and then south and east to near Coolidge, Arizona. The San Juan upgrade involved 25 miles of 36 inch pipe, adding 375,000 MMcf/day of additional capacity from the Blanco point to the Thoreau point. The Phoenix Expansion part of the project involved 259 miles of pipe (95 miles of 42 inch pipe and 164 miles of 36 inch pipe) with a capacity of 500,000 MMcf/day. This project was constructed to provide additional pipeline capacity into central Arizona and the vast majority of its service is to electric generating units. The table below shows the actual timeline from the initial non-binding

open season to its in-service date. It should be noted that there were on-going discussions and planning prior to the non-binding open season.

Transwestern Phoenix Expansion Timeline	
May 11, 2004	Non-binding open season begins
December 1, 2004	Binding open season begins
November 10, 2005	Transwestern files request with FERC for initiation of pre-filing process for Phoenix Expansion Project (FERC Docket PF-06-4)
December 16, 2005	Arizona Public Service Company pre-approval filing with the ACC
February 22, 2006	Southwest Gas Corporation pre-approval filing with the ACC
March 23, 2006	ACC Decision on Arizona Public Service Company pre-approval filing (Decision No. 68597)
June 5, 2006	ACC Decision on Southwest Gas Corporation pre-approval filing (Decision No. 68753)
September 15, 2006	Transwestern makes certificate filing with FERC (FERC Docket CP06-459) – (the filing projected some facilities would be in service May 2008 and all facilities would be in service by October 2008)
September 29, 2006	UNS Gas Inc. pre-approval filing with the ACC
February 22, 2007	ACC Decision on UNS Gas, Inc. pre-approval filing (Decision No. 69333)
November 15, 2007	FERC issues an order authorizing construction of the Phoenix Expansion Project
March 1, 2009	Transwestern's Phoenix Expansion Project in-service date

Thus, from the time of the initial non-binding open season to the in-service date was close to five years. Additional issues of note regarding Transwestern's Phoenix Expansion Project include:

1. Construction of major pipeline projects is very expensive, with the total cost of the Transwestern Phoenix Expansion costing roughly $958 million. This is significantly more expensive than the initial projected cost of approximately $660 million. Transwestern has cited a number of contributing factors to the higher overall cost, including higher costs for right-of-ways and permits, material costs, construction costs, and environmental inspection costs. Constructing new pipeline capacity to meet significant new natural gas demand in Arizona would entail the addition of pipeline capacity from either the San Juan Basin in New Mexico or the Permian Basin in west Texas, a considerably longer distance than the Phoenix Expansion Projects represents. The cost to build such pipeline capacity has undoubtedly increased in the intervening years since the shorter Phoenix Expansion was built for $958 million.

2. Land in Arizona is owned by a wide variety of entities, including various tribal, federal, state and private landowners. Private land represents only 17.6 percent of Arizona's land area. Working with a large variety of different landowner interests can be a significant complication in developing a lengthy pipeline project. The map below provides some perspective on the land ownership in relation to the location of interstate pipelines in Arizona. There are likely some circumstances where development and other factors simply preclude the expansion of existing pipeline facilities or construction of new pipeline facilities. For example, in developing the Phoenix Expansion, Transwestern indicated to the ACC Staff at the time that there was development encroaching on right of way options in the Prescott, Arizona area and that if a pipeline project such as the Phoenix Expansion were not sited soon in the area, use of the possible routes through the Prescott area would soon be precluded from use due to further development in the area.

Source: Energy Information Administration

3. Many parts of Arizona are mountainous and remote, presenting difficult construction conditions.

4. Land acquisition in Arizona is difficult, with no "quick take" provisions, meaning that land acquisitions had to occur without court involvement and involve significant negotiations with various land owners.

5. The actual time to construct a new pipeline is hard to know, as various factors can extend the timeframe beyond what is expected. For the Phoenix Expansion, the in-service date ended up being significantly later than was projected at the beginning of the process.

OPERATIONAL FLEXIBILITY

Another significant issue related to natural gas supply is the need for operational flexibility to provide utilities the ability to turn cycle their power plants on and off as needed. Natural gas is the most flexible conventional generation technology and thus is relied on heavily to respond to fluctuating electricity demand, a feature that is becoming ever more important in the Desert Southwest as renewable energy generation grows. When a power plant is not operating, it consumes little or no natural gas. When it begins operating, it suddenly places a significant demand for natural

gas on the interstate pipeline. These swings from no demand to significant demand and back and forth can place significant pressure on the interstate pipeline system to accommodate such needs. Arizona has no market area natural gas storage and thus heavily reliant on interstate pipeline line pack to meet the fluctuating demand for natural gas.

NATURAL GAS STORAGE

Natural gas storage has been a point of discussion in Arizona for many years and interest has grown as the state has become much more dependent on natural gas for generating electricity. As the Energy and Environmental Analysis Inc.'s 2006 study entitled Arizona Natural Gas Market and Infrastructure Study notes:

"Since Arizona currently lacks storage capacity within the state, any storage capacity would be extremely valuable to meet daily and hourly swings of growing gas use in power generation."

Arizona's geology is such that the reservoir and depleted field storage facilities that have been constructed in other parts of the country would not be an option in Arizona. Arizona does have a number of large salt deposits that could host a natural gas storage facility. However, some sites are not considered viable, given encroaching development and other considerations. The number of known possible sites is very small (possibly as small as one) and there are a variety of issues to be resolved before salt cavern natural gas storage could be built in Arizona, including cost, time to construct, land availability and acquisition, and brine disposal.

The area that has been the focus of discussion in recent years is the Picacho Basin area between Phoenix and Tucson. In a 2011 presentation to the ACC, El Paso indicated that a possible project in the area, with 2,000,000 to 4,000,000 dekatherms of working capacity and 400,000 dekatherms of deliverability per day would cost approximately $320 million as of 2008. This project had a projected timeline of over four years to the first cavern being available and over eight years to the fourth and final cavern being available. The significant uncertainties regarding development of natural gas storage in Arizona make it likely that cost and time estimates would increase and it is not a certainty that a natural gas storage facility will be able to be built. However, absent such a project, Arizona would become ever more dependent on interstate pipeline line pack to handle the variations in natural gas demand for power generation. Development of new natural gas infrastructure, whether pipelines or gas storage facilities, is a long process, a necessity given the need to develop projects that integrate into the existing system, meet customer needs, address potential environmental issues, and address any other public interest concerns that may be raised. Rushing the process to construct such projects to meet an arbitrary interim goal is likely infeasible and is certainly inadvisable.

GAS-ELECTRIC COORDINATION

Greater coordination between the natural gas and electric industries has been a topic of growing interest in recent years for a number of reasons, including the growing presence of renewable energy

resources across the nation and growing reliance on natural gas generation. Both of these are significant factors in the Desert Southwest. The Federal Energy Regulatory Commission and the North American Energy Standards Board are currently considering ways to enhance the coordination between the electric and natural gas industries. Comments to the FERC Notice of Proposed Rulemaking are due on November 28, 2014.[ii] In the Desert Southwest, including Arizona, the need for greater gas-electric coordination is important and growing each year as the region grows more dependent on natural gas and intermittent renewable energy resources. Arizona entities are key participants in the Desert Southwest Pipeline Stakeholders group that made a number of proposals to provide greater operational flexibility for natural gas generators who hold firm pipeline capacity rights on interstate pipelines. Arizona's interests in this proceeding are focused on providing electric generators great ability to manage their natural gas supplies during peak afternoon/early even periods during the summer. At this point it is unclear to what extent Arizona's gas-electric coordination needs will be addressed in the current FERC/NAESB process. To the extent Arizona's interests are not meaningfully addressed in the FERC/NAESB process, a significant ramp up of Arizona's reliance on natural gas over a short time frame is cause for concern.

SCHEDULING OF SAFETY INSPECTIONS AND MAINTENANCE

A further concern with significantly greater natural gas reliance year round is its impact on the ability of pipelines to schedule necessary safety inspections and maintenance activities. Currently pipelines try to conduct most of these activities in the spring and fall seasons when natural gas demand drops off significantly. However, even in the current environment, growing natural gas demand in the last decade or so has squeezed the windows of opportunity for pipelines to undertake these necessary activities. If natural gas generation significantly replaced coal generation in Arizona, natural gas demand in the spring and fall periods would rise considerably. Initial discussions with one of the interstate pipelines serving Arizona points to the likelihood that safety inspections and maintenance activities may have to be spread out across the calendar, as natural gas demand would be relatively high in all seasons. Under such a scenario, there is a greater likelihood of the need to take some amount of pipeline capacity out of service at times of high natural gas demand, lessening the capacity available to provide service to electric generation facilities.

SHIFT FROM A DIVERSE GENERATION PORTFOLIO

Elimination of much if not all of Arizona's coal generation would drastically shift Arizona's generation mix from one which is quite diversified to one that is very heavily reliant on natural gas generation. Apart from the simple fact that diversified portfolio of generation resources is preferable, there are a number of long term implications of such a shift.

HOMELAND SECURITY CONCERNS

A primary concern in this area is the introduction of homeland security risks of relying on a handful of pipes to fuel a vast majority of Arizona's electric generation. In a number of areas some of these pipes run in close proximity to each other and could become a target for terrorist activity.

The region might be able to absorb the loss of a 30 inch mainline pipe for a period of time, as happened with the Pecos River explosion near Carlsbad, New Mexico in 2003. In that instance, one of El Paso's south system mainline pipes exploded and was thus out of service for a period of time as El Paso moved into its lower throughput spring season . In this circumstance El Paso and its shippers were able to work together to maintain service to all shippers, despite losing a noticeable amount of pipeline capacity for a period of time. Electric utilities were able to rely on other generation assets in the area, principally coal and nuclear generation, during this time when gas supplies were constrained. However, natural gas demand has grown significantly since 2003 in the desert southwest and the potential loss of multiple mainline pipes represents the very real risk of crippling electric generation in the desert southwest for a significant period of time, leading to potentially catastrophic results. A sudden shift to much greater reliance on natural gas generation greatly exacerbates this concern.

NATURAL GAS PRICE VOLATILITY

Another concern with becoming heavily dependent on natural gas for electric generation is the potential for natural gas price volatility to create much more unstable electricity rates than have been seen in the past in the United States or Arizona. By its nature, the total cost of natural gas generation is weighed more heavily toward fuel costs and less toward facility costs, thus making the cost of natural gas as a fuel extremely important. Prior to the shale gas revolution, the United States experienced years of very volatile natural gas prices, with exponential swings in natural gas prices experienced multiple times, particularly during winter heating seasons. Natural gas prices have been much less volatile since the introduction of large volumes of shale gas into the natural gas supply portfolio of the United States. However, in the future there is no guarantee that natural gas prices will not return to a state of great volatility, particularly if natural gas demand is driven much higher by heavy reliance for electric generation in the future.

OTHER ISSUES REGARDING NATURAL GAS SUPPLIES

Another matter of note is that a number of existing natural gas generation facilities in the Phoenix metro area are served off of El Paso's lateral system in the area. This lateral system has capacity constraints that at times in the past have raised concerns regarding the ability of both electric generators and local gas distribution companies to meet their full supply needs on a cold winter day. Reliance on running such Phoenix area natural gas generation facilities at a high capacity factor may run afoul of the limitations inherent in El Paso's Phoenix area lateral system. Expansion of the El Paso's Phoenix area lateral system would be very difficult and costly, and really is improbable, given the built up nature of the metro area where the existing system lines are located.

Some Arizona electric generators, including the incumbent local utilities, have sculpted capacity contracts with El Paso, the result of proceedings at FERC in the mid 2000s where issues surrounding the availability of capacity on the El Paso system were dealt with at FERC. Electric generators were allocated much greater pipeline capacity during the summer months to meet their

summer peaking needs, while natural gas distribution companies were allocated much greater winter pipeline capacity to meet their winter heating needs. These existing seasonally sculpted capacity contracts still exist and thus incumbent local utilities do not currently hold as much pipeline capacity during non-summer months. While utilities do have the ability to adjust their pipeline capacity holdings over time, the current lack of available pipeline capacity in the region would likely make it more difficult for the utilities to acquire additional non-summer pipeline capacity rights if they needed to run their electric generation assets year round. Merchant natural gas generation plants could have even more difficulty in acquiring existing pipeline capacity, given that many of them currently hold little or no firm pipeline capacity and may rely on the availability of interruptible capacity.

Natural gas service can be impaired at times by unforeseen force majeure events that can take a portion of the pipeline system out of operation in an unexpected fashion. In a recent example, El Paso's Havasu Crossover line experienced a force majeure event on August 20-22, 2014, taking the line from its normal capacity of 650,000 Mcf/day to zero due to the discovery of a line leak.

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[i] March 13, 2013 United States Energy Information Administration article entitled "U.S. natural gas exports to Mexico reach record high in 2012."

[ii] FERC Docket No. RM-14-2-000

EXHIBIT 10

LOCATION OF COAL AND NGCC GENERATION IN ARIZONA

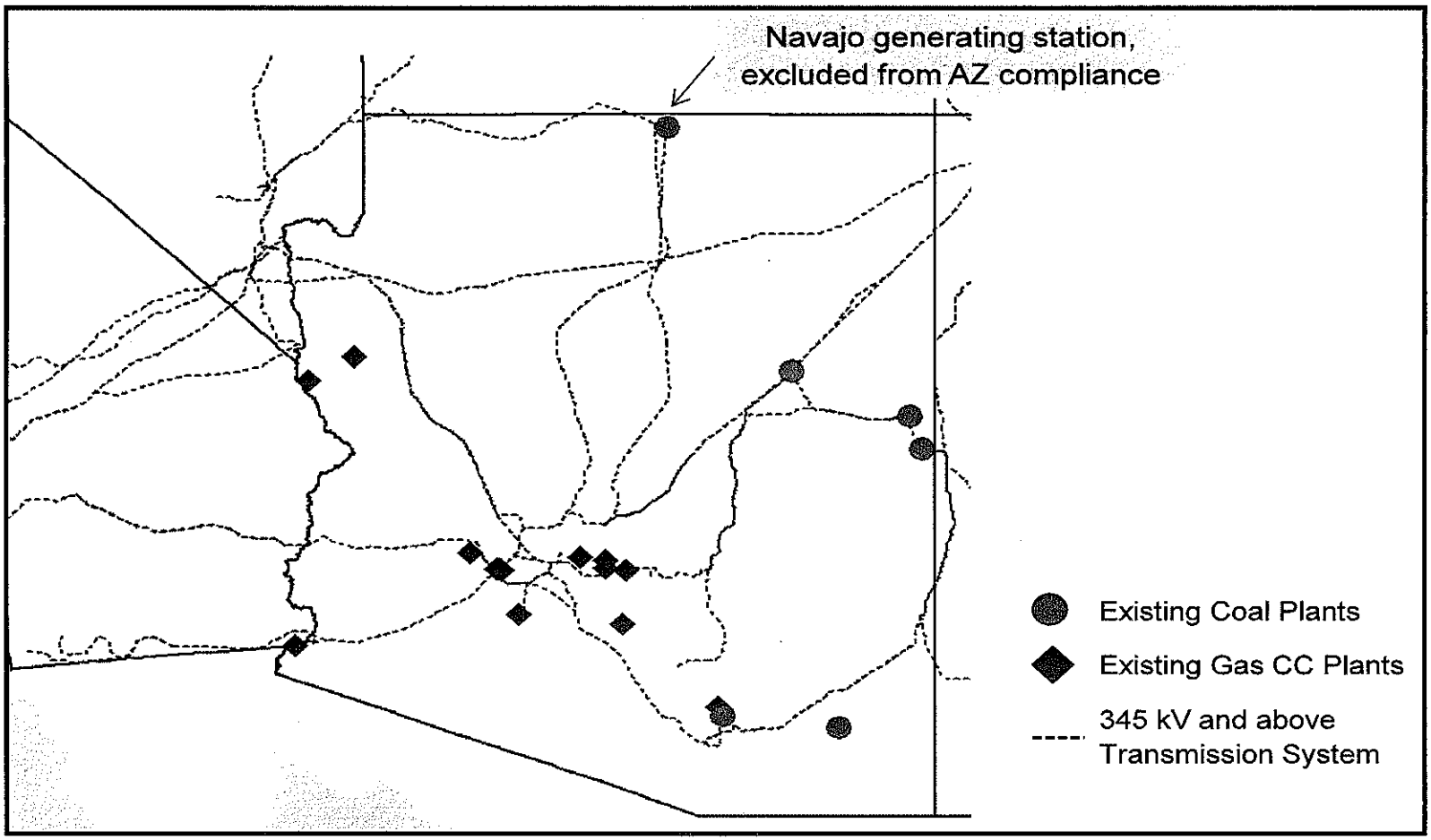


EXHIBIT 11

FOR DISCUSSION PURPOSES ONLY

Coal Plant Shutdown Assessment Report of SWAT Investigation

Presented to SWAT CRATF

July 10, 2014

Ron Belval
Transmission Planning

Sara Eftekharnejad
Transmission Planning

Outline

- SWAT Coal Plant Retirement Study Activities
- Regional Outreach
- Study Scope
- Modeling & Analysis
- Results
- Issues Requiring Further Research
- Conclusions
- Recommendations

SWAT Actions and Issues

- Agreement on need to study impact of coal plant shutdowns expected by 2019
- Key Issues;
  - Loss of "inertia" resulting in possible stability impact
  - Less than five years to respond
  - Change in generation pattern will impact Path Ratings
  - Problem goes beyond SWAT coal plant reduction
    - SONGS Retirement (~2000 MW)
    - California – Retirement of gas fired once through cooling plants (~8000 MW)
- Coal Reduction Assessment Task Force (CRATF) formed at February 19, 2014 SWAT Oversight Meeting
  - Guidance to define problem and study scope
  - Agreement on need to reach out to California and other entities

Coal Reduction Study Objectives

Phase 1:

- To identify possible reliability issues due to loss of inertia and/or dynamic reactive capability associated with anticipated coal plant shutdowns
- To identify potential limit to shutdowns through sensitivity analysis

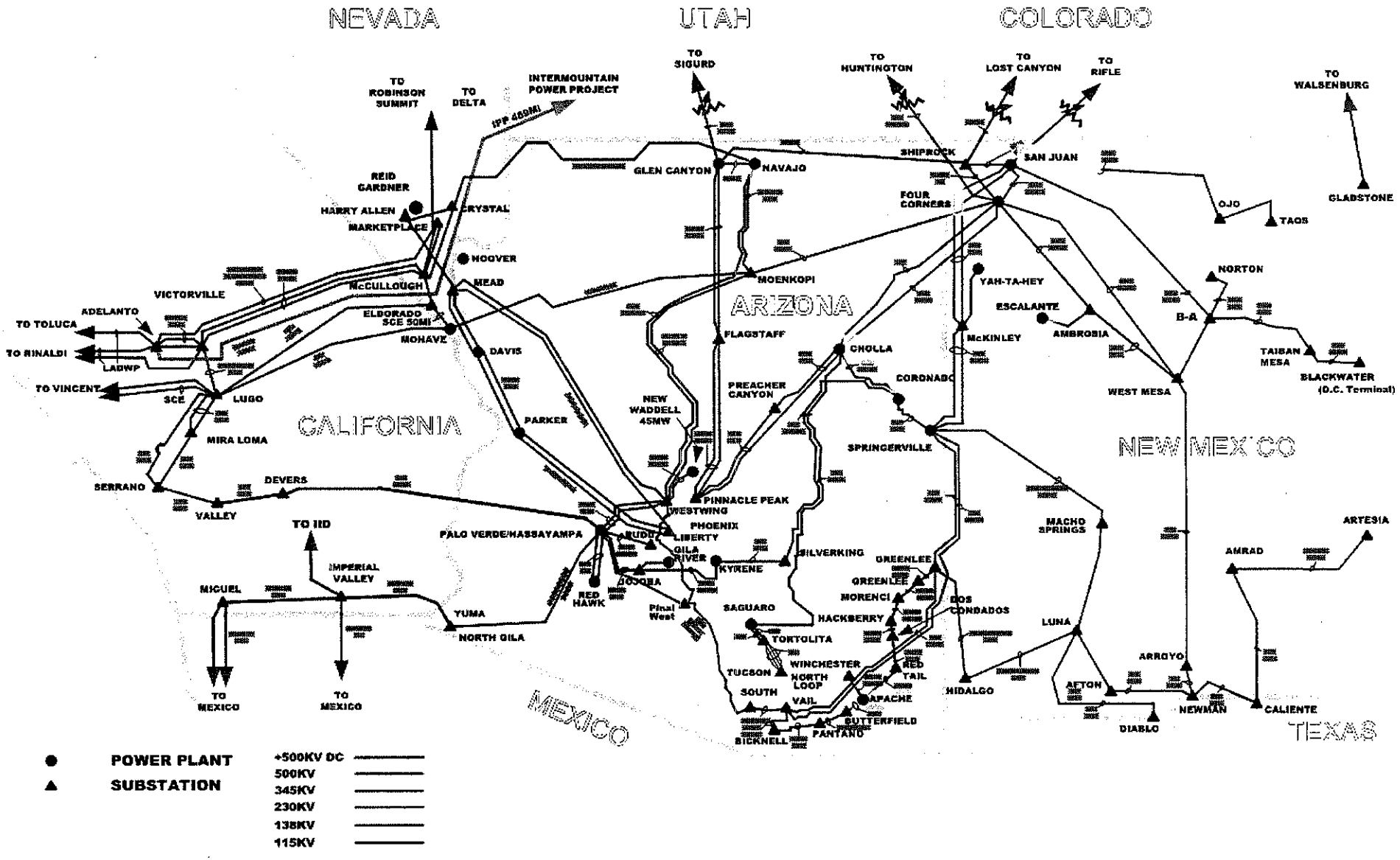
Phase 2:

- Specific objectives to be determined upon completion of Phase 1
- Possibly Identify Path Rating issues associated with change in generation resource mix and plant locations due to anticipated coal plant shutdowns

SWAT Coal Plant Retirement Discussion

- SWAT area coal reduction of approximately 25% (of ~10 GW total) by 2019
  - California plans to mitigate SONGS and once-through cooling retirements with preference resources
- Possible transmission system impacts
  - Dynamic stability issues
  - Potential Path Rating changes due to change in generation fleet
- Modeling and Analysis
  - Simulate coal reduction generation dispatch
  - Consider G-1, N-1 and some N-2 contingencies
  - Depending upon study results, consider dispatch modifications if needed to maintain dynamic stability

SWAT Coal Plants



Baseline and Scenario Assumptions

- Baseline
  - Reference case without coal plant shutdowns
- Scenarios
  - Coal plant capacity retirements expected by 2019
  - Specific units modeled out of service to accurately simulate plant shutdowns.
  - Specific generating units and locations identified to replace retired units to the extent information was available
- Sensitivities
  - Sensitivity to renewable/gas ratio for expected retirements
  - Sensitivity to renewable/gas ratio for high coal reduction

Modeling and Data Exchange

- Transient stability scenarios for dynamic studies
- List of multiple contingencies used for the power flow studies
- Update dynamic models for coal plants that will be converted to run on natural gas
- Dynamic models for new gas turbines that will be built on sites of retired coal plants and within load centers
- Models for renewable resources not included in the 2019HS case that will replace the output of the retired coal plants
  - WECC has offered to provide assistance modeling wind and solar resources.

Outreach to WestConnect

- NV Energy is interested in pursuing
- CRATF formation presented at the WestConnect Annual Planning Meeting on February 20, 2014
- CCPG has addressed the issue in its area
  - Plans to build new gas fired generation on the existing coal plant sites
- Presented Initial Study Results at the Arizona ACC BTA Workshop on May 15, 2014
  - No stability issues identified at that time
- Discussed at the WestConnect PMC on June 17, 2014:
  - Reported that coal plant reductions approaching 50% of SWAT footprint with high renewable resources/minimal new gas generation appears to impact transmission reliability
  - Interest in reporting results to EPA after results are validated

Outreach to CAISO

- Verbal contact with CAISO on February 21, 2014
  - Willing to work with us, but will await our response to bring this matter up internally or with other regions
  - CAISO representation on CRATF WebEx meetings

- CAISO Situation
  - Has had five years to address SONGS and Once-through gas generation shutdown
  - Relationship with IID, SMUD and LADWP
  - Willing to work with SWAT and/or WestConnect

Outreach to California TOs

- Participants in CRATF webinars
  - IID
  - LADWP
  - SCE
- Verbal contact with SDG&E in June, 2014
  - Reported preliminary results following CRATF TO call on June 24, 2014

Planning Regions Coordination

- Regional Planning Coordination Meeting February 28, 2014
  - One of 3 Objectives: "Identify opportunities to coordinate current transmission needs/solutions spanning more than one Planning Region"
  - Participants: CAISO, CG, NTTG & WC
- Presented to TEPPC TAS on April 29, 2014
  - WECC interested in following progress and reviewing results
  - Possible opportunities for coordination
  - Request to present at TEPPC August 13-14, 2014 meeting
- Discussed with Southwest Power Pool (SPP) on July 1, 2014
  - SPP interested in reviewing results and possibly coordinating comments

Power Flow Modeling and Analysis

- Power Flow Model and Analysis
  - Baseline: 2019 HS WECC/AZ Coordinated Case / No Coal Reduction
  - "CR Scenario" Case: Expected Coal Reduction with Planned new Gas
  - "CR Scenario Renewable" Case: Expected Coal Reduction with Planned new Gas replaced by Renewables
  - "CR Sensitivity High Renewable" Case: High Coal Reduction with High Renewables
  - "CR Sensitivity Gas/ Renewable" Case: High Coal Reduction with Renewables and Planned new Gas
- Contingency Analysis
  - Single and Category C multiple contingencies within the SWAT footprint.
  - Benchmark Scenario and Sensitivity cases against Baseline with pre-coal reduction dispatch

Transient Stability Analysis

- Disturbances:
  - 3-phase fault with normal clearing
  - 3-phase or single-line-to-ground fault with delayed clearing (breaker failure)
  - 3-phase fault with normal clearing plus loss of circuit on common tower or in common corridor.
  - Voltage, frequency and rotor angle plots are created for identified buses

Status of Technical Analysis

- Case Preparation
  - Baseline Case: No coal reduction
  - Expected Coal Reduction Scenario with Planned Gas replacement
  - Expected Coal Reduction with Renewable replacement
  - High Coal Reduction with High Renewables
  - High Coal Reduction with High Renewables and Planned Gas units
- Power Flow Analysis
  - Analysis of all TO provided contingencies completed on all cases
  - Comparison of all cases against Baseline cases completed
- Transient Analysis
  - Simulations of all TO provided transient scenarios completed
  - Comparison of Baseline & CR Scenario/Sensitivity results completed

Modeled Power Flow Coal Generation Dispatch (MW)

Coal Units	Baseline No CR	"Gas " & "Renewable" CR 2k	"High Renewable" CR 5k Sensitivity	"High Renewable\Gas" CR 5k Sensitivity
Four Corners 1 - 3	0	0	0	0
Four Corners 4 & 5	1597	1597	748	748
San Juan 1	360	360	0	0
San Juan 2 & 3	894	350	0	0
San Juan 4 (PNM Swing Generator)	472	415	505	527
Navajo 1	805	0	0	0
Navajo 2 & 3	1610	1610	805	805
Apache 2& 3	389	389	195	195
Cholla 1 - 4	1119	1119	1119	1119
Coronado 1 & 2	850	850	429	429
Springerville 1 - 4	1650	1441	1391	1391
Reid Gardner 1-3	0	0	0	0
Reid Gardner 4	257	0	0	0
Total	10003	8131	5192	5214
Reduction from Baseline		1872	4811	4789

Power Flow Modeled Gas Generation (MW)

Coal Units	Baseline No Reduction	CR 2k "Gas"	CR 2k "Renewable"	"High Renewable" CR 5k Sensitivity	"High Renewable\Gas" CR 5k Sensitivity
Reid Gardner CC Unit 1	0	180	0	0	180
Reid Gardner CC Unit 2	0	180	0	0	180
Reid Gardner CC Unit 3	0	230	0	0	230
Ocotillo	0	95	0	0	95
Ocotillo	0	95	0	0	95
Ocotillo	0	95	0	0	95
Ocotillo	0	55	0	0	55
Ocotillo	0	55	0	0	55
San Juan GT	0	170	0	0	170
La Luz GT	0	40	0	0	40
Total Planned Gas Units	0	1195	0	0	1195

Power Flow Modeled Incremental Renewable Power Output (MW)

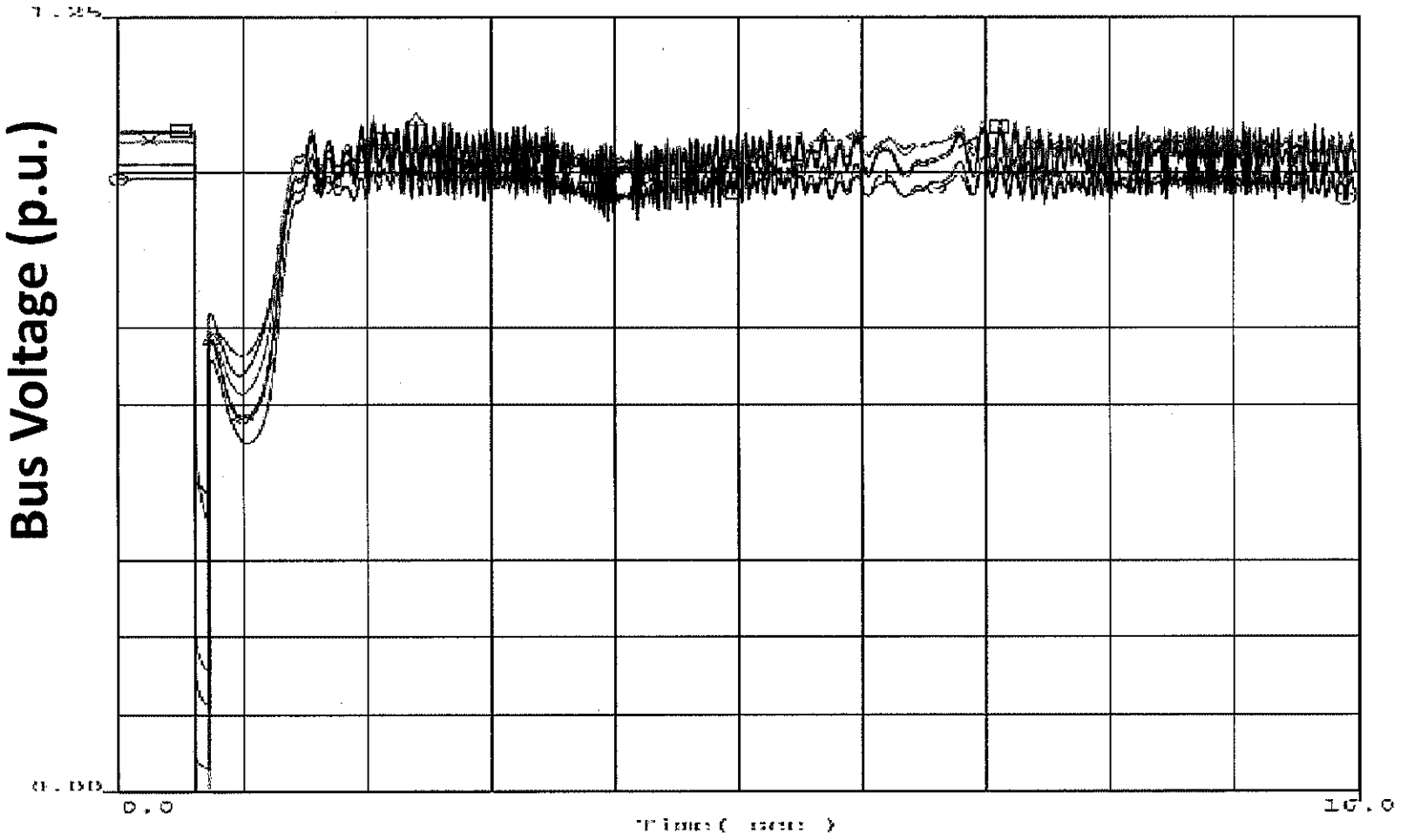
New PV Units	Baseline No CR	"Gas " CR 2k	"Renewable" CR 2k	"Renewable" CR 5k	"High Renewable\Gas" CR 5k Sensitivity
Rooftop PV in Arizona	0*	0	0	1360	950
Utility scale PV in Arizona	0	0	514	804	804
Rooftop PV in New Mexico	0	0	0	300	85
Wind unit in New Mexico (San Juan)	0	0	210	450	450
Utility scale PV in Nevada	0	300	890	890	300
Utility scale PV in TEP	0	60	60	112.3	112.3

* Indicates amount of renewable resources in addition to that which was already in service in the 2019 case.

Baseline Scenario

- 2019 Arizona Coordinated Heavy Summer Base Case
- No Coal Plant Retirements Assumed

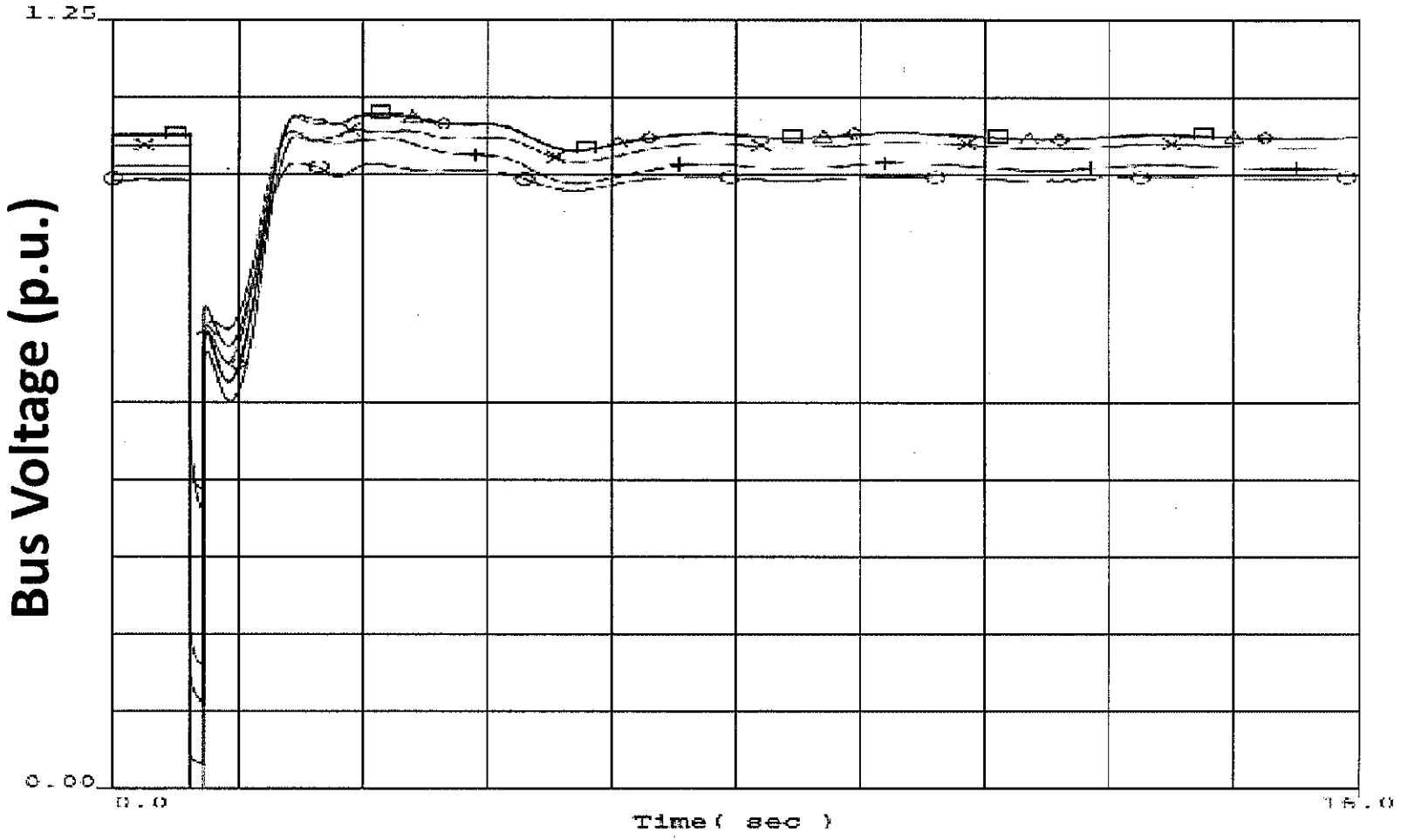
Baseline
Fault at Largest Single Generating Unit, Loss of Unit



Coal Reduction Scenario

- 2019 Arizona Coordinated Heavy Summer Base Case
- 1872 MW coal plant retirements assumed
- 1195 MW new gas units added
- 360 MW of new renewables added
- 317 MW balance from reduction in area interchange to California

CR Scenario
Fault at Largest Single Generating Unit, Loss of Unit



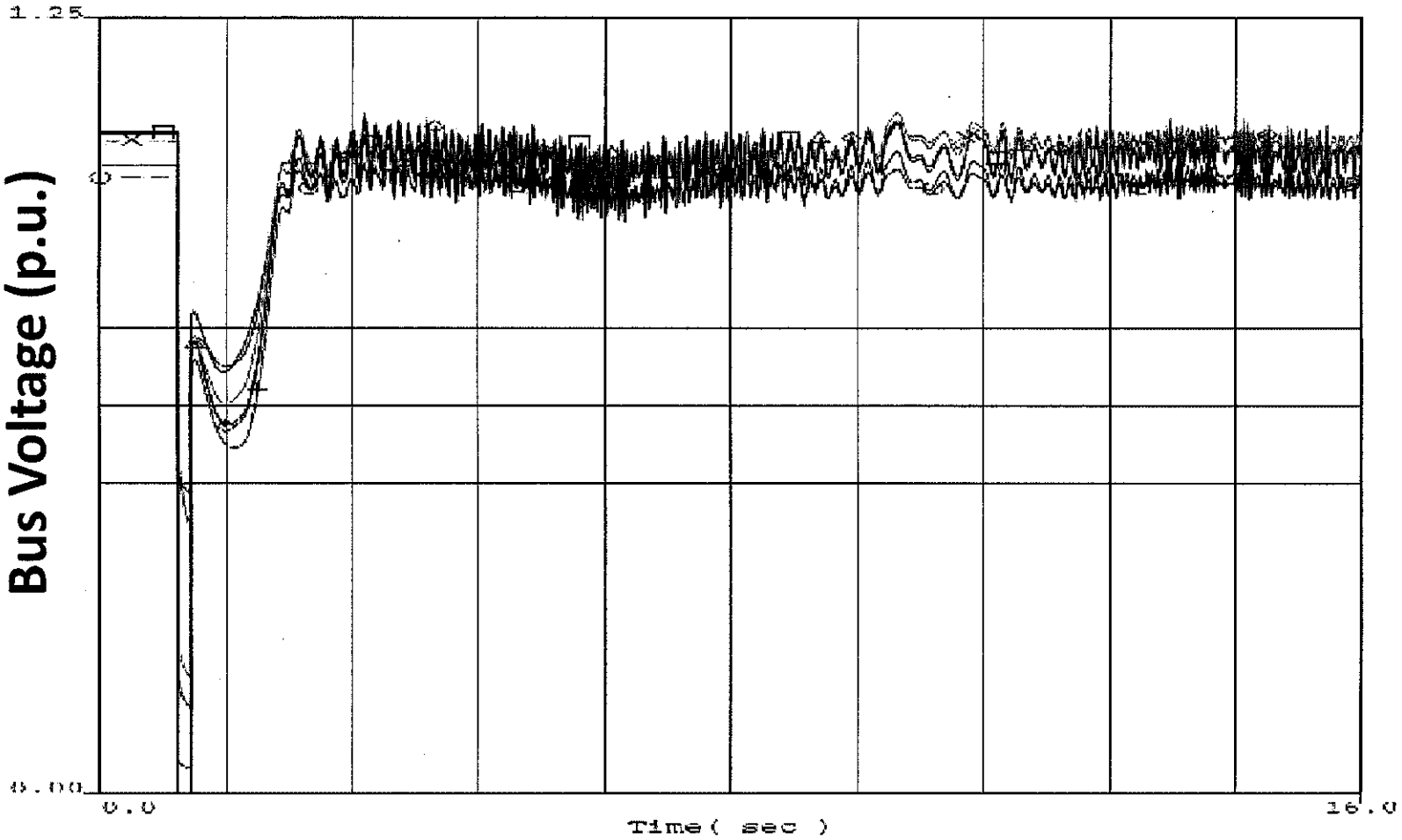
Baseline versus CR Scenario

- Both are stable
- Coal reduction with gas performance is improved over Baseline
- Addition of gas units contributes to inertia and dynamic reactive capability
- Units located closer to load centers and fault locations improve performance

Coal Reduction Scenario with Renewables Added in Place of Gas

- 2019 Arizona Coordinated Heavy Summer Base Case
- 1872 MW coal plant retirements assumed
- 0 MW new gas units added
- 1674 MW of new renewables added
- 315 MW from reduction in area interchange to California
  - Assumes that California will add resources

CR Renewable (No Incremental Gas) Scenario
Fault at Largest Single Generating Unit, Loss of Unit



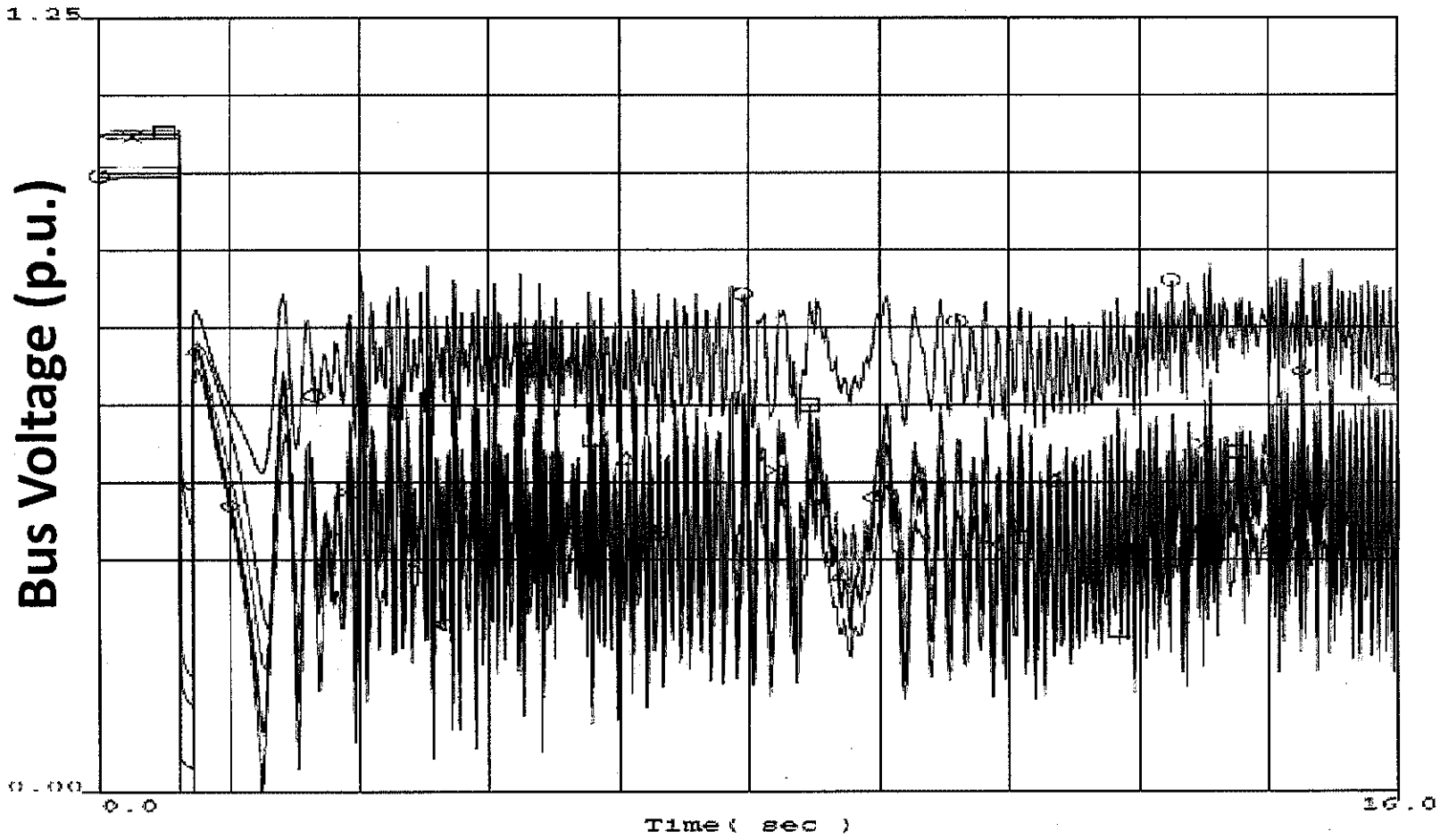
CR Gas versus CR Renewable Scenario

- Both are stable
- Coal reduction with gas performance is better than CR renewable scenario
- Addition of gas units contributes to inertia and dynamic reactive capability
- Renewables have less reactive capability

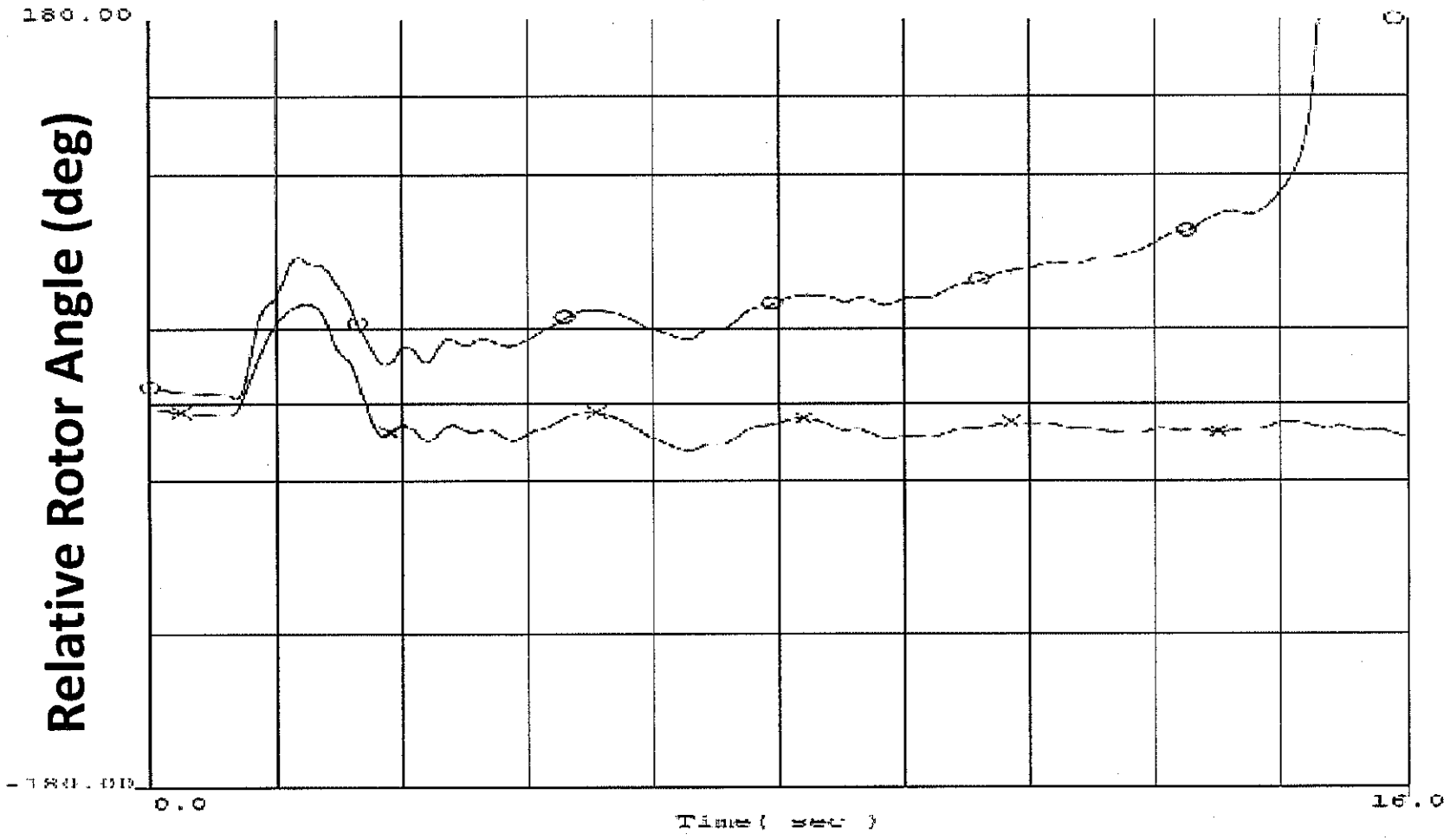
High Coal Reduction Renewable Sensitivity

- 2019 Arizona Coordinated Heavy Summer Base Case
- 4811 MW coal plant retirements assumed
- 0 MW new gas units added
- 3916 MW of new renewables added
  - Possibly higher renewables than would actually be available by 2019
- 895 MW balance from area interchange
  - Assumes that California will add resources

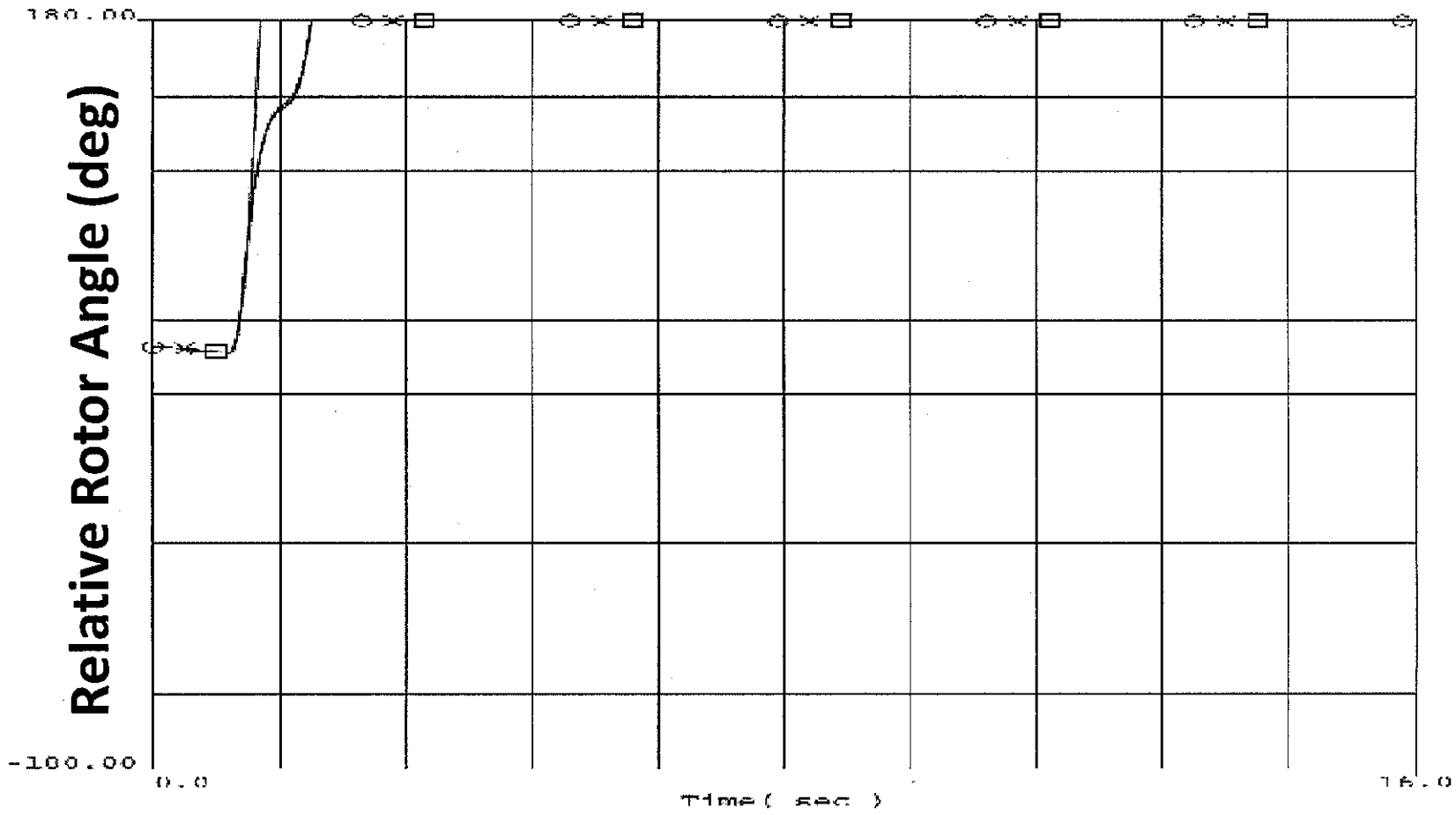
High CR & Renewable Sensitivity
Fault at Largest Single Generating Unit, Loss of Unit



High CR & Renewable Sensitivity
Fault at Largest Single Generating Unit, Loss of Unit



High CR & Renewable Sensitivity
Fault at Largest Single Generating Unit, Loss of Unit



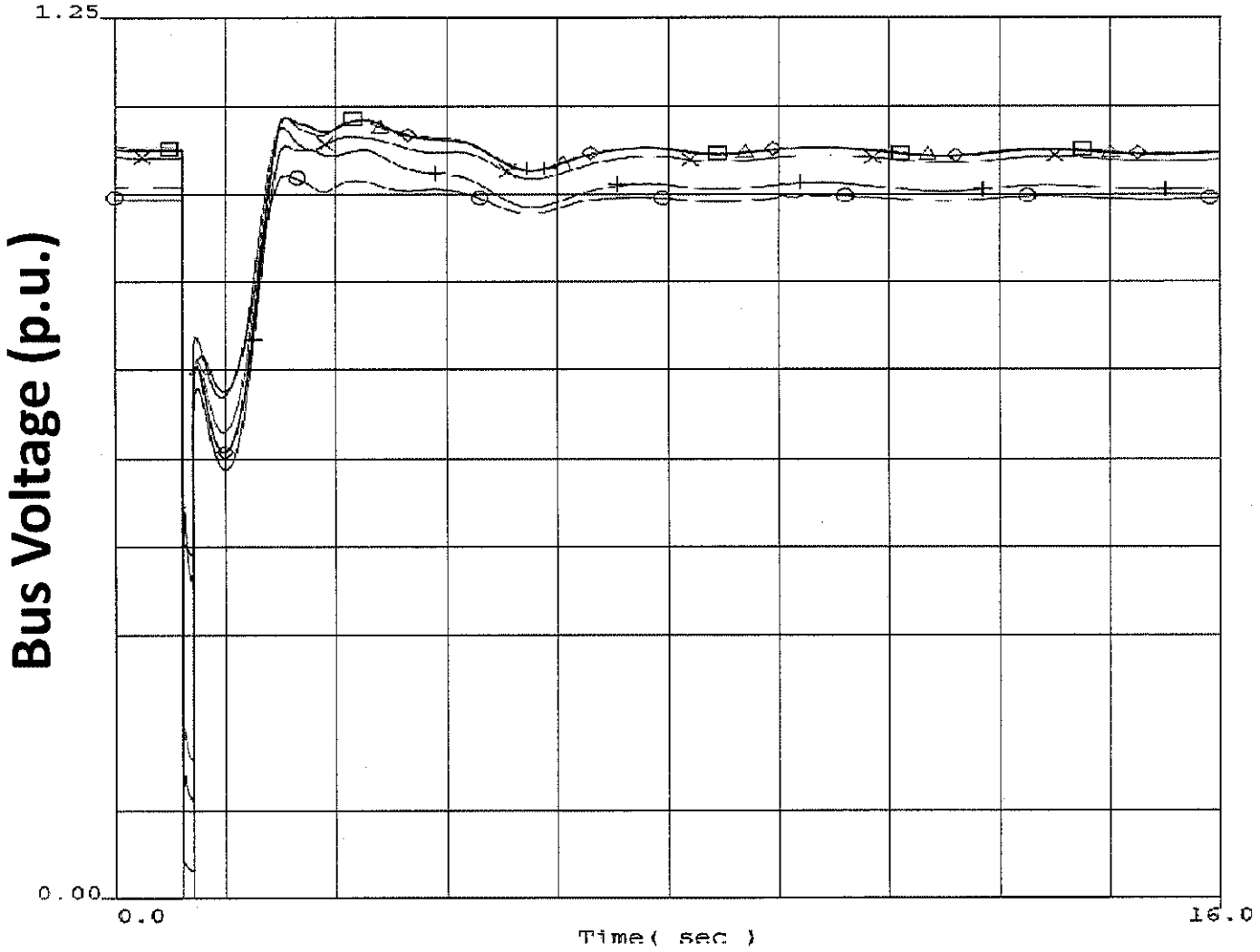
High CR & Renewable Sensitivity

- Bus voltage unstable
- Large loss of coal plant inertia and dynamic reactive power capability
- Renewables do not add inertia and have limited reactive capability
  - Rooftop assumed to operate at unity power factor
  - Utility scale PV have inverters with reactive capability
- This sensitivity case was based on assumed resources and locations

CR Sensitivity - High CR & Renewable

- Rotor angle oscillations are undamped
- Generators will eventually trip
- Can result in cascading failures

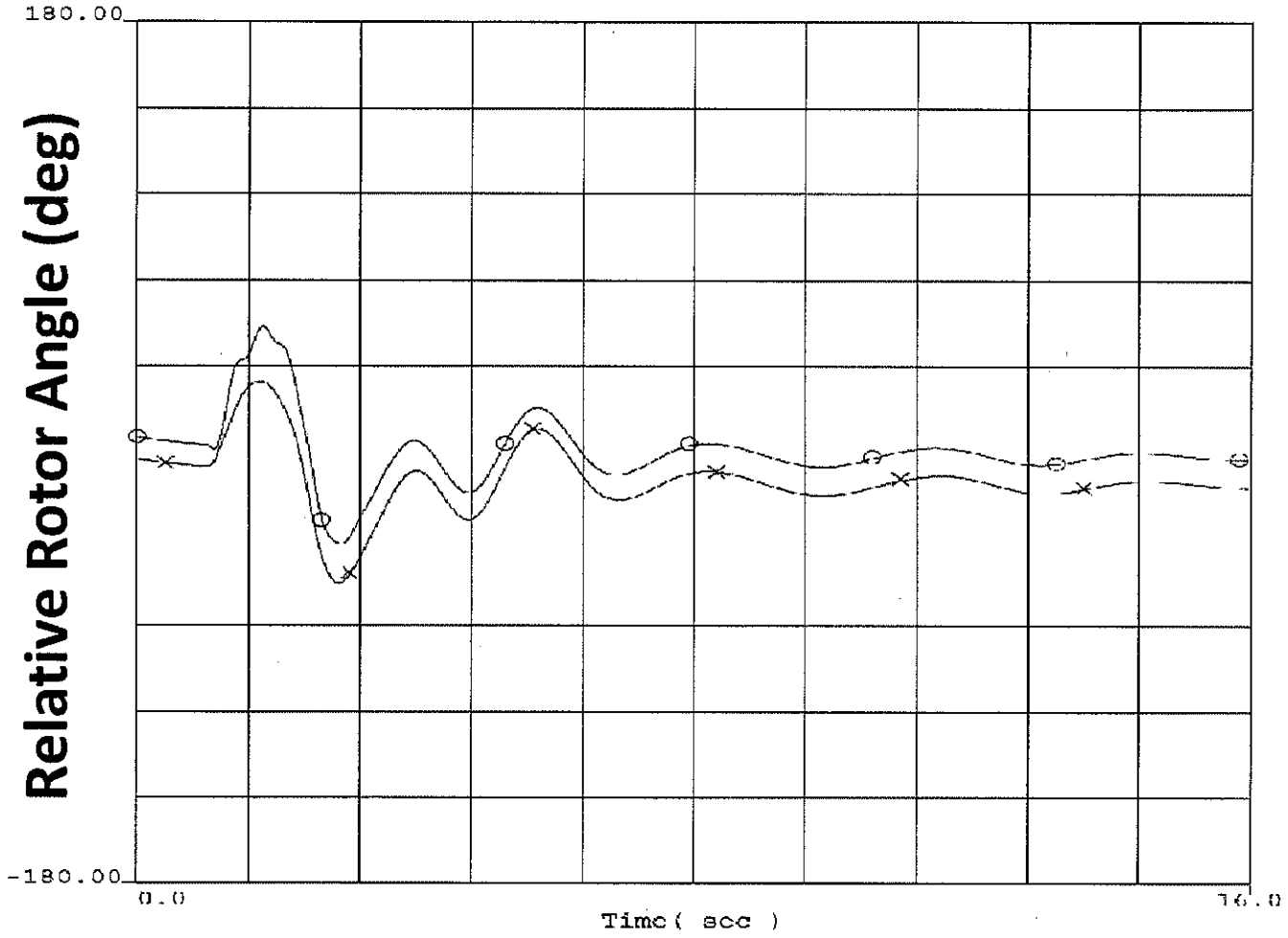
High CR with Gas and Renewable Sensitivity
Fault at Largest Single Generating Unit, Loss of Unit



High Coal Reduction with Gas and Renewable Sensitivity

- 2019 Arizona Coordinated Heavy Summer Base Case
- 4811 MW Coal Plant Retirements Assumed
- 1195 MW New Gas Units Added
- 25 MW addition of SAN JUAN 4
- 2701 MW of New Renewables Added
- 893 MW balance from reduction in area interchange to California
  - Assumes that California will add resources

High CR & Gas Renewable Sensitivity
Fault at Largest Single Generating Unit, Loss of Unit



High CR & Gas/Renewable Sensitivity Generator Relative Rotor Angle

- Rotor angle oscillations are damped
- Bus voltages are stable and similar to baseline scenario
- Addition of the planned gas units eliminates stability issues

Issues Requiring Further Research

- Inertia versus Voltage Support (added gas resources)
- Observed high voltage issues on 500kV system in Four Corners area
  - Possibly due to shutting down coal units resulting in reduced loading on lines (line charging) and losing voltage regulation capability
- Impacts on Major Paths
- Impacts of Renewable intermittency
- Impacts of intraregional and Interregional power transfer

Conclusions

- There is a limit to the amount of coal plants that may be shut down while maintaining reliable system operation
- The limit to the amount of coal capacity that may be reduced is influenced by gas fired replacement capacity
- The amount of renewable resources that may be integrated is dependent upon addition of gas fueled generation, or other resources that compensate for loss of inertia and dynamic reactive capability
- A question to consider: "Is replacing coal capacity with an appropriate ratio of gas/renewables the only solution?"
  - Decisions related to coal plant shutdowns within the five-year planning horizon could limit options for the future
  - Should we take a little more time to come up with a more comprehensive regional / interregional strategy?

Recommendations

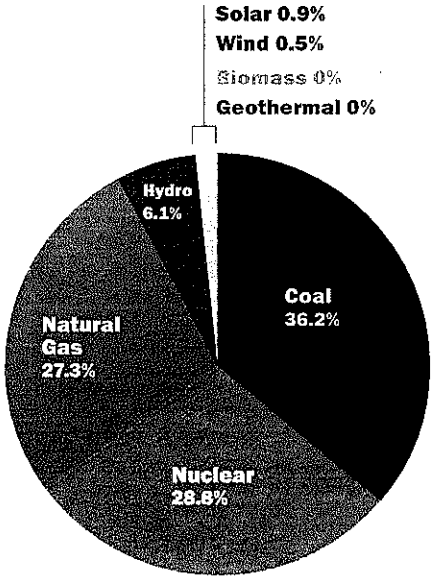
- Investigate developing a regional coal reduction study as a WestConnect scenario to identify regional transmission needs that may be met by regional transmission or non-transmission alternative projects
  - Coordinate with CAISO, NTTG and CG to the extent that interregional projects may be submitted
- Coordinate with TEPPC on Interconnection-wide studies
- Coordinate with SPP on comments to the EPA
- Develop SWAT study plan and scope for Phase 2:
  - Expand scope to include California
  - Spring season analysis
  - Path Rating impacts

EXHIBIT 12

ADEQ Arizona Department of Environmental Quality

ENERGY MIX CHART

Comparison of CO_2 emissions (lbs.) / state electricity generation in megawatt-hour (MWh)

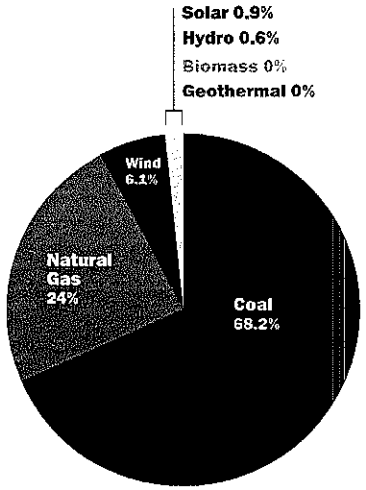


ARIZONA

REDUCTION: 51.7%

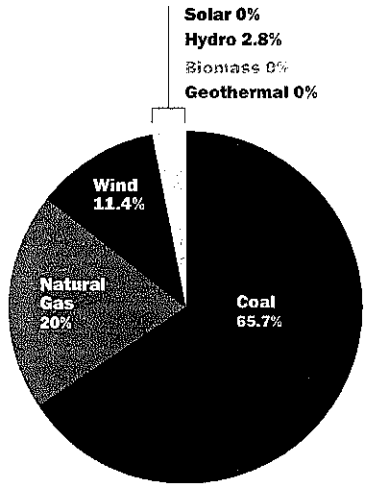
GOAL: 702 lbs./MWh

2012 Actual: 1,453 lbs./MWh



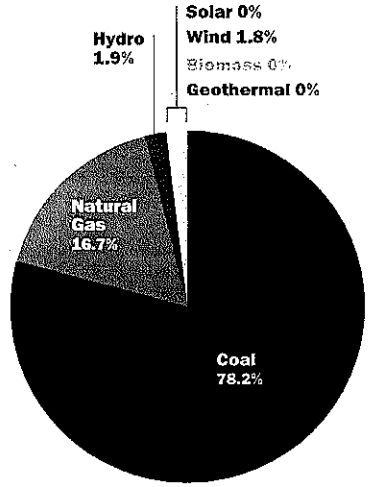
NEW MEXICO: 34.0% REDUCTION

2030 GOAL: 1,048 lbs./MWh
2012 Actual: 1,586 lbs./MWh



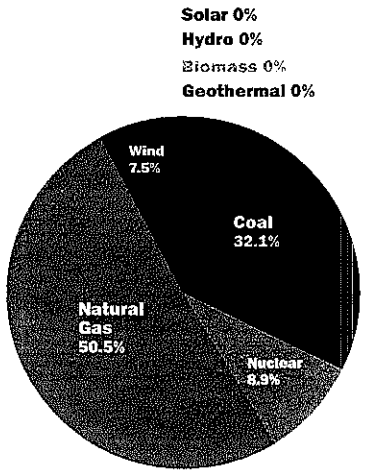
COLORADO: 35.4% REDUCTION

2030 GOAL: 1,108 lbs./MWh
2012 Actual: 1,714 lbs./MWh



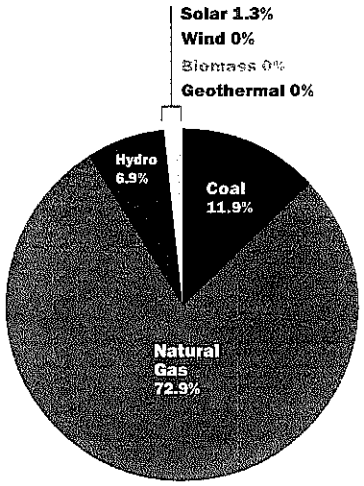
UTAH: 27.1% REDUCTION

2030 GOAL: 1,322 lbs./MWh
2012 Actual: 1,813 lbs./MWh



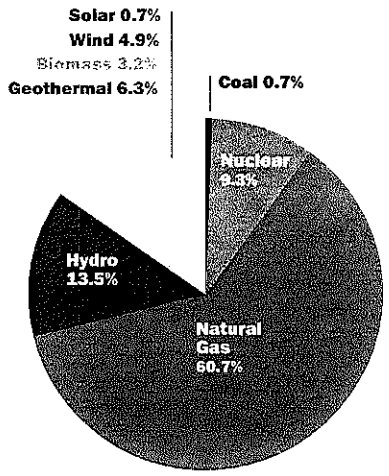
TEXAS: 39.1% REDUCTION

2030 GOAL: 791 lbs./MWh
2012 Actual: 1,298 lbs./MWh



NEVADA: 34.5% REDUCTION

2030 GOAL: 647 lbs./MWh
2012 Actual: 988 lbs./MWh



CALIFORNIA: 23.1% REDUCTION

2030 GOAL: 537 lbs./MWh
2012 Actual: 698 lbs./MWh

Source: http://cleanpowerplanmaps.epa.gov/CleanPowerPlan/

Publication Number: C-14-28

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Assessment of the Clean Power Plan

Prepared for:

The Arizona Utility Group

November 21, 2014

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TABLE OF CONTENTS

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EXHIBITS

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1. Executive Summary

Several of the prominent utilities operating in Arizona including Tucson Electric Power Company (TEP), Arizona Public Service Company (APS), Salt River Project (SRP), Unisource Energy Services (UES), and Arizona Electric Power Cooperative (AEPCO), collectively referred to as the Arizona Utility Group or (AUG), retained Pace Global to perform an assessment of the impacts to the state that could result from the implementation of the EPA's proposed Clean Power Plan (also referred to herein as the "CPP") and to provide comments and recommendations to the EPA on its proposed rule.

Under the EPA's proposed Clean Power Plan, Arizona would be required to reduce the carbon dioxide (CO_2) intensity of its power generation fleet by approximately 47% by 2020 and approximately 52% by 2030 in order to meet its goals. Arizona undoubtedly faces one of the most aggressive reduction requirements of all states, driven by the application of the EPA's proposed building block approach to determining state-level emission goals. Pace Global's analysis of Arizona's compliance implications finds that the rule is neither flexible nor achievable and that implementation of this plan without modifications would result in severe impacts to the reliability of electric supply in the state and excessive cost implications for Arizona customers. The CPP is projected to increase fuel and purchased power costs by 40% and generation capital expenditures by 30% when compared to more reasonable alternatives

Pace Global conducted the following analyses:

- Analyzed the reasonableness of key assumptions in the building block approach for Arizona;
- Assessed the potential costs to Arizona customers associated with implementing the Clean Power Plan as proposed by the EPA.
- Analyzed an alternative path for the state to reduce the carbon intensity of its generation on a realistic and achievable timeframe.

Pace Global's major conclusions are:

1. The interim targets resulting from EPA's building blocks are unreasonable, are inequitable for Arizona, and cannot be achieved without major reliability concerns.
2. The infrastructure needs and costs associated with implementing the Clean Power Plan as it currently stands are very significant over a relatively brief period of time.
3. Alternative interim and final goals that fully consider the remaining useful life of existing plants would achieve significant carbon reductions without jeopardizing grid reliability and result in a lower cost to ratepayers.

Each conclusion is discussed in more detail below and in the remainder of this report.

1.1. EPA's Interim Goals Resulting from Building Blocks are Unreasonable, Inequitable and Unachievable

- **Building block 1 cannot be technically achieved:** EPA's assumption of a six percent efficiency improvement for operating coal plants is highly speculative and technically impossible, especially noting that the rule, as proposed, would not account for efficiency improvements made to date.
- **Building block 2 should account for plant useful life and result in reasonable timeline for compliance:** In the computation of the goal, the application of building block 2 accounts for 73% of Arizona's total reduction requirement. Reductions from this building block would be required by 2020,

as the EPA assumes that increased utilization of existing natural gas combined cycle units and proportional reduction in coal generation is an immediate measure to reduce CO_2 emissions from electric generation. In Arizona, this would result in the elimination of all affected coal capacity in the state without considering the significant remaining useful life that some of these units have. This assumption ignores many realities of how the electric power system operates and how long it takes to add required infrastructure, the fact that transmission in the state would need to be reconfigured (expanded) to operate gas units at the levels that would be required, and the fact that massive amounts of new gas capacity and pipeline infrastructure would have to be built to maintain operating reserve margins in Arizona. Pace Global's analyses show that all coal plants would have to retire due to this building block by 2020 using realistic assumptions of plant operation.

  - Pace Global recommends that the EPA consider the remaining useful life of existing plants as well as applying a phase-in of the re-dispatch assumed by building block 2 over the 2020 to 2030 time period rather than assuming that this re-dispatch could occur by 2020.

- **Building block 3 needs clarification:** Although building block 3 accounts for a smaller portion of Arizona's overall reduction requirement, renewable generation can be an important compliance strategy for Arizona in meeting its goals under the Clean Power Plan.
  - Consistent with the treatment of renewables under virtually all state renewable energy standards, the EPA should clarify that renewable generation should be accounted for at the point of delivery and not the source of generation for use in compliance purposes under building block 3.

- **Building block 4 is not reasonably achievable:** The application of building block 4 drives 15% of Arizona's reduction requirements. This building block was apparently developed by considering what aggressive states have achieved over the past few years in energy efficiency reductions. There is no evidence that achieving levels of 1.5% per year can be maintained over a period of 10 or more years. The EPA's approach selects far too aggressive efficiency levels for goal calculation and does not consider what Arizona has already achieved nor factor in the ability of states to meet the 1.5% annual reduction continuously for more than a decade.
  - Pace Global recommends that the EPA adjust building block 4 to consider a 0.6% annual efficiency improvement rather than 1.5% when establishing overall target levels. This benchmark would be more in line with studies of achievable efficiency penetration levels.

The CPP is Inequitable for Arizona

The goals are particularly severe for Arizona and would require all affected coal in the state to be eliminated by 2020.

- The state of Arizona must reduce its carbon levels by 47% by 2020 and 52% by 2030 from current levels, which is one of the highest reductions in the country, with all but 10 states having less than a 40% reduction by 2030. The fact that the vast majority of the reductions are required for the interim goal means that the plan must effectively be implemented by 2020, a virtually impossible task.

EPA's Interim Targets Imply Major Reliability Concerns in Arizona

- Pace Global's analyses of the CPP Building Block application indicate that all of the non-tribal coal in the state would be retired by 2020. This would drive reserve margins in the state negative by 2020

without the addition of significant new capacity in the state. To maintain reserve margins, Pace Global estimates that by 2020, at least 2.4 GW of incremental natural gas generation capacity costing around $2 billion[1] (over baseline expected needs to meet load growth and account for planned retirements) would be needed within a period of three years. This is virtually impossible to plan, permit and construct in Arizona.

- The direct application of the four building blocks would require momentous changes to Arizona's coal fleet by 2020. Approximately 3,316MW of coal fired generation would have to be retired by 2020, on top of already planned retirements and re-powerings, implying a stranded investment of over $3 billion (2013$) in 2020.
- Most coal generation is in the eastern part of Arizona, while most of the existing natural gas generation is in western Arizona. Transmission capacity has been built out to serve load from the existing capacity sites. Without additional transmission infrastructure investment, which can take five to ten years to develop and construct, electric reliability and deliverability could be severely compromised.
- There are two main natural gas pipelines serving Arizona, and one is already near capacity throughout the year, with both near capacity during peak periods. The CPP building blocks imply that a more than 3-fold increase in natural gas demand by the power sector alone would be expected by the early 2020s, driving the need for pipeline upgrades. Without additional pipeline infrastructure that can take four or more years to develop and construct, current pipeline capacity would be overwhelmed, and electric, as well as consumer natural gas, reliability and deliverability could be severely compromised.

[1] This is generation cost only. Cost for additional transmission and gas pipeline infrastructure have not been specifically estimated in this analysis, but would be significant.

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1.2. There are Reasonable Alternatives Available to the EPA

The significant cost, reliability and timing constraints that would impact Arizona's ability to comply with the proposed goals of the Clean Power Plan can be mitigated by the application of several changes to the building blocks, which would result in a more gradual, but ultimately significant reduction in the CO_2 intensity of generation. These specific recommendations and justification are summarized in Exhibit 1.

Exhibit 1: Recommended Adjustments to the CPP Building Blocks and Justification

	Recommended Change for the EPA	Rationale
Building Block 2	(1) Exclude coal plants from NGCC re-dispatch if they are 40 or less years old as of 2030. (2) Evenly phase in the re-dispatch assumed by building block 2 over the 2020 to 2030 time period rather than assuming that this re-dispatch could occur by 2020	This would both account for the useful life of plants and result in a more feasible timeline to address infrastructure issues and costs (including stranded) associated with the required significant generation switching required.
Building Block 3	Clarify that all renewable generation should be accounted for at the point of delivery and not the source of generation.	This would enable states to rely on regional resources for compliance and is consistent with virtually all existing state renewable energy standard legislation.
Building Block 4	Adjust building block 4 to assume a 0.6% annual efficiency improvement rather than 1.5%.	This penetration level is more consistent with a reasonable achievable level for purposes of target setting and would allow states to rely on efficiency as a compliance mechanism, providing flexibility.

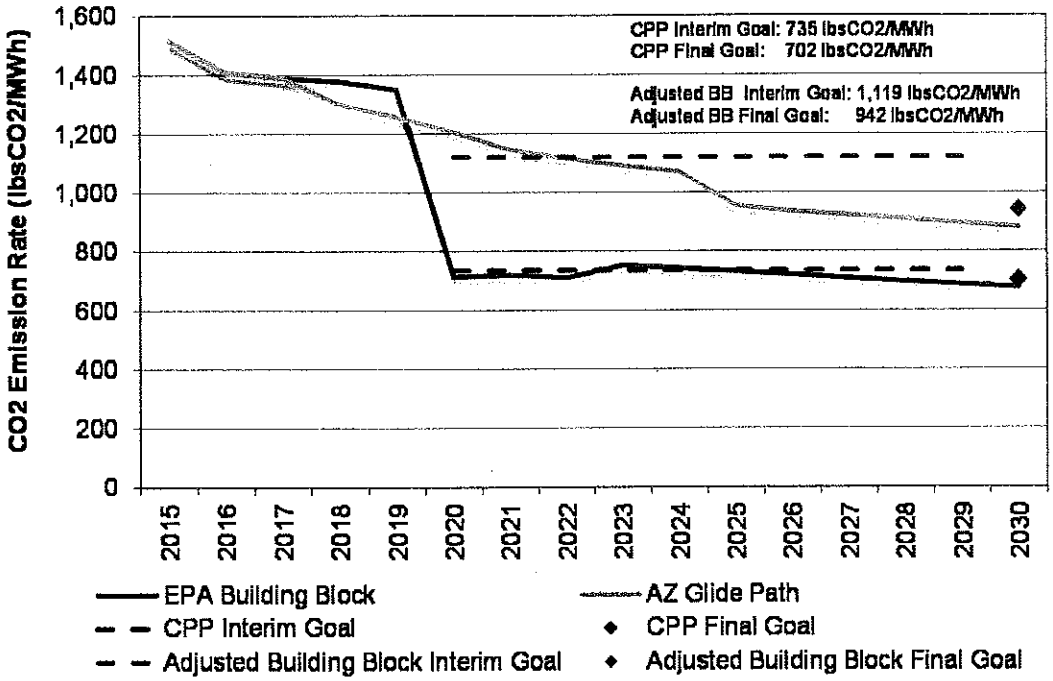
Source: Pace Global.

In applying these recommended changes to the EPA's building block approach, Pace Global determined recommended goals for Arizona that would:

- Reduce the carbon emission intensity of generation in Arizona by around 35% by 2030, with an adjusted final 2030 goal of 942 $lbCO_2/MWh$ versus the EPA's goal of 702 $lbCO_2/MWh$ proposed;
- Account for the useful life of coal plants;
- Provide adequate time to develop the transmission infrastructure to ensure grid reliability;
- Provide adequate time to develop the gas pipeline infrastructure to ensure gas supply reliability;
- Achieve these reductions at a much lower cost to the customer and avoid near-term rate shocks (as depicted in Exhibit 3).

Exhibit 2 presents emission rates by year between now and 2030 for the EPA Building Block scenario and the Arizona Glide Path scenario based on Pace Global's analysis. Both scenarios achieve significant reductions in carbon emissions. However, the Arizona Glide Path scenario offers a much more gradual path to meeting these reductions, without the cost and reliability concerns that would result from implementing the interim and 2030 targets for Arizona as currently proposed.

Exhibit 2: Emission Rates by Scenario v. CPP Proposed and Adjusted Goals



Source: Pace Global.

1.3. The Costs of Compliance under the EPA Building Block Scenario are Very Significant

Pace Global assessed the cost implications of the Clean Power Plan assuming the literal application of the building blocks as well as an alternative scenario to reducing emissions in a more reasonable and cost effective manner. Costs of the EPA building block analysis were compared to the alternative Arizona Glide Path scenario that accounts for the useful life of coal plants in the state to assess costs directly attributed to meeting Clean Power Plan compliance. This comparison is summarized in Exhibit 3 and includes the following key findings:

- The fuel and purchased power component of costs for Arizona electric ratepayers are estimated to increase by 40% (with risk of higher impacts, depending on the impact of the plan on U.S. natural gas markets and pricing) under the EPA Building Block scenario versus the Arizona Glide Path scenario. This is due to fuel switching from lower-cost coal to higher-cost natural gas, as well as increases in the expected cost of natural gas over time as a result of substantially higher gas demand in the EPA Building Block scenario.
- New capital expenditures associated with building gas plants are likely to be 30% higher in the Building Block scenario between 2020 and 2030 than the Arizona Glide Path scenario's plan to phase coal out more gradually.
- In addition, the EPA Building Block scenario would result in $3 billion in utility stranded costs in 2020, resulting in ratepayers paying twice for the same service.

Exhibit 3: Summary of Cost Impacts of the Clean Power Plan (2013$)

	AZ Glide Path Scenario	EPA Building Block Scenario	Delta (EPA BB – AZ Glide Path)	Percent Change
2020-2030 Average Fuel + PP Costs ***($/MWh)***	$37.9/MWh	$52.7/MWh	$15/MWh	40%
2020-2030 Total Fuel + PP Costs ***($Billion)***	$44.5B	$62.2B	$17.7B	40%
2020 – 2030 Gas Capacity (MW)	7,825MW	10,125MW	2,300MW	29%
2020-2030 Capital Cost Investment ***($Billion)***	$6.2B	$8.1B	$1.9B	31%
Stranded Cost in 2020 Due to Early Coal Closures ***($Billion)***	n/a	$3.04B	n/a	n/a

Note that the additional cost associated with new and upgraded electric transmission and natural gas pipeline infrastructure required to meet Clean Power Plan goals are not included in this summary.

Source: Pace Global.

This analysis shows that customers would benefit greatly from a more moderate and gradual reduction in coal generation that accounts for the useful life of coal plants while still achieving significant reductions in carbon intensity.

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2. Assessment Overview

Pace Global performed an assessment of the Clean Power Plan's impacts on Arizona to analyze the following:

- Analyzed the reasonableness of key assumptions in the building block approach for Arizona;
- Assessed the potential costs to Arizona customers associated with implementing the Clean Power Plan as proposed by the EPA.
- Analyzed an alternative path for the state to reduce the carbon intensity of its generation on a realistic and achievable timeframe.

In performing the assessment, Pace Global reviewed the impacts of the Clean Power Plan on Arizona's natural gas and electric power systems by assessing the implications of the prescribed draft rule and by comparing the plan with a more plausible alternative. Scenarios considered in this analysis include:

- EPA Building Block scenario – literal application of EPA's four building blocks resulting in 0 MW of affected coal capacity remaining in the state by 2020
- Arizona Glide Path scenario – ~2,500MW remaining coal capacity in the state by 2030

Pace Global performed electric market dispatch analysis and fuel market analysis under these different scenarios to quantitatively assess the consumption, generation, cost, and infrastructure impacts specific to Arizona. To support the quantitative analysis, Pace Global deployed an hourly chronological dispatch model to simulate the economic dispatch of power plants within a competitive framework with the AuroraXMP platform. In its fuel market analysis, Pace Global utilized the Gas Pipeline Competition Model ("GPCM") to conduct analysis of natural gas economics in North America. An overview of the modeling approach and assumptions used in the analysis are included as appendices to this report.

The remainder of the report is organized into three major chapters as follows:

- EPA's Building Block Approach and Implications for Arizona
- Assessment of Alternative Scenario
- Cost Implications of the Clean Power Plan

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3. EPA's Building Block Approach and Implications for Arizona

The EPA defines the Best System of Emission Reduction (BSER) as four building blocks which are uniformly applied to actual 2012 baseline state generation profiles to determine individual state-level, rate based carbon dioxide goals ($lbCO_2$ / MWh) under the Clean Power Plan. These building blocks, which the EPA characterizes as "reasonably achievable," aim to account for individual states' baseline generation mix. The resulting state goals, however, vary widely among different states in terms of the magnitude of reduction in emission rates required to comply and the expected cost and changes to generation mix that would be required to achieve them. As proposed, Arizona would be required to decrease its emission rate 52%, from 1,453 $lbCO_2$/MWh in 2012 to 702 $lbCO_2$/MWh by 2030, making it one of the most aggressive of all state goals in the proposed plan.

Exhibit 4 presents the calculation of the state's goal by building block and the relative reduction applicable to each one.

Exhibit 4: Application of the Building Blocks to Arizona

- Arizona's final goal: 702 lbs of CO_2 / MWh by 2030
  - Interim Goal: 735 lbs of CO_2 / MWh average over 2020-2029

- Final Target Calculation:
  - 2012 Baseline: 1,453 lbs CO_2 / MWh
  - Block 1 HR: 1,453 lbs CO_2 / MWh → 1,394 lbs CO_2 / MWh → 8% of total reduction
  - Block 2 Disp.: 1,394 lbs CO_2 / MWh → 843 lbs CO_2 / MWh → 73% of total reduction
  - Block 3 Ren.: 843 lbs CO_2 / MWh → 814 lbs CO_2 / MWh → 4% of total reduction
  - Block 4 EE: 814 lbs CO_2 / MWh → 702 lbs CO_2 / MWh → 15% of total reduction

- Total Reductions:
  - 1,453 lbs CO_2 / MWh → 702 lbs CO_2 / MWh → 52% reduction over baseline

Source: EPA.

3.1. Assessment of Reasonableness of Building Block Assumptions

Building block 1: Make Fossil Fuel Plants More Efficient – Building block 1 assumes that the average heat rate of affected fossil units[2] decreases 6%. However, EPA's basis for concluding that a 6% efficiency improvement for all affected units is possible, much less reasonably achievable, is not supported by the facts. The application of building block 1 would not account for efficiency gains made before 2012, and in effect would further disadvantage units that have already made efficiency improvements before this time. Interestingly, in the application of the building block approach under the proposed rule, Arizona would have to retire or otherwise eliminate all coal by 2020 to meet interim goals (pursuant to building block 2), which would essentially eliminate this building block as a compliance option for Arizona.

Building block 2: Use Low-Emitting Power Sources More – Building block 2 assumes that affected existing and under construction NGCC units could increase dispatch up to a 70% capacity factor while proportionally backing down coal to reduce the emission intensity of the state's generation mix. The application of this building block in determining state goals assumes that this occurs by 2020. Due to the large amount of NGCC capacity in Arizona, this building block has a significant impact on its state goal computation and would require significant and sudden shifts in the state's generation mix to meet the resulting emission rate reductions. In fact, as applied in the EPA's building block approach, the increased use of NGCC units in the state would displace all coal fired generation in the state, in effect forcing the retirement of all of the approximately 3,316 MW of coal capacity operating[3] as of the 2012 baseline net already planned retirements and units slated for conversion to natural gas.

There are several issues with the prescription of building block 2 for Arizona:

(1) ***Existing NGCC Resources are Inadequate to Replace AZ Coal Retirements*** - Today, all Arizona utilities rely on the existing coal-fired and natural gas resources within in the state, including the existing natural gas merchant plants, to meet their summer peaking demand requirements. In addition to serving a portion of Arizona loads, Arizona's merchant gas resources are also committed to meet summer peak demands in adjacent states. As a result, the early retirement of Arizona's existing coal-fired resources by 2020 will necessitate the construction of new natural gas plants in order to maintain system reliability for 2020 and beyond.

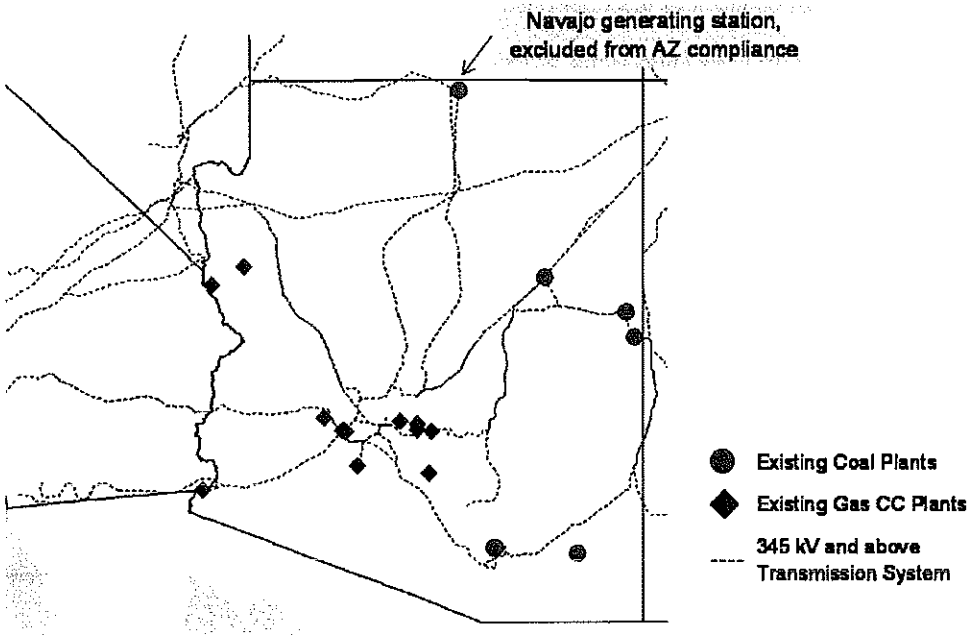
(2) ***Useful life of Fossil Generation is Not Considered*** – Arizona is home to some of the newest coal fired units in the country with the most recent units commencing operation as recently as 2009. These investments assume a long and useful life of 40 years or more. The application of building block 2 would require the retirement of virtually all if not all coal generation in the state by 2020, with no consideration to the useful life of the existing coal fleet. Retiring these units far earlier than a reasonable planned useful life would result in excessive stranded costs and ratepayers essentially paying twice for this generation capacity.

(3) ***Transmission Infrastructure Would Not Support a Wholesale Change in the Generation Mix*** - The lack of transmission import capacity limits load serving entities from displacing all the retired coal units with the existing NGCC units, as shown in Exhibit 5. The majority of coal units and associated

[2] Affected electric generating units are generally defined as currently operational or under construction in 2012, over 25MW and designed to operate more than one third of the time.
[3] Arizona's state goal only includes affected generating units on non-tribal land and therefore the Navajo generating station is not accounted for in the discussion of state goal computation and compliance implications.

transmission from which generation would shift is located in the far eastern and southern parts of the state while the existing NGCC units are located in and to the west of the Phoenix area. The transmission system works well for current operations, but the changes proposed by the EPA may well demand significant modifications.

Exhibit 5: Arizona's Existing Coal and NGCC Units and Transmission Infrastructure



Source: Pace Global, Ventyx.

(4) ***Increased Natural Gas Demand Would Strain Pipeline Infrastructure*** - Incremental natural gas demand resulting from the increased utilization of natural gas fired generation and the required new natural gas capacity needed to backfill the retired coal units to meet load would exceed the capacity of Arizona's existing, but already heavily utilized natural gas pipeline network. Pace Global's analysis indicates that compliance with Arizona's interim goals would result in increased use of the El Paso system, as the alternate pipeline, Transwestern, is already 98% to 100% utilized. Both the El Paso and Transwestern systems would require expansion by the mid-2020s to maintain adequate supply capacity. Pipelines require a minimum of four years lead time from need determination to in service date. The timing of the CPP goals would require these expansion projects to begin soon to meet demand.

Building block 2 accounts for over 70% of Arizona's reduction required from baseline to its 2030 goal. The assumption that this generation switching could occur by 2020 is not feasible for Arizona due to in large part to the magnitude of investments in generation, transmission and pipeline infrastructure simultaneously, which require substantial commitments, permitting and construction lead times. Significant new infrastructure in the form of new electric transmission infrastructure, natural gas pipeline expansions, and generation infrastructure to maintain reliability would be needed. Further it would leave stranded investments in the state's existing coal fleet that would impact electric rates.

(5) ***EPA IPM Modeling Found to be Inconsistent with Economic Utility Practices*** - The EPA's analysis of the Clean Power Plan using the Integrated Planning Model (IPM) assesses several compliance scenarios. The Option 1 compliance for Arizona individually as a state is the most relevant comparison, considering that Arizona has no firm plans for regional compliance at this time. This modeling reflects 1,497 MW of coal-fired generation remaining online through 2030 and beyond while Arizona still meets interim and final proposed goals. The EPA modeling achieves this 2030 result through a decade of sub-optimal dispatch at the four units located at the Springerville Generating Station, the newest and generally most efficient of the coal-fired units currently operating in Arizona.

As shown in Exhibit 6, the four existing units at the Springerville Generating Station maintain an annual capacity factor of 83% in 2016 and 2018. Starting in 2020, the output on Springerville Unit 3 drops to a 0% annual capacity factor with a maximum annual capacity factor of 26% in 2025 and 2030. Springerville Units 1 and 2 show annual capacity factors declining to 33% in 2020 and 36% in 2025 before returning to a 61% capacity factor in 2030. EPA's modeling results in much smaller curtailments at the newest Springerville Unit, 4, with operation at an annual capacity factor of 66% in 2020 and a 72% annual capacity factor in 2025 and 2030.

Pace Global finds the EPA analysis to be inconsistent with economic utility practice in its assumption that coal units, specifically Springerville Units 1, 2 and 3, would operate for such an extended period of time at sub-optimal dispatch. This large reduction in the overall plant utilization at the Springerville Generating would result in an economic outcome that would favor shut down over operating the plant at average annual capacity factor of 40% over a 10 year period. Pace Global does not find this analysis to support Arizona's ability to maintain any more than a very minimum capacity of the existing coal fleet online beyond 2019 while complying with EPA's goals, particularly the interim goal.

Exhibit 6: Arizona Affected Coal Unit Capacity Factors (EPA IMP Analysis of CPP)

Unit Capacity Factors	2016	2018	2020	2025	2030
Apache Unit 2	85%				
Apache Unit 3	85%				
Cholla Unit 1	84%	85%			
Cholla Unit 2	83%				
Cholla Unit 3	83%				
Cholla Unit 4	84%				
Coronado Unit 1	84%	84%			
Coronado Unit 2	84%	84%			
Navajo Unit 1-3*	83%	83%	83%	83%	83%
Springerville Unit 1	84%	84%	33%	36%	61%
Springerville Unit 2	84%	84%	33%	36%	61%
Springerville Unit 3	82%	82%		26%	26%
Springerville Unit 4	82%	82%	66%	72%	72%

*Note that Navajo units located on tribal land are not affected units under the proposed Clean Power Plan and therefore do not impact Arizona's compliance.

Source: EPA Analysis of the Clean Power Plan, Option 1 – State

Finally, the modeling does not take into account region-specific technical issues. In particular, given the remote location of Arizona's existing coal units, it is anticipated that shutdown of these units may result in issues surrounding voltage and system stability. In the absence of a detailed transmission analysis, given Arizona's demonstrated lack of flexibility, EPA would be unable to assess what units are necessary for the reliability of the electric grid.

Pace Global recommends that the EPA adjust the building block approach to exclude remaining useful life units from the re-dispatch calculation and phase in the application of building block 2 evenly over the 2020 to 2030 time period, similar to the application of building blocks 3 and 4. The additional timing will enable more cost effective decision making and reduce the cost and reliability impacts associated with stranded coal investments and simply defaulting to natural gas for compliance.

Building block 3: Use More Zero- and Low-emitting Power Sources – Building block 3 assumes that renewable generation meets a progressive state-assigned target based on regional build out trends by 2030 and that under construction nuclear units come online and at risk nuclear units stay online through 2030.

The proposed rule is unclear as to whether or not renewable generation must be physically located in a state or delivered into a state, accounting for the fact that virtually all states that have renewable mandates implemented rely on out of state generation for compliance. Consistent with many legislated state renewable energy standards, the EPA should clarify that the renewable generation is accounted for at the final point of delivery and not the point of generation. Enforceability[4] is one of the key criteria by which the EPA will assess state compliance under the Clean Power Plan. Noting this, it is very likely that most states will have to enact legislation of some type to align oversight agencies and generation owners and operators (and independent system operators where applicable) to ensure that responsible parties can be held to requirements under the state implementation plan. State renewable energy standards almost universally recognize delivered renewable energy from out of state sources for compliance. Legislation could only include the state RPS if the EPA were to accept that renewable energy delivered to a state from outside state borders could be recognized for compliance purposes under the Clean Power Plan.

The nuclear portion of building block 3 defines certain new and "at risk" nuclear generation units that, should they not be online in the compliance timeframe, would very likely result in higher overall emission rates in select states, as the alternative generation would likely not all come from zero-emitting sources. The expected generation from these units was calculated to be on average approximately 6% of U.S. nuclear generation, which was uniformly applied to all states' nuclear generation in developing proposed goals. This creates a significant inequity for states with nuclear generation that is not at risk.

The EPA should amend this part of building block 3 to account for at risk units specifically and not apply a blanket average to all states that have nuclear generation. This would impact the application of building block 3 in determining state goals as well as the use of nuclear generation for compliance under the Clean Power Plan. The Palo Verde nuclear generating station in Arizona is not viewed as at risk, as it has several owners that rely on the plant to meet native load. However, through the application of building block 3, Arizona's state goal is downwardly adjusted based on the national average of nuclear generation

[4] The four general criteria by which the EPA proposes to evaluate SIPs are enforceability, achievement of state goals, verifiable emission reductions, and the process for regular reporting progress towards goal attainment.

deemed to be at risk. The EPA should clarify the ability of the state to document and count this unit for use in compliance towards its goals.

Building block 4: Use Electricity More Efficiently – Building block 4 assumes that demand-side energy efficiency increases 1.5% annually from 2017 to 2030. This building block has the second largest impact on Arizona's state goal derivation, driving a reduction of 15% of the rate reduction by 2030 versus the 2012 baseline.

The EPA selected a 1.5% annual reduction based on a review of the top tier states' efficiency performance in the 2012 baseline year, noting that three states actually achieved this level in one year and that nine other states had mandates to achieve this level for at least one year by 2020. Achieving a 1.5% efficiency improvement has been demonstrated in top tier states in a single year. However, the EPA's assumption in building block 4 is that this high level is achieved by all states for the years 2017 to 2029. In the EPA's Clean Power Plan technical support document on GHG Abatement Measures, only one source, the American Council for an Energy Efficient Economy (ACEEE), reported efficiency potential of 1.5% per year. The next highest efficiency potential was reported from the Electric Power Research Institute (EPRI), a non-partial source, in a 2014 study to be 0.6%, representing the high end of achievable efficiency penetration levels.[5] Thus, even the EPA's scientific support is not fairly supporting the fact that 1.5% efficiency penetration in all states is feasible, much less the achievement of this level consistently for more than a decade.

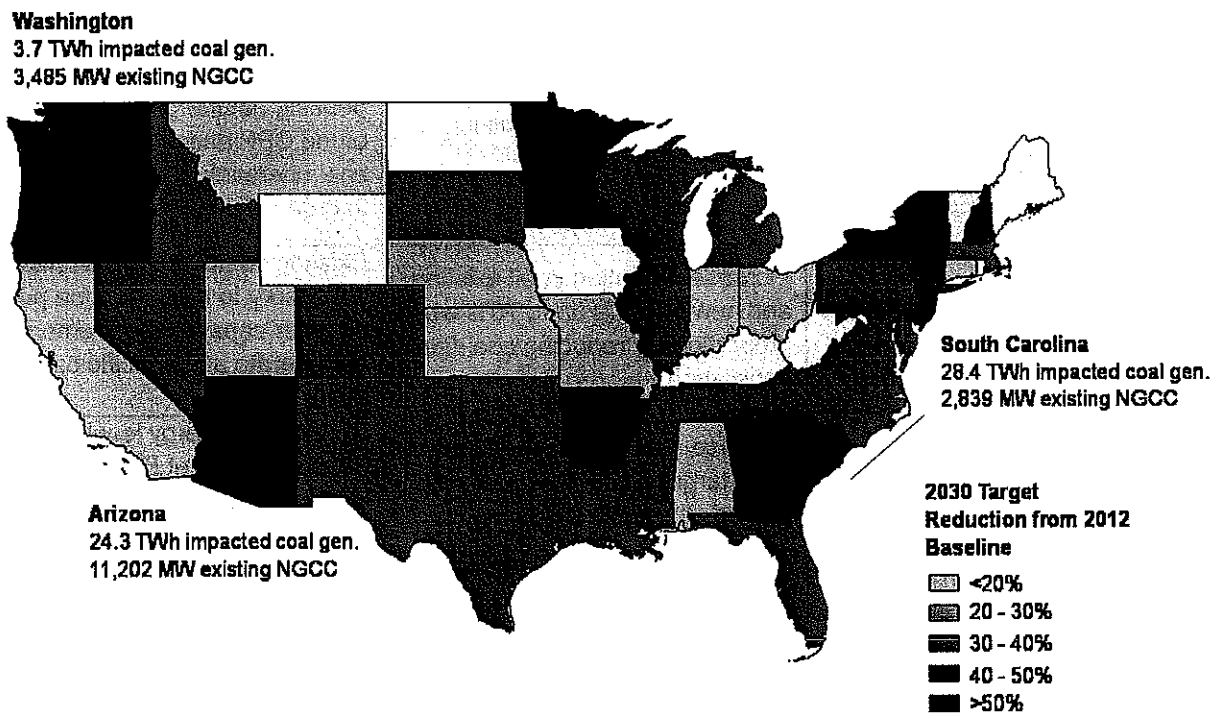
Although a full legal analysis was not performed for this scope, Pace Global anticipates that this building block will be heavily scrutinized in the comment process and either reduced or eliminated from the building block approach in the final rule or challenged in the courts following the release of the final rule. For the purpose of goal setting, the EPA should lower the efficiency reduction level to 0.6% per year, in line with the EPRI efficiency potential study. Although Arizona does have strong efficiency standards adopted at the state level, the application of this building block just further lowers the state target and increases their already aggressive compliance burden. The EPA should ensure that goal setting does not become a compliance obligation, but rather enables entities to have flexibility to choose between renewable energy and energy efficiency to achieve compliance. Arizona's existing efficiency program should be viewed as a compliance mechanism to manage its significant reduction requirements under the Clean Power Plan and particularly building block 2.

3.2. The CPP's Proposed Goal Levels are Inequitable for Arizona

Implications for Arizona to comply with the proposed rule are disproportionately higher than nearly any other state. Arizona has one of the most severe reduction targets of all states covered under the Clean Power Plan, with a reduction below its 2012 baseline of 52%, while most states' requirements are well below 50% with some less than 20% (Exhibit 7). Other states like Washington and South Carolina also have a large percentage reduction, although the drivers are different. Washington State has only a small amount of coal, so relatively minor generation switching measures can achieve compliance. South Carolina is impacted not by building block 2, as it has limited existing NGCC capacity, but rather by building block 3, due to the proposed new nuclear generation capacity in the state. Arizona stands out as the state most impacted by building block 2, due to its high coal generation and significant existing NGCC capacity.

[5] EPA Technical Support Document "GHG Abatement Measures," Table 5-7 "Summary of National EE Potential Studies"

Exhibit 7: Reduction of 2012 Emission Required by Final Clean Power Plan Goals (%)



Source: EPA, Pace Global.

3.3. Interim Goals

Interim state goals as proposed in the Clean Power Plan, which would need to be met on average over the 2020 to 2029 time period, are very close to the final goals and would require near-term generation changes including replacing most if not all of the coal capacity in the state, enhancements to the gas transportation infrastructure, and transmission infrastructure development. Arizona's interim goal of 735 $lbCO_2$ / MWh is 47% below its 2012 baseline emission rate. Because Arizona's interim and final goals proposed are below the emission rate of even the most efficient natural gas generation, incremental renewable generation and energy efficiency over levels prescribed in the building blocks would be required to comply.

3.4. Implications of Building Blocks on Arizona's Electric System

Pace Global assessed the implications of the CPP building block's on Arizona's electric system by quantitatively assessing compliance through an approximation of a literal application of the Clean Power Plan building blocks (generally following the EPA's goal setting calculation). While this modeling approach shows Arizona complying with EPA's interim and final goals, the results shown in this analysis are not achievable given the real world timeframes needed to construct new generation, transmission and gas pipeline infrastructure. The purpose of this Building Block scenario analysis is to highlight the potential reliability impacts for Arizona that are likely to result under the implementation of the Clean Power Plan. Exhibit 8 below summarizes the building blocks and modeling assumptions.

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Exhibit 8: Building Block Scenario Assumptions

Building Blocks	Modeling Assumptions	Commentary on Modeling
1. Fossil plant efficiency improvements	Increase efficiency of existing coal plants by ~6%	Because of Arizona's significant peaking natural gas capacity as of the CPP baseline in 2012, no coal operates in 2020 or beyond in order to meet building block 2
2. Coal-to-natural gas combined cycle (NGCC)	Increase utilization of all existing and new NGCCs up to 70% while proportionally reducing coal-fired generation	Existing combined cycle units are necessary to meet Arizona peak summer capacity requirements, not operate at a specific capacity factor value
3. Coal-to-low- or no-emitting sources	Increase renewables to Arizona state target of 4%, and assume no nuclear retirements	Renewable energy levels were assumed to meet EPA goal values; Palo Verde continues to operate
4. End-use energy efficiency	Reduce demand-side energy use 1.5% annually through 2030	For Arizona this equates to ~12% by 2030

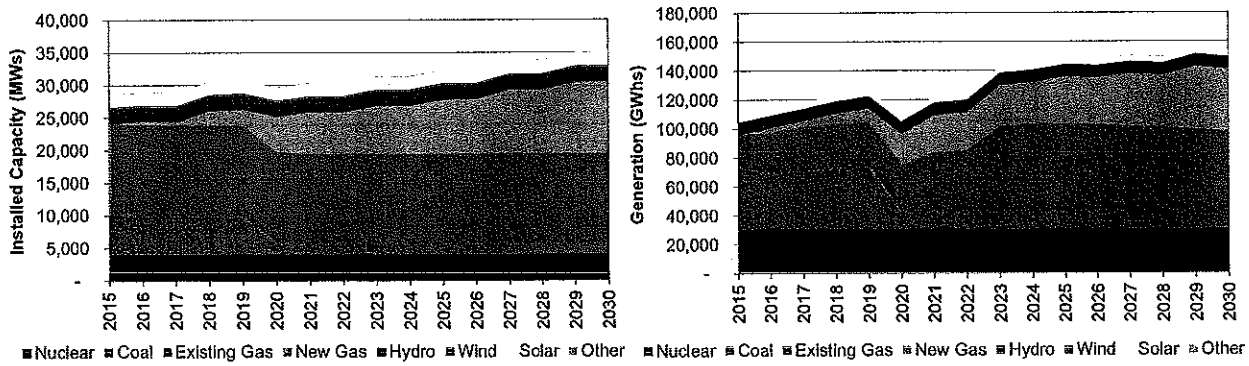
The study of the building block scenario focused on the generation supply and demand implications of the rule as well as the impacts to natural gas consumption and infrastructure utilization. An economic analysis of these impacts was performed as well to quantify costs associated with the implementation of the Clean Power Plan versus some of the alternative scenarios assessed. It is important to note that the study does not incorporate plant decommissioning expenses, specific transmission infrastructure or upgrade requirements, contractual take-or-pay provisions, or specific change in operating and maintenance costs at facilities.

Source: EPA, Pace Global.

3.4.1. Arizona Generation Mix and Installed Capacity under the CPP Building Block Scenario

Exhibit 9 shows the annual generation and installed capacity for Arizona from 2015 through 2030. Under the literal application of the Clean Power Plan building blocks, Arizona would be required to retire all of its existing coal-fired generation in 2020 to comply with EPA's goals (except for tribal coal). The total elimination of coal-fired generation in Arizona required to meet the CPP interim targets would require an estimated 10 GW of new resource capacity from 2020 to 2030 to meet future reserve margins for Arizona's peak summer season, with about 2.3GW directly attributed to CPP impacts and not load growth. The only coal-fired generation included beyond 2020 is sourced from the Navajo Generation Station that is on tribal land and not subject to Arizona interim and final goals.

Exhibit 9: Arizona Generation and Installed Capacity (2015-2030)



Note that in-state generation dips slightly in 2020 as the new gas capacity including NGCC and peaking units does not completely replace baseload coal retirements and some economic imported purchased power is assumed to meet reserve margins in this period. Over time, new NGCCs do end up replacing most of the lost coal generation and the in-state generation rises.

Source: Pace Global.

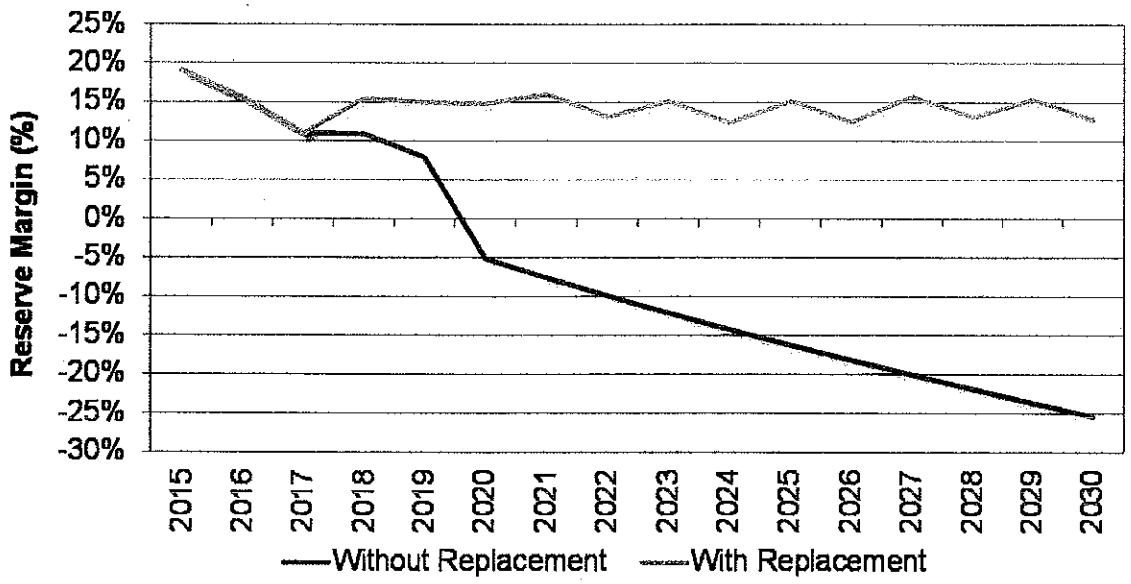
3.5. Risks to Electric Reliability

The electric reliability issues from the Clean Power Plan are associated with both supply and deliverability. The elimination of existing coal-fired generation reduces overall electric supply. The assumption that incremental, lower-emitting generation resources can be permitted and brought online in a two to three year period from state plan development to compliance is not possible and would drive lower reserve margins. Even accounting for planned new builds between now and 2020, reserve margins would be right around 15%, meaning that the loss of most or all of Arizona's coal fired generation would require virtually a MW for MW replacement of this generation to maintain safe reserve margins.

An estimated 3.5 GW of new natural gas capacity by 2020 and over 10 GW by 2030 would be needed to meet reserve margin requirements in Arizona by 2030 following the retirement of all affected coal capacity within the state. This analysis assumes that Arizona utilities would not be able to rely on power imports from out of state to cover large shortfalls in generation capacity, meaning that new local natural gas builds would be needed in state to maintain system reliability. This assumption is based on the fact that the

Arizona Corporation Commission's (ACC) Integrated Resource Planning (IRP) rules state that utilities cannot rely on capacity that is not sourced from known generation for reserve margin requirements.[6] Therefore, absent specific knowledge of generation resource and transmission infrastructure changes in neighboring states, out of state generation cannot be relied upon. Exhibit 10 shows the impact to Arizona's reserve margins under compliance with state Clean Power Plan goals both with and without incremental new natural gas capacity.

Exhibit 10: Arizona Reserve Margins with and without Incremental Natural Gas Builds



Source: Pace Global.

The assumption that coal generation can be one-for-one diverted to existing NGCC units is inaccurate, and the magnitude and timing which Arizona specifically would need to switch generation would make the state's electric supply unreliable. The lead time for new transmission infrastructure is five to ten or more years. The recent North American Electric Reliability Corporation's (NERC) report[7] on the Clean Power Plan cites the need for a 10 to 15 year outlook for planning transmission development due to the time required for engineering, contracting, siting and permitting, as well as the various federal, state, provincial, and municipal approvals required. The CPP interim goals would allow for less than a 5 year outlook from state planning finalization until when the new transmission capacity would absolutely be needed.

Since the CPP requirements will not be finalized until mid-2015 and state implementation plans will not be approved by EPA until mid-2017 or later, timing of the final state plan approval and the typical five-year

[6] Arizona Corporation Commission Resource Planning and Procurement for 2011-2012, Docket No. E-00000A-11-0113, Decision No. 73884

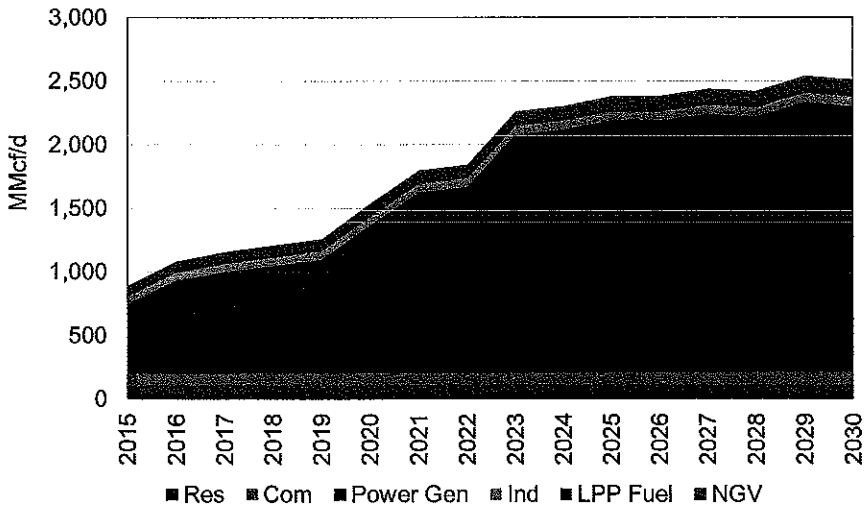
[7] Potential Reliability Impacts of EPA's Proposed Clean Power Plan, Initial Reliability Review November 2014

timeframe to site and construct new power plants would result in real reserve margin declines, noting the sharp decrease in coal generation required under Pace Global's analysis of the CPP Building Block scenario. Given these real world constraints, Arizona will need to seek relief from the CPP's interim goals in order to maintain grid reliability and security. The EPA should include a reliability safety valve mechanism in the final rule. Even if the interim goals are delayed or state goals reduced, there is still a risk to reliability. Consistent with impacts, the EPA should include in its final rule circumstances under which compliance can be delayed to manage real time issues that will compromise electric reliability.

3.5.1. Arizona Natural Gas Demand under the EPA Building Block Scenario

Pace Global projects power sector natural gas demand in Arizona in the building block case to increase from 546 MMcf/d in 2015 to 2,088 MMcf/d by 2030, an almost four-fold increase from the power sector alone. This growth is driven by the increased utilization of existing NGCC units and incremental natural gas capacity additions to meet reserve margins. Growth in non-power sectors is expected as well, although as illustrated in Exhibit 11, these increases are dwarfed by the growth for power sector end use.

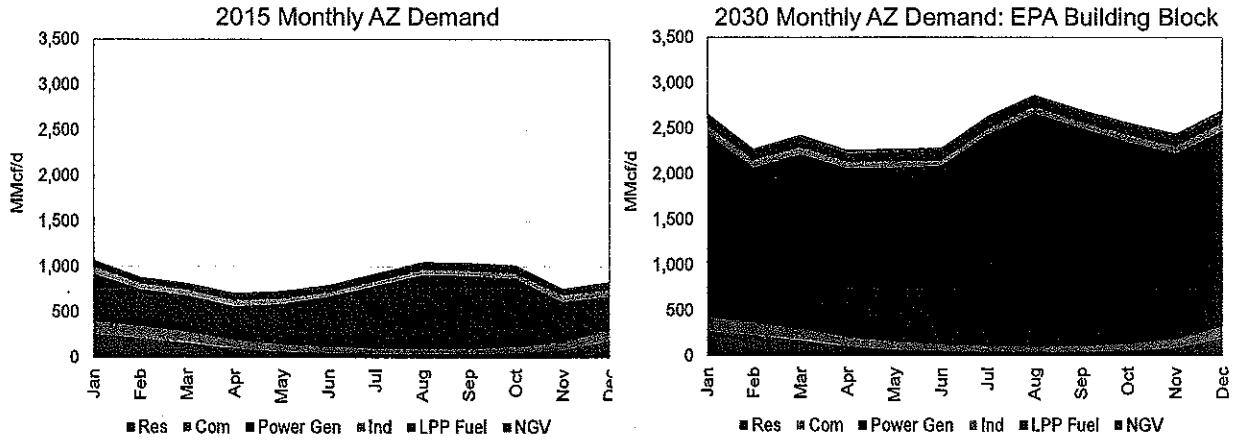
Exhibit 11: Projected Annual Arizona Natural Gas Need in EPA Building Block Scenario



Source: Pace Global

Arizona currently is a winter peaking market, but also exhibits a peak close to winter levels in the summer months as well. Although the increase in power sector consumption under the Building Block scenario is not anticipated to alter Arizona's seasonal peaking profile, the peaks both in the winter and summer would increase dramatically as evidenced in the graphics in Exhibit 12.

Exhibit 12: Monthly Arizona Natural Gas Need 2015 v. Projected 2030 Building Block Scenario



Source: Pace Global

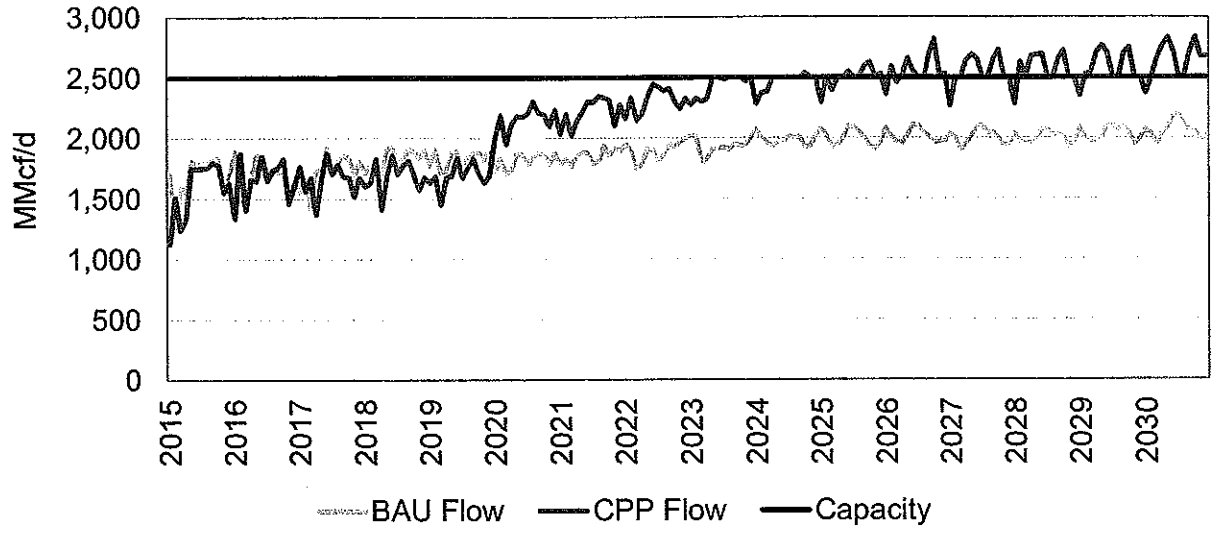
3.5.2. Arizona's Natural Gas Transportation Requirements under the EPA Building Block Scenario

Arizona benefits primarily, though not exclusively, from two long-haul pipelines, Transwestern and El Paso Natural Gas pipelines. Both of these pipelines are expected to remain highly utilized, as they currently are, to serve demand in New Mexico, Arizona and California and also to serve rising exports to Mexico. Given the current high capacity factor of pipeline usage in this region, the addition of Clean Power Plan induced natural gas demand for power needs in the southwest leads to concerns that the current pipeline system is inadequate to serve all demand during periods of peak usage. Pace Global's pipeline flow model analysis indicates that under the Clean Power Plan, expansions would be needed to meet consumption needs and maintain reliability on both the northern and southern legs of the El Paso pipeline and on the Transwestern pipeline, as illustrated in Exhibit 13 through Exhibit 15.

Pace Global's pipeline flow model analysis indicates that under the Clean Power Plan, the following expansions would be needed to meet consumption needs and maintain reliability:

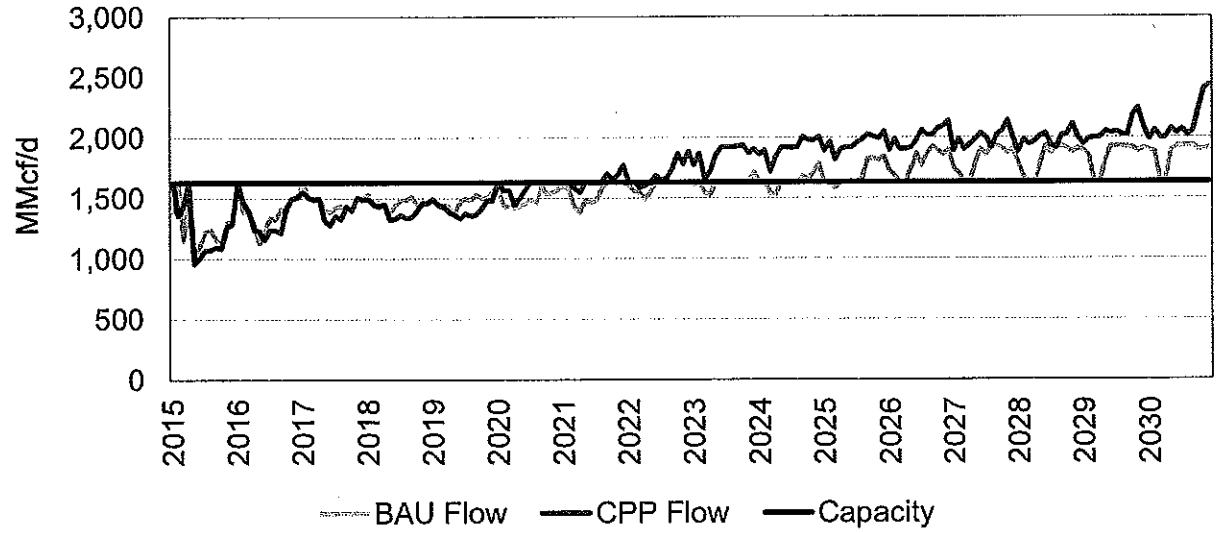
- El Paso Southern leg would require expansion by the early 2020s if not sooner, as it is expected to exceed design flow by 2022 based on average flows.
- El Paso Northern leg would require expansion by 2025.
- Transwestern pipeline, which is already over 95% utilized, would benefit from expansion, although most of the incremental flows will impact the El Paso pipeline system.

Exhibit 13: El Paso North Projected Monthly Pipeline Flow v. Pipeline Capacity



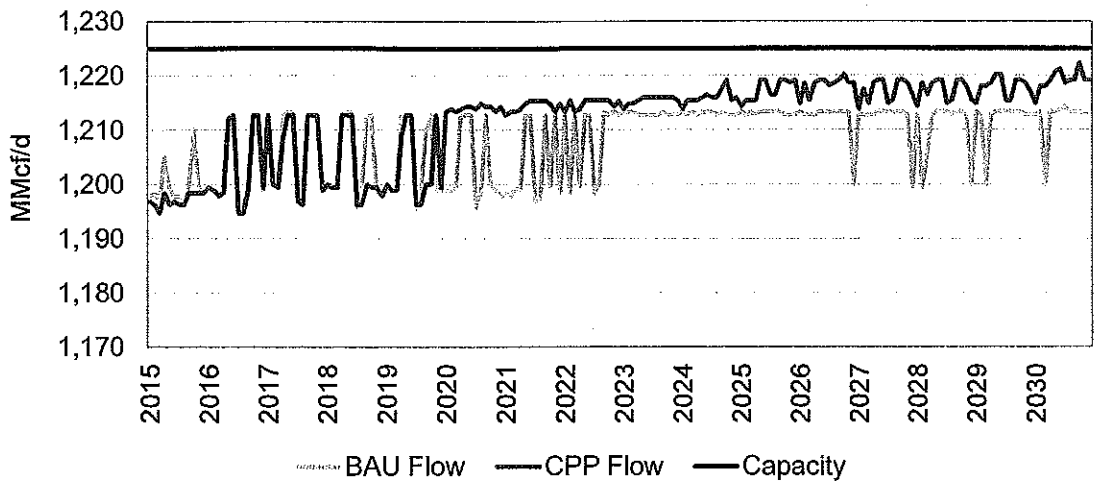
Source: Pace Global, RBAC

Exhibit 14: El Paso South Projected Monthly Pipeline Flow v. Pipeline Capacity



Source: Pace Global, RBAC

Exhibit 15: Transwestern Projected Monthly Pipeline Flow v. Pipeline Capacity



Source: Pace Global, RBAC

Generators will need to secure existing pipeline capacity in order to ensure readily available supply. Even so, generators who are in the money and could generate, but who rely on interruptible pipeline capacity, may find themselves unable to dispatch during periods of high demand due to pipeline constraints. The pipeline constrained Northeastern U.S. experienced just such a situation during the 2013-2014 winter months. The gas-fired capacity expected to be built by 2020 will be contending with several large new sources of demand (e.g., LNG and pipeline exports, industrial projects), which will put upward price pressure on natural gas. This significant increase in natural gas demand coupled with inadequate natural gas storage and transportation infrastructure will ultimately lead to higher natural gas and power price volatility in the Desert Southwest.

3.6. Risks to Natural Gas Supply Reliability

The dramatic projected increases in natural gas demand pose risks with regard to pipeline capacity able to deliver sufficient supply. In terms of whether there is sufficient time and incentive to build the pipeline that is needed, it is not likely. Pipeline is generally built on the basis of demonstrated firm demand resulting from an open season. Historically power generators have been hesitant to sign up for long term firm transportation capacity that is required to gain the needed investment in a timely manner. This results in a slower build-out of gas transmission, such as we see in the Northeast, where incremental pipeline capacity is not growing fast enough to mitigate periods of very high gas prices. As power generators' share of gas consumption in Arizona and surrounding states grows, a similar situation to the Northeast region may develop in the Southwest, in which new pipeline capacity is hindered by hesitation for firm capacity commitments.

Time to develop new pipeline infrastructure is at a minimum four years from the determination of need. The permitting stage can often significantly extend the process to five years or much longer. An extension of this timeline is very possible in Arizona and the greater Western U.S. as the amount of land owned by the military, federal government, state governments, and tribal nations is large. In Arizona, approximately 41% of land is owned by the federal government, almost 13% by the state, and about 27% belongs to tribal nations. All of this adds to the complexity of siting and constructing new capacity. Incremental expansions through compression upgrades can be realized in a two-year timeframe, but this only provides for small incremental capacity expansions. In fact, NERC[8] specifically identifies Arizona as one state whereby the existing pipeline capacity is not adequate to handle incremental gas needs of the state under the CPP, consistent with Pace Global's findings.

Additionally, the natural gas supply situation in combination with literal application of the CPP building blocks appears to place Arizona in a precarious position. Given that Arizona is reliant on the supply of natural gas from 3 major pipelines, the prolonged disruption of service to one of these pipelines could prove devastating to Arizona residents in the absence of backup coal capacity."

Finally, grid reliability issues associated with increased renewable resources are not directly addressed as part of the EPA's proposed building block approach. Based on recent industry studies[9] and prior NERC reliability assessments, as the penetration of variable generation resources increases, maintaining system reliability will become more challenging. Given that Arizona would be required to retire all of its existing coal-fired generation in 2020 to comply with EPA's goals, additional assessments, including interconnection-wide studies, will be needed as state implementation plans are developed to further understand potential reliability challenges that may indirectly result from the proposed CPP.

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[8] Potential Reliability Impacts of EPA's Proposed Clean Power Plan, Initial Reliability Review November 2014

[9] NERC-CAISO Joint Report: Maintaining Bulk Power System Reliability While Integrating Variable Energy Resources – CAISO Approach; other industry reports include those developed by the Integration of Variable Generation Task Force (IVGTF)

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4. Alternative Scenario Assessment

Pace Global assessed the Arizona electric system under an alternative scenario that offers a more gradual reduction of coal generation in the state to reduce emissions. The purpose of this analysis was to identify the impacts to Arizona's Clean Power Plan compliance and overall emission rate, while maintaining some of the most efficient coal generating stations in the state to reduce cost and reliability impacts.

Exhibit 16 presents a summary of the alternative scenario modeled.

Exhibit 16: Summary of Alternative Scenario Modeled

Scenario	Remaining Coal Capacity 2030 (MW)	Percentage of Coal Online in 2030 (%)*	Rationale for Scenario
Arizona Glide Path scenario	2,542	77%	Scenario maintaining useful life of coal units

*Note, percentage based on the total affected coal capacity in Arizona excluding planned retirements and repowerings, including 3,316MW of the total 3,861MW operating today.

Source: AUG

A summary of the affected coal capacity and generation in the state is summarized in Exhibit 17.

Exhibit 17: Affected Coal Assumptions by Scenario

	Capacity (MW)	Generation (MWh)	% Coal Capacity v. 2014	% Coal Generation v. 2014
Total Coal (2014)	3,861	24,801,925	100%	100%
Planned Retirements / Conversions by 2020	545	2,967,068	14%	12%
Planned Remaining Coal by 2020	3,316	21,834,857	86%	88%
EPA Building Block Scenario - Remaining Coal 2020	0	0	0%	0%
Arizona Glide Path scenario - Remaining Coal 2030	2,542	16,662,479	66%	67%

Note that only affected coal units in the state are included in these values.

Source: AUG and Pace Global

In comparison to EPA's renewable target setting for Arizona under building block 3, the alternative scenario assumes significantly higher levels of installed renewable capacity from 2020 through 2030. Under this scenario, the assumed installed renewable capacity reflects a level more in line with the Arizona renewable energy standard which assumes 15% of a load serving entity retail load is sourced from renewable resources. Incremental renewable capacity additions assume approximately 85% solar and 15% wind.

The higher levels of renewable generation, in combination with the reduction in retired coal fired capacity, reduce the amount of new natural gas fired generation needed to meet future load and reserve margins requirements in Arizona. Of course some new natural gas capacity would be expected to come online in Arizona, regardless of actions taken to reduce emissions, just to meet load growth. Exhibit 18 presents new capacity by technology for both scenarios.

Exhibit 18: Arizona New Capacity by Technology by Scenario (MW)

	Natural Gas				Renewables	
	Total 2020	**Cumulative Total 2020 - 2030**	**2020 Capacity Attributed to CPP**	**Cumulative 2020-2030 Capacity Attributed to CPP**	**2020**	**Cumulative 2020 - 2030**
EPA Building Block	3,525	10,125	2,400	2,300	0	0
Arizona Glide Path scenario	1,125	7,825	0	0	1,000	3,462

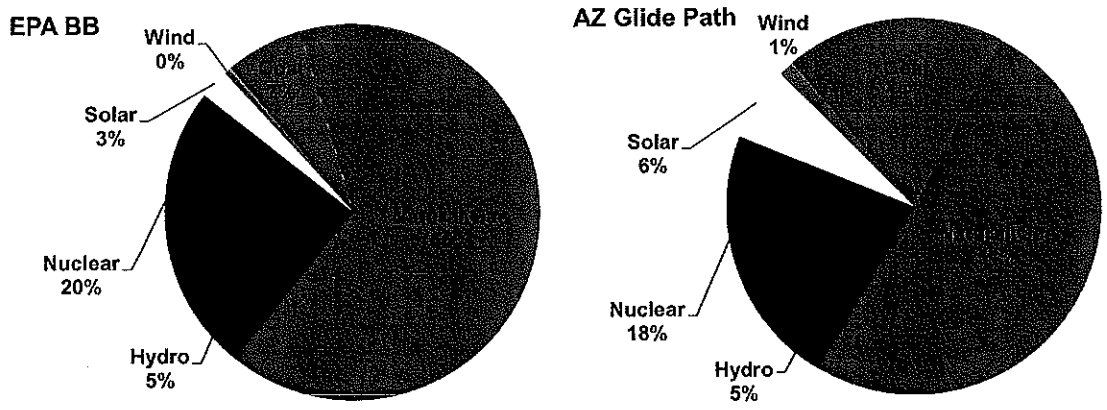
Note: Arizona Glide Path scenario assumed as baseline case for comparison purposes to determine capacity additions attributed to the Clean Power Plan. Also, per the EPA's building block approach, the renewable generation target would be met before 2020 and therefore no incremental additions are assumed over the 2020 to 2030 time period assuming the literal application of the building blocks.

Source: Pace Global

4.1. Generation Mix and Capacity Needs by Scenario

Exhibit 19 presents Arizona's generation mix for both scenarios. To properly represent the generation mix of the state, the Navajo coal plant, which is not an affected unit for Arizona CPP compliance, is reflected as ~7% of the coal generation in the state that remains through 2030. Navajo represents the only coal remaining in the EPA Building Block scenario. The Arizona Glide Path scenario shows a declining relative share of coal generation through 2030, maintaining coal at 19% of generation by 2030.

Exhibit 19: Total Arizona Generation Mix in 2030 by Scenario (MWh)



Source: Pace Global

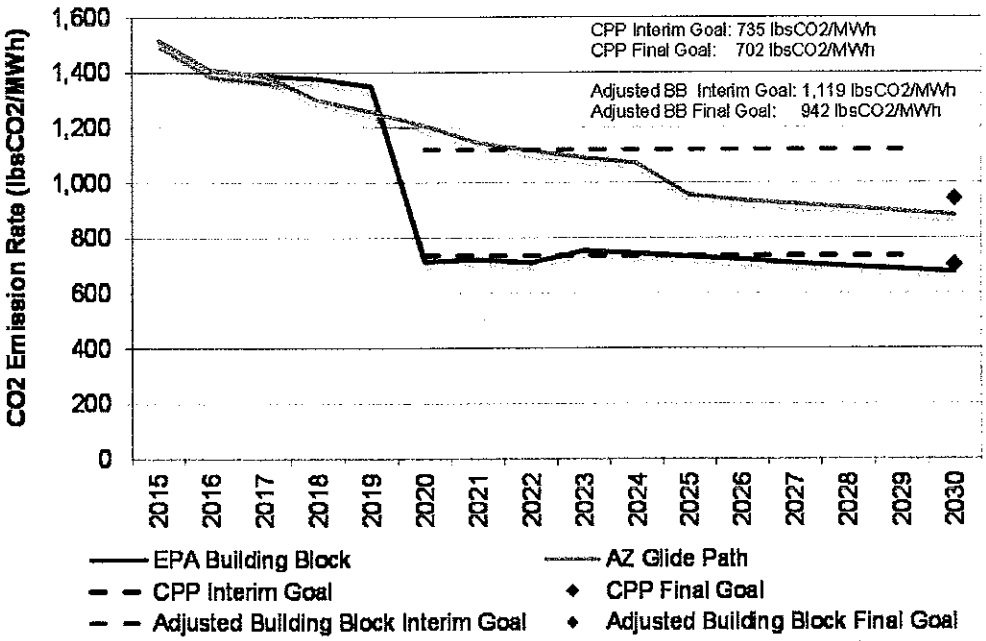
4.2. Proposed Modifications to EPA Building Blocks to Address Interim Goal Issues

Pace Global's suggested modifications to the EPA's building block approach include specific adjustments to building blocks 2 and 4 that would impact the level of Arizona's goals. As referenced earlier in the report, these adjustments include:

- Pace Global recommends that the EPA consider the remaining useful life of existing plants as well as applying a phase-in of the re-dispatch assumed by building block 2 over the 2020 to 2030 time period rather than assuming that this re-dispatch could occur by 2020.
- Pace Global recommends that the EPA adjust building block 4 to consider a 0.6% annual efficiency improvement rather than 1.5% when establishing overall target levels. This benchmark would be more in line with studies of achievable efficiency penetration levels.

These building block adjustments would make compliance feasible under more extended timelines and would be more consistent with the emission trajectory of the Arizona Glide Path scenario. Exhibit 20 presents the annual emission rates for scenarios modeled and proposed and adjusted goals. The adjusted goals would result in a reduction of the interim goal for Arizona from the unachievable 735 $lbCO_2/MWh$ to 1,119 $lbCO_2/MWh$. The final adjusted goal would be slightly higher than that proposed in the CPP at 942 $lbCO_2/MWh$ versus the proposed 702 $lbCO_2/MWh$.

Exhibit 20: Emission Rates by Scenario v. CPP Proposed and Adjusted Goals



Source: Pace Global.

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5. Cost Implications of the Clean Power Plan

There are significant cost impacts from new infrastructure investments, including power and natural gas infrastructure, operational changes to the generation fleet, and the recovery of stranded investments. Natural gas pricing would likely increase as well, noting the increased reliance on natural gas to meet power demand nationally. All costs are presented in this section in real 2013 dollars unless otherwise noted.

5.1. Cost of New Generation Infrastructure

The cost of new NGCC capacity is likely to be in the range of $1,000/kW, noting that installed costs will vary depending on the size of the project, technology selected, interconnection retirements, etc. Significant associated transmission investment could also be required depending on the location of the new capacity versus the load centers in the state. Capital cost assumptions are detailed in Appendix A.

Pace Global estimates capital costs for new natural gas generation to meet CPP compliance, net of the expected required investment to meet load growth through 2030, to be $1.9 billion. This represents an approximately 31% increase in costs on average from 2020 to 2030 between the EPA Building Block scenario and Arizona Glide Path scenario, that would otherwise be borne by ratepayers under the Arizona Glide Path scenario gradual emission reduction plan.

Exhibit 21: Capital Costs for New Natural Gas Generation by Scenario (2013$M)

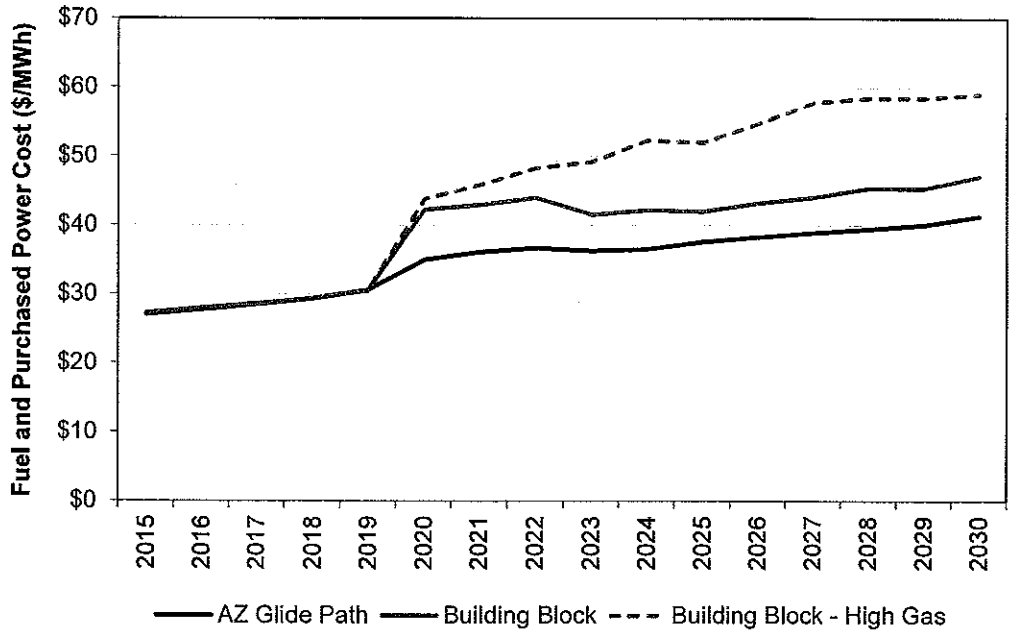
	Total 2020	Cumulative Total 2020 - 2030	2020 Cost Attributed to CPP	Cumulative 2020-2030 Cost Attributed to CPP
EPA Building Block	$3,000	$8,067	$1,991	$1,900
Arizona Glide Path	$1,009	$6,167	$0	$0

Source: EPA, Pace Global.

5.2. Cost of Fuel and Purchased Power

The EPA Building Block scenario would require a wholesale retirement of the coal capacity in Arizona, shifting the cost of fuel for ratepayers from coal to more expensive natural gas. Pace Global estimated costs of both fuel and purchased power for electric ratepayers in Arizona Glide Path scenario and the EPA Building Block scenario. Noting the uncertainty associated with the long-term impacts to natural gas pricing associated with the incremental demand under a Clean Power Plan compliance scenario, these costs were assessed both with and without the impacts of potential higher gas pricing (as described next). Exhibit 22 compares these costs estimated for the EPA Building Block scenario versus Arizona Glide Path scenario. This shows that the current building block plan would cost electric ratepayers up to 40% more in fuel and purchased power costs between 2020 and 2030 as a result of fuel switching and expected increases in natural gas prices over time.

Exhibit 22: Fuel and Purchased Power Costs, EPA Building Block vs. Arizona Glide Path

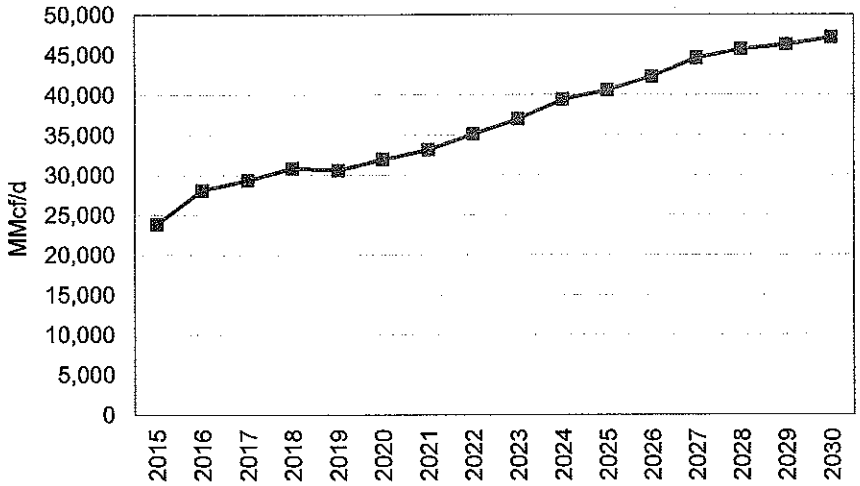


Source: Pace Global.

5.3. Cost of Natural Gas

Increases in natural gas demand resulting from implementation of the Clean Power Plan are likely to raise gas prices and overall consumer prices nationally and in Arizona. The impact of an additional gas demand required for compliance would come at a time when exports (liquefied natural gas and pipeline exports to Mexico) are also growing rapidly. Pace Global estimates that all other things constant, power sector consumption could increase from approximately 24 Bcf/d in 2015 to 47 Bcf/d by 2030 under the EPA Building Block scenario. This is shown in Exhibit 23.

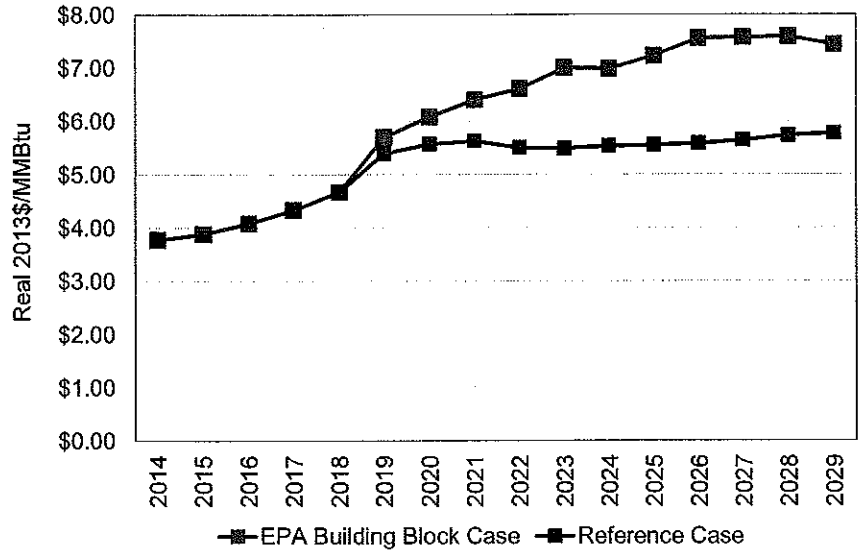
Exhibit 23: Projected National Natural Gas Power Sector Demand (EPA Building Block)



Source: Pace Global.

Pace Global estimates that this incremental increase in national consumption levels would result in price increases nationally at the Henry Hub pricing point. When compared to a reference case outlook of Henry Hub pricing, the price increase under the Clean Power Plan is around $1.35 on average between 2020 and 2030, with deltas in the $1.50-2.00/MMBtu range by the end of the 2020s. Henry Hub pricing projections for the reference case and the EPA Building Bock scenarios are presented in Exhibit 24.

Exhibit 24: Projected Henry Hub Natural Gas Pricing, EPA Building Block v. Reference



Source: Pace Global.

In addition, the market has recently seen a sharp increase in the volatility of market prices in regions where shale gas development has outstripped the infrastructure capability to deliver to markets where the gas is needed. Price spikes in the northeast last winter, for example, exceeded $123.50/MMBtu. As

demand increases rapidly, this issue could become a much wider problem than in just the northeast. Volatility could be very significant with growth in power sector natural gas demand projected under the Clean Power Plan.

5.4. Other Cost Implications

5.4.1. Cost of Stranded Assets

The retirement of some or all coal-fired generating capacity in Arizona that would be necessary to meet the interim and final goals of the CPP would result in significant stranded asset value for utilities in Arizona. This stranded value is only exacerbated by recent investments in control technology and plant upgrades in recent years. Depending on the treatment, these costs would be recovered through higher rates for Arizona customers. The stranded asset value under the building block scenario is estimated to be $3.8 billion in 2020 ($3.0 billion in 2013$), resulting from the retirement of all coal generation in the state. Again, the ultimate treatment of these stranded costs could result in severe rate impacts for Arizona customers in or around 2020.

5.4.2. Cost of New Natural Gas Infrastructure

Generally speaking, new gas pipeline construction costs have averaged $155,000 per inch-mile, according to a 2013 U.S. pipeline economics study conducted by *Oil and Gas Journal*. For smaller pipes, less than 12 inches in diameter, costs are assumed to range from $20,000 to $70,000 per inch-mile. Adding capacity potentially can cost less if the design capacity of the pipeline allows for the addition of incremental compression.

The northern leg of El Paso Natural Gas pipeline is likely to become highly constrained by 2020 and in need of expansion. At a minimum, the 330 mile length of El Paso in Northern Arizona, which varies between a 30 and 36 inch diameter and averages approximately 2.5 Bcf/d in throughput capacity, would need to be expanded by 500 MMcf/d no later than 2023 at a likely maximum cost of $335 million.[10] If a 12 inch or smaller diameter pipeline can be used (which has a median $45k/mile cost, according to the same Oil and Gas Journal study), then at a minimum the additional infrastructure cost would be $97 million. The range for a gas pipeline infrastructure upgrade on the most affected portion of pipeline (El Paso Arizona North) is between $97 and $335 million dollars. This estimate is illustrative of one expansion required for major a major pipeline and not exhaustive of all other upgrades that would be required for both major pipelines and smaller distribution systems.

5.5. Cost of Changing Coal Plant Operational Behavior

In addition to coal plant retirements, compliance with the Clean Power Plan could include the operation of coal plants at less than economic dispatch. This could include startup/ shutdown cycles and load following cycles. For coal-fired units, cold starts are often defined as when a unit is offline over 40 hours. Warm starts are commonly defined to include starts occurring after the unit has been offline from five to forty hours. Hot starts are generally those occurring within five hours of a unit going offline. While each of these cycles causes some measure of wear and tear in excess of steady state operation, cold starts are generally the most damaging and load following the least damaging.

As mentioned above, cycling any unit results in increase equipment wear and therefore cost. These impacts generally manifest themselves in some combination of the following measurable effects:

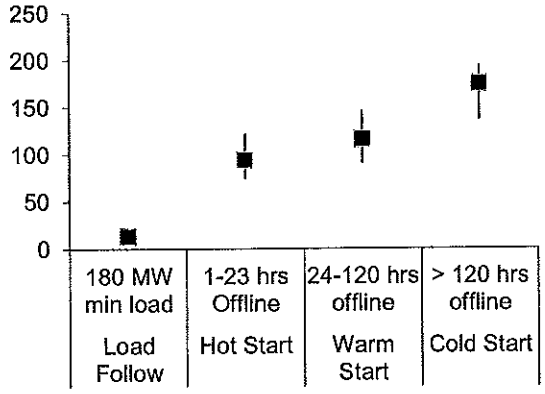
[10] These figures are derived from the following: ($155,000 $/inch-mile) * (330 miles) * (6.5 inch-equivalent of additional pipeline capacity needed).

- Decreased reliability evidenced by increased equivalent forced outage rate (EFOR) and increased cost of replacement energy;
- Derating resulting from damage;
- Increased capital and maintenance costs to repair increasingly worn parts;
- Increased fuel consumption, either from increased startups and/or higher heat rates resulting from part load operations;
- Other startup costs i.e. chemicals, auxiliary power, manpower;
- Shorter unit economic life.

Depending upon the cycling type, from 49-62% of the cycling cost results from increased capital and maintenance costs associated with increased maintenance frequency, inspections, and repairs. Moreover, 23-29% of the cost increase results from forced outages requiring not only repairs (parts and labor), but also purchase of replacement power.

Arizona's coal-fired units were designed for baseload service and therefore do not cycle well. As a result, load cycles requiring startups and shutdowns will mostly be met with combustion turbine-based power plants, either combined cycle or peaking units. A limited amount of load cycling while the unit is online can be feasible and has relatively low operating costs. As evidenced in Exhibit 25, not only are expected load cycling costs much lower than the startup / shutdown cycles, the range of expected costs, and therefore the certainty around those costs, is higher than load following operations. The amount of load cycling that is possible is, however, constrained by minimum load requirements, O&M cost impacts, and emissions issues associated with running coal plants at low loads.

Exhibit 25: Coal-Fired Power Plant Cycling Cost Range, $000 per Cycle



Note: Typical 500 MW conventional coal-fired power plant. Values in 2008$

Source: Coal Power Magazine, Intertek-Aptech, Pace Global.

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6. Conclusions

6.1. Summary of Key Recommendations

Arizona's interim goals proposed in the Clean Power Plan, which require a shutdown of the entire, non-tribal coal fleet in Arizona by 2020, cannot be met. A state plan for compliance and associated regulation that likely will be likely be needed for enforcement will not be in place before June 2017, and three years is inadequate to plan, coordinate, permit, construct and operate the natural gas plants necessary to maintain statewide reserve margin requirements, the transmission infrastructure required to deliver the gas fired generation to customers and the natural gas pipeline capability to supply the generating facilities.

Arizona is one of the hardest hit states in the country by the Clean Power largely because of inappropriate assumptions about the ability to redispatch from coal to gas by 2020 that does not account for the major transmission and infrastructure required to do so. Further, the EPA's energy efficiency assumptions used in goal setting are well above levels that have been maintained to date for any significant length of time. This creates a high bar for compliance rather than a reasonably achievable efficiency benchmark for goal determination. Even the EPA's own analysis of Arizona's ability to comply with the proposed goals has coal capacity running below operating minimums.

These inequities and impossible to meet targets can be best dealt with through a number of measures:

- Amend building block 2 to set a balanced more gradual reduction target for coal fired generation between 2020 and 2030 and account for the useful life of coal units that will give time to develop the needed infrastructure to build needed gas generation in the state and reduce stranded cost impacts to ratepayers.
- Amend Building Block 3 to ensure that renewable generation is counted at the point of delivery.
- Recalculate Building Block 4 to include energy efficiency measures of 0.6% per year rather than 1.5% per year.
- Reset the interim and 2030 targets for Arizona consistent with these measures.

Making these adjustments would still achieve dramatic reductions in Arizona's carbon footprint by 2030, but would do so in a way that would not jeopardize reliability of power and natural gas supply in the state and would avoid the likelihood of severe customer rate shock by 2020.

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Appendix A: Scenario Assumptions

Pace Global performed power and natural gas market modeling for the EPA Building Block scenario and the alternative Arizona Glide Path scenario. Assumptions underlying these analyses are presented in this section.

EPA Building Block Scenario Assumptions

The EPA Building Block Scenario assumes the following assumptions to literally model the EPA's building blocks for Arizona.

Exhibit 26: EPA Building Block Scenario Assumptions

Building Blocks	Modeling Assumptions	Commentary
1. Fossil plant efficiency improvements	Increase efficiency of existing coal plants by ~6%.	Because of Arizona's significant peaking natural gas capacity as of the CPP baseline in 2012, no coal operates in 2020 or beyond in order to meet building block 2.
2. Coal-to-natural gas combined cycle (NGCC)	Increase utilization of all existing and new NGCCs up to 70% while proportionally reducing coal-fired generation.	Existing combined cycle units are necessary to meet Arizona peak summer capacity requirements, not operate at a specific capacity factor value.
3. Coal-to-low- or no-emitting sources	Increase renewables to Arizona state target of 4%, and assume no nuclear retirements.	With under construction renewables, Arizona already exceeds 4%; therefore current levels of ~5% are assumed; Palo Verde continues to operate.
4. End-use energy efficiency	Reduce demand-side energy use 1.5% annually through 2030.	For Arizona this equates to ~12% by 2030.

The following tables present key assumptions underlying the analysis.

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Exhibit 27: Natural Gas Price and Regional Basis (2013$/MMBtu)

Year	Henry Hub	N. Arizona Basis	S. Arizona Basis
2015	3.77	0.05	0.15
2016	3.88	0.02	0.14
2017	4.08	0.05	0.18
2018	4.33	0.06	0.23
2019	4.67	0.03	0.18
2020	5.39	0.11	0.30
2021	5.57	0.09	0.24
2022	5.63	0.12	0.25
2023	5.50	0.15	0.24
2024	5.49	0.16	0.23
2025	5.53	0.17	0.21
2026	5.55	0.27	0.30
2027	5.58	0.34	0.35
2028	5.64	0.38	0.38
2029	5.73	0.42	0.40
2030	5.77	0.57	0.53
2031	5.84	0.60	0.53
2032	5.93	0.65	0.57
2033	6.01	0.67	0.57
2034	6.05	0.68	0.57
2035	6.09	0.71	0.59

Source: Pace Global

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Exhibit 28: Average Arizona Delivered Coal Prices (2013$/MWh)

Year	Coal Price ($/MWh)
2015	23.2
2016	23.4
2017	23.7
2018	23.6
2019	23.6
2020	23.5
2021	23.3
2022	23.3
2023	23.2
2024	23.2
2025	22.7
2026	22.7
2027	22.6
2028	22.6
2029	22.5
2030	23.4

Note: Delivered coal prices to individual plants in Arizona range from approximately $21.5/MWh to $27.5/MWh.

Source: Pace Global

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Exhibit 29: Arizona Load Forecast Before Efficiency (MW) and Efficiency Assumed (%)

Year	Average	Peak	Building Block 4 Efficiency %
2015	10,469	20,055	
2016	10,788	20,669	
2017	11,106	21,283	1.5%
2018	11,425	21,896	1.5%
2019	11,743	22,509	1.5%
2020	12,062	23,121	1.5%
2021	12,380	23,734	1.5%
2022	12,698	24,346	1.5%
2023	13,017	24,960	1.5%
2024	13,336	25,574	1.5%
2025	13,654	26,187	1.5%
2026	13,973	26,800	1.5%
2027	14,298	27,427	1.5%
2028	14,631	28,069	1.5%
2029	14,972	28,726	1.5%
2030	15,321	29,398	
2031	15,678	30,086	
2032	16,043	30,790	
2033	16,417	31,511	
2034	16,800	32,248	
2035	17,191	33,003	

Note: Load forecast is gross economic demand and does not include any efficiency or demand side program assumptions. All scenarios assume that the building block 4 efficiency annual percentages are applied resulting in a cumulative efficiency savings of 11.4% by 2030.

Source: Pace Global and EPA

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Exhibit 30: Capital New Resource Technology Parameters for Market Expansion

Technology	Early Capital Cost	Mid Capital Cost	Late Capital Cost	Early Levelized	Mid Levelized	Late Levelized
	(2014-2016)	(2017-2024)	(2025-2030)	(2014-2016)	(2017-2024)	(2025-2030)
	$/kW	*$/kW*	*$/kW*	*$/kW-yr*	*$/kW-yr*	*$/kW-yr*
CC (7FA)	1046	974	890	148	139	127
CT (FA)	735	685	624	115	109	100
Advanced CT (LMS 100)	1099	996	880	160	147	131
Solar PV*	2392	2012	1616	161	200	165
Wind 1.5 MW*	1909	1779	1632	183	212	197

*Wind and Solar Costs increase during the "mid levelized" period as tax benefits such as PTC is assumed to phase out and ITC reduces.

Source: Pace Global

Exhibit 31: New Units Additions

Owner Name	Plant Name	NERC Sub Region	Unit Status	Online Date	Primary Fuel	Prime Mover	Winter Capacity (MW)
PacifiCorp	Lake Side Power Plant	BASIN	Operating	May-14	Gas	CC	647.4
Kennecott Utah Copper Corp	KUCC	BASIN	Under Const	Aug-15	Gas	GT	5.9
Gerlach Geothermal LLC	San Emidio Project	BASIN	Under Const	Jun-15	Geo	GE	8.6
Durbin Creek Windfarm LLC	Durbin Creek Windfarm	BASIN	Site Prep	Sep-14	Wind	WT	20.0
Willow Spring Windfarm LLC	Willow Spring Windfarm	BASIN	Site Prep	Sep-14	Wind	WT	30.0
Hanford Peaker LLC	GWF Hanford Combined Cycle	CAL N	Site Prep	Sep-16	Gas	CC	120.0
Henrietta Peaker LLC	Henrietta Peaker***	CAL N	Site Prep	Sep-16	Gas	CC	123.0
Contra Costa Generating Station LLC	Oakley Generating Station **	CAL N	Under Const	Dec-16	Gas	CC	624.0
Xeres Ventures LLC	Santa Clara SC1 Data Center	CAL N	Operating	Jun-14	LOil	IC	9.0
Westlands Solar Farms LLC	Westlands Solar Farm	CAL N	Operating	Apr-14	Solar	PV	23.0
Topaz Solar Farms LLC	Topaz Solar Farm	CAL N	Under Const	Jan-15	Solar	PV	151.9
Topaz Solar Farms LLC	Topaz Solar Farm	CAL N	Under Const	Mar-15	Solar	PV	92.0
Lax Arpt	Central Utilities Plant LAX	CAL S	Under Const	Dec-14	Gas	CC	8.8
Lax Arpt	Central Utilities Plant LAX	CAL S	Under Const	Dec-14	Gas	CT	6.6
Los Angeles Dept of Water & Power	Scattergood	CAL S	Under Const	Dec-15	Gas	CC	309.0
Los Angeles Dept of Water & Power	Scattergood	CAL S	Under Const	Dec-15	Gas	GT	190.0
Lax Arpt	Central Utilities Plant LAX	CAL S	Under Const	Dec-14	Other	CA	2.2
Genesis Solar LLC	Genesis Solar Energy Project	CAL S	Operating	Mar-14	Solar	SS	125.0
Desert Sunlight 300 LLC	Desert Sunlight Solar	CAL S	Under Const	Jun-14	Solar	PV	25.2
Desert Sunlight 300 LLC	Desert Sunlight Solar	CAL S	Under Const	Jul-14	Solar	PV	20.2
Desert Sunlight 300 LLC	Desert Sunlight Solar	CAL S	Under Const	Aug-14	Solar	PV	18.9
Desert Sunlight 300 LLC	Desert Sunlight Solar	CAL S	Under Const	Oct-14	Solar	PV	22.7
Desert Sunlight 250 LLC	Desert Sunlight Solar	CAL S	Under Const	Nov-14	Solar	PV	25.2
SG2 Imperial Valley LLC	Solar Gen 2	CAL S	Under Const	Dec-14	Solar	PV	50.0
SG2 Imperial Valley LLC	Solar Gen 2	CAL S	Under Const	Dec-14	Solar	PV	100.0

Owner Name	Plant Name	NERC Sub Region	Unit Status	Online Date	Primary Fuel	Prime Mover	Winter Capacity (MW)
Imperial Valley Solar 3 LLC	Imperial Valley Solar	CAL S	Under Const	Dec-14	Solar	PV	400.0
AES Solar LLC	Mount Signal Solar Farm	CAL S	Under Const	Dec-14	Solar	PV	109.0
Solar Star California XIX LLC	Antelope Valley I Solar Project	CAL S	Under Const	Oct-15	Solar	PV	310.0
Solar Star California XX LLC	Antelope Valley II Solar Project	CAL S	Under Const	Oct-15	Solar	PV	276.0
Rice Solar Energy LLC	Rice Solar Energy Project	CAL S	Site Prep	Jun-16	Solar	SS	150.0
Los Angeles Dept of Water & Power	Headworks Reservoir	CAL S	Under Const	Dec-17	Water	HY	4.0
Jawbone Wind Energy LLC	Jawbone Wind Energy Project	CAL S	Site Prep	Mar-15	Wind	WT	39.0
Geolectric Power Co NM LLC	Lightning Dock Geothermal	DESERT SW	Site Prep	May-15	Geo	GE	6.0
Sexton Energy LLC	Tangerine LFG Project	DESERT SW	Under Const	Jan-15	Renew	IC	1.4
Copper Mountain Solar 2 LLC	Copper Mountain Solar	DESERT SW	Under Const	Oct-14	Solar	PV	30.0
Copper Mountain Solar 2 LLC	Copper Mountain Solar	DESERT SW	Under Const	Dec-14	Solar	PV	30.0
Tucson Electric Power Co	H Wilson Sundt Generating Station	DESERT SW	Under Const	Dec-14	Solar	PV	5.0
Sempra Generation	Copper Mountain Solar	DESERT SW	Under Const	Mar-15	Solar	PV	250.0
American Capital Energy	Searchlight Solar	DESERT SW	Under Const	Jun-15	Solar	PV	20.0
First Solar Inc	Moapa Solar Project	DESERT SW	Under Const	Jun-15	Solar	PV	150.0
First Solar Inc	Moapa Solar Project	DESERT SW	Under Const	Dec-15	Solar	PV	100.0
Torch Renewable Energy	Red Horse 2 Wind	DESERT SW	Under Const	Jun-15	Wind/Solar	WT	70.0
Iberdrola Renewables Inc	El Cabo Wind	DESERT SW	Under Const	Dec-15	Wind	WT	298.0
Moapa Solar LLC	Moapa Solar Energy Center	DESERT SW	App Pending	Sep-15	Solar	PV	100
Moapa Solar LLC	Moapa Solar Energy Center	DESERT SW	App Pending	Sep-16	Solar	SS	100
Silver State Solar Power South LLC	Silver State South Solar Project	DESERT SW	App Pending	Dec-16	Solar	PV	250
Arlington Valley Solar Energy I LLC	Arlington Valley Solar Energy Project	DESERT SW	Proposed	Dec-15	Solar	SS	125
Arizona Public Service	Ocotillo	DESERT SW	Proposed	Apr-18	Gas	CT	525
Silver State Solar Power South LLC	Silver State South Solar Project	DESERT SW	Proposed	Dec-18	Solar	PV	100
Pacific Hydro Inc	Kingman Wind	DESERT SW	Proposed	Dec-17	Wind	WT	10.2
Portland General Electric Co	Carty Generating Station	NWPP	Under Const	Jul-16	Gas	CC	440.0
Dorena Hydro LLC	Dorena Dam	NWPP	Under Const	Oct-14	Water	HY	5.2
Fairfield Wind LLC	Fairfield Wind	NWPP	Operating	May-14	Wind	WT	10.0
Portland General Electric Co	Lower Snake River Wind Energy Project	NWPP	Under Const	Jun-15	Wind	WT	267.0
Two Elk Generation Partners LP	Two Elk Energy Park	RMPA	Site Prep	Dec-16	Coal	ST	290.0
Black Hills Corp	Cheyenne Power Plant	RMPA	Under Const	Oct-14	Gas	CC	55.0
Cheyenne Light Fuel & Power Co	Cheyenne Power Plant	RMPA	Under Const	Oct-14	Gas	CC	40.0
Cheyenne Light Fuel & Power Co	Cheyenne Power Plant	RMPA	Under Const	Oct-14	Gas	CS	37.0
Public Service Co of Colorado	Cherokee (CO)	RMPA	Under Const	Sep-15	Gas	CC	633.2
Haxtun Wind LLC	Haxtun Wind Farm	RMPA	Site Prep	Dec-14	Wind	WT	28.8

Source: Pace Global and the AUG

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Alternative Scenario Assumptions

Pace Global modeled an alternative scenario for reducing emissions statewide but also maintaining some coal generation in the state. The treatment of affected coal units in this scenarios is detailed Exhibit 32

Exhibit 32: Affected Coal Unit Assumptions by Scenario

	Capacity (MW)	Generation (MWh)	% Coal Capacity v. 2014	% Coal Generation v. 2014
Total Coal (2014)	3,861	24,801,925	100%	100%
Planned Retirements / Conversions by 2020	545	2,967,068	14%	12%
Planned Remaining Coal by 2020	3,316	21,834,857	86%	88%
EPA Building Block Scenario - Remaining Coal 2020	0	0	0%	0%
Arizona Glide Path scenario - Remaining Coal 2030	2,542	16,662,479	66%	67%

Source: Pace Global and the AUG

The Arizona Glide Path scenario did not prescriptively model the EPA's building blocks with the exception of building block 4 to ensure consistency in load across all analyses. The prominent assumptions presented in the tables above were also assumed for this scenario. No improvements in coal plant heat rates are assumed. NGCC units operated at economic dispatch levels. The renewable build out in Arizona was based on aggregate estimates by utility.

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Appendix B: Power Market Analysis Methodology

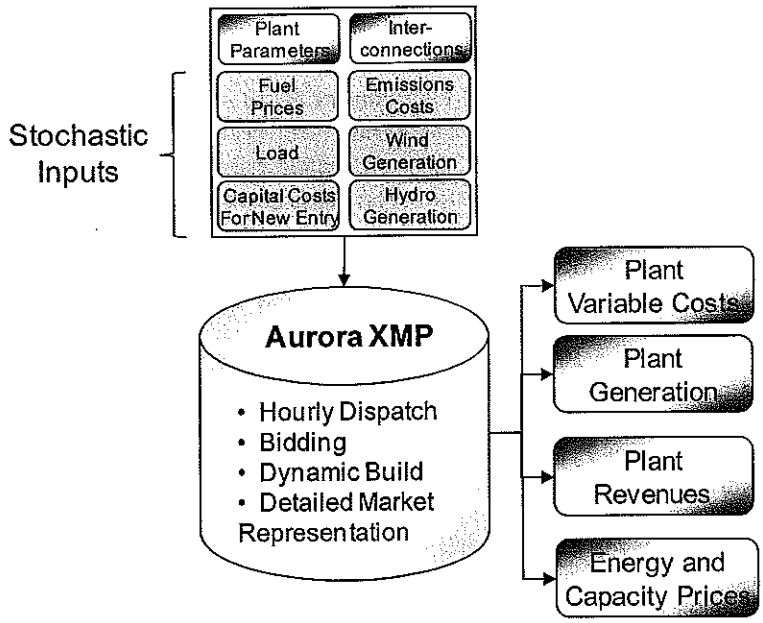
Power Market Modeling

Pace Global deploys an hourly chronological dispatch model to simulate the economic dispatch of power plants within a competitive framework. Representations of hourly regional demand profiles and plant-level supply characteristics are included, as well as detailed assessments on the fundamental drivers of power plant dispatch within each relevant market area. Key components of our methodology include:

- **Load Forecast:** Pace Global independently develops regional load forecasts (with stochastic uncertainty bands) based on the historic relationship between economic drivers, weather, and load.
- **Regional Fuel/Emission Projections:** Pace Global develops independent projections of fuel and emission pricing inputs (with stochastic uncertainty bands) based on the fundamental drivers of each market and a comprehensive review of regulatory environments.
- **Renewable Generation Profiles:** Pace Global analyzes the historic generation of renewable technologies throughout its modeling regions in order to characterize renewable generation profiles.
- **Bidding Function:** Pace Global's market simulations incorporate bidding behavior and scarcity premiums in our dispatch algorithm. Each region's bidding function is based on hourly analyses of the historic relationship between prices and reserve margins
- **Dynamic Capacity Expansion:** Gas-fired, wind, and solar capacity expansions are built dynamically when observed margins reach a specified threshold.
  - Creates boom/bust cycles that capture observed market behavior

A summary of the methodology with key inputs, algorithms, and outputs is shown in Exhibit 33.

Exhibit 33: Pace Global Market Analysis Methodology



Source: Pace Global.

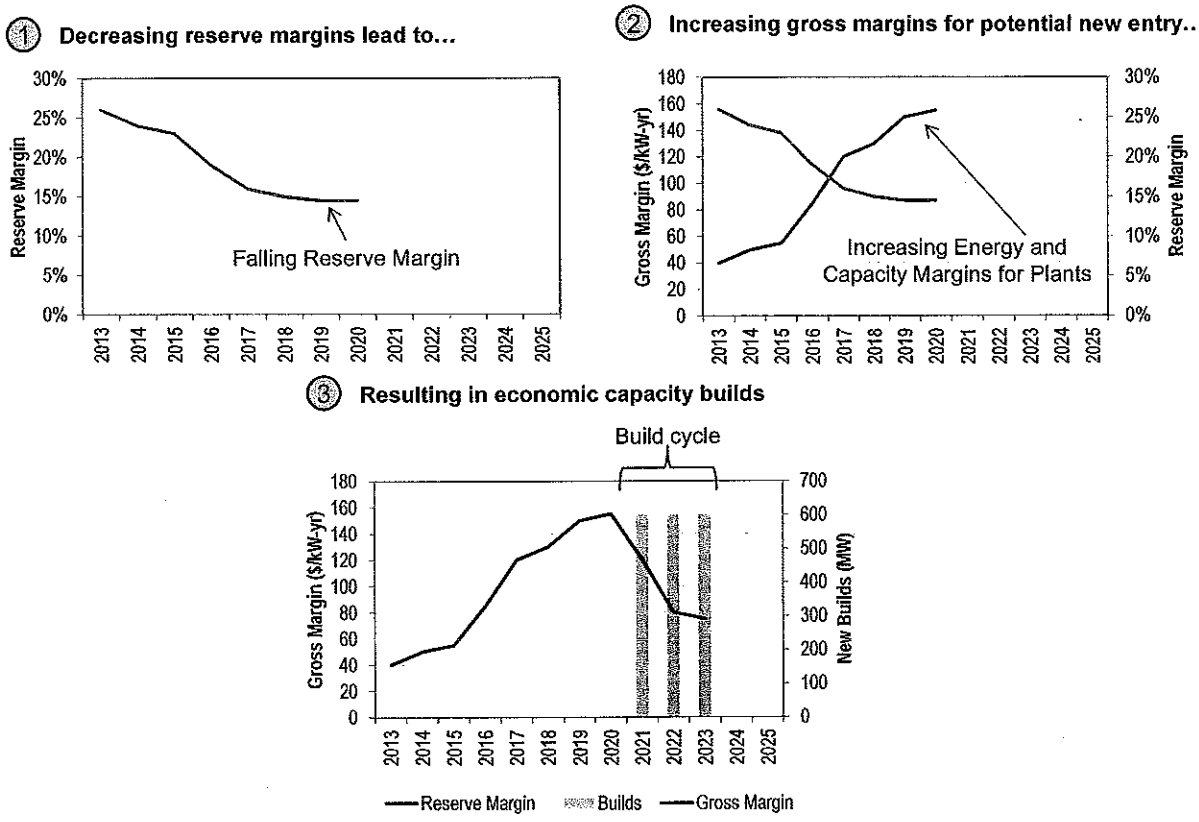
Dynamic Build Capacity Expansion

Pace Global incorporates the dynamic simulation of additional economic capacity in our long term analyses. With this approach, incremental expansion is expected when economic conditions provide a sufficient rate of return for new units. Where net energy and capacity revenues together justify build of a new unit on the basis of a historic trend, a new unit is built. Sustained positive returns, generally stimulated by falling reserve margins and rising prices are expected to lead to capacity additions. The magnitude of the capacity expansion depends on the achieved Return on Investment ("ROI") specific to the type of generating plant.

Pace Global's dynamic build logic is illustrated in Exhibit 34. This graphic illustrates how new capacity enters the market according to economic signals – these units are shown under the legend "Economic Expansion" (the units labeled "Additional Expansion" reflect announced units or units built on the basis of RPS or reliability requirements). For example, following an expected widening in system reserve margins over the period to 2009-2011, the system is expected to tighten during the 2011-2014 timeframe. In this example, we project that rising margins in the period 2011-2014 will send a signal causing a new plant to come online around the 2015 time frame.

Following a temporary capacity glut, rising plant margins during the 2015-2018 period are unlikely enough to provide an unequivocal signal to new plant developers. In this case, a full build phase is not supported until the period from 2023-2026. From 2021, declining plant margins set in, reflecting the overbuild cycle. The dynamic expansion methodology is currently applied to incremental natural gas-fired combined cycles, natural gas-fired peakers, wind, and solar builds in the region, and is employed across all iterations of analysis. This allows all market simulations to incorporate the reactive behavior observed in the market to periods of sustained margins.

Exhibit 34: Dynamic Build Simulation Logic



Source: Pace Global.

Escalation Rate

Exhibit 35 shows Pace Global's annual deflator series. Pace develops its market projections in real terms and converts prices to nominal values using the market rate implied by the yield on treasury bonds and similar maturity Treasury Inflation Protected Securities ("TIPS"). The yield quoted on treasury bonds is equal to the real yield plus inflation, while the yield quoted for TIPS is the real yield. Subtracting the yield of TIPS from the yield of Treasury bonds arrives at the market's forward implied inflation rate.

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Exhibit 35: Pace Global's Annual Deflator Series

Year	Deflator Series
2014	1.0164
2015	1.0331
2016	1.0500
2017	1.0672
2018	1.0863
2019	1.1058
2020	1.1256
2021	1.1494
2022	1.1738
2023	1.1987
2024	1.2260
2025	1.2540
2026	1.2826
2027	1.3118
2028	1.3417
2029	1.3723
2030	1.4036
2031	1.4356
2032	1.4683
2033	1.5018
2034	1.5356
2035	1.5701

Source: Pace Global and U.S. Treasury Department.

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Appendix C: Fuel Market Analysis Methodology

GPCM-Based Natural Gas Market Modeling

In its fuel market analysis, Pace Global utilizes the Gas Pipeline Competition Model (GPCM) to conduct analysis of natural gas economics in North America. GPCM, developed and updated by RBAC, Inc., is a combination software-database system that allows Pace Global to quantitatively analyze the complex interactions among producers, pipelines, storage facilities, gas marketers, and consumers in the highly integrated North American natural gas industry. The primary output of GPCM is natural gas price forecasts and gas trading hub basis differentials to the Henry Hub, but has a range of other outputs including pipeline usage, transportation zone pricing customer receipts, storage balances, etc.

Model Structure and Capabilities

Mathematically, GPCM is a network model that can be diagrammed as a set of "nodes" and "arcs". Nodes represent production regions, pipeline zones, interconnects, storage facilities, delivery points, and customers or customer groups. The connections between these nodes are called arcs, which represent transactions and flows. Some of these are supplier deliveries to pipelines, transportation across zones and from one zone to another, transfers of gas by one pipeline to another, delivery of gas into storage, storage of gas from one period to another, withdrawal of gas from storage, and pipeline deliveries of gas to customers.

GPCM dynamically solves for economic rents, allowing cheaper supplies to be used before more expensive supplies and enabling customers willing to pay more to be served before those willing to pay less. By including the entire system of North American gas production, transmission, storage, consumption, and imports/exports, GPCM optimizes gas flows in an economically sensible order to produce an economically efficient, market-clearing solution. GPCM contains more than 200 existing and proposed pipelines, 400 storage areas, 85 production areas, 15 liquefied natural gas (LNG) import/export terminals, and nearly 500 demand centers.

GPCM can be adapted to model different scenarios based upon varying assumptions for projected gas supply and demand growth, among other variables. The model provides a "Base Case" scenario using existing pipeline tariffs, capacities, and normal weather for demand regions. This Base Case can be adapted to model the following factors:

- Increases or decreases of projected demand by sector
- Increases or decreases of production capacity in traditional and unconventional areas
- Proposed pipeline projects or expansions
- Proposed LNG export terminals and capacity expansions
- New storage fields or increases in existing storage capacity

The output from GPCM consists of the following types of items, which can be exported to an Excel spreadsheet for further analysis and reporting:

- Production and spot market prices by region
- Pipeline receipts from producers by zone
- Pipeline flows from zone to zone
- Transportation prices and discounting by pipeline and zone
- Transfers between pipelines at interconnects
- Injections into and withdrawals from storage
- Deliveries by pipelines to customers
- Gas supply available to each customer in each region
- Market clearing prices in each region

Dynamic Build Capacity Expansion

Pace Global has the capability to incorporate the dynamic simulation of additional pipeline capacity in our long term analyses. To the extent that the scenario under consideration requires that only "pre-programmed builds" come online (i.e., announced and under construction new pipeline or expansions that increase capacity), Pace Global has the ability to turn off the dynamic simulation switch. With this approach, incremental expansion is expected when economic conditions provide a sufficient rate of return for new pipeline capacity. Where utilization rates approach the capacity ceiling and there are economic opportunities to expand service, existing pipeline capacity can be expanded to increase revenue and reduce deadweight loss. Sustained positive returns are expected to lead to capacity additions. The magnitude of the capacity expansion depends on the rents that could be generated under an expansion scenario.

Geography and Granularity

GPCM covers the North American natural gas market, including Alaska, Canada, the continental United States, and Mexico. GPCM also contains a graphical display system to visually analyze interconnections, flows, and other output from the model. Demand forecasts can be manipulated by sector and by state. Supply sources can be manipulated by basin or play. Output data is provided on a monthly basis but can be aggregated up to annual averages. The forecasting horizon extends out to December 2035.
Exhibit 36 below provides a list of natural gas market points reported out by GPCM (note that additional market points can be built into the model, as needed).

Exhibit 36: GPCM Reported Natural Gas Market Points (Gas Hubs)

Agua Dulce Hub	Florida Gas, zone 3	SoCal Gas
Algonquin, city-gates	GTN, Kingsgate	Southern Natural, La.
Algonquin, receipts	Henry Hub	Southern Star, Tx.-Okla.-Kan.
Alliance, into interstates	Houston Ship Channel	Stanfield, Ore.
ANR, La.	Iroquois, receipts	TCPL Alberta, AECO-C
ANR, ML 7	Iroquois, zone 2	Tennessee, La., 500 Leg
ANR, Okla.	Iroquois-Z1	Tennessee, La., 800 Leg
Carthage Hub	Katy	Tennessee, zone 0
CEGT-South	Kern River, delivered	Tennessee, zone 6 delivered
CEGT-West	Kern River, Opal plant	Texas Eastern, ELA
CenterPoint, East	Lebanon Hub-Ohio	Texas Eastern, ETX
Cheyenne Hub	Leidy Hub	Texas Eastern, M-1 (Kosi)
Chicago city-gates	Mich Con city-gate	Texas Eastern, M-3
CIG, Rocky Mountains	NGPL, Amarillo receipt	Texas Eastern, STX
Columbia Gas, Appalachia	NGPL, La.	Texas Eastern, WLA
Columbia Gulf, La.	NGPL, Midcontinent	Texas Gas, zone 1
Columbia Gulf, mainline	NGPL, STX	Texas Gas, zone SL
Consumers Energy city-gate	NGPL, Texok zone	TGP-Z1 100L
Dawn, Ontario	Niagara	Transco, zone 1
Dominion, North Point	Northern, demarc	Transco, zone 2
Dominion, South Point	Northern, Ventura	Transco, zone 3
Dracut, Mass.	Northwest, Can. bdr (Sumas)	Transco, zone 4
El Paso, Bondad	Northwest, s. of Green River	Transco, zone 5 delivered
El Paso, Permian Basin	Northwest, Wyo. Pool	Transco, zone 6 N.Y.
El Paso, San Juan Basin	Oneok, Okla.	Transco, zone 6 non-N.Y.
El Paso, South Mainline	Panhandle, Tx.-Okla.	Transwestern, Permian Basin
Emerson, Viking GL	PG&E city-gate	Trunkline, ELA
Florida city-gates	PG&E, Malin	Trunkline, WLA
Florida Gas, zone 1	PG&E, south	Waha
Florida Gas, zone 2	Questar, Rocky Mountains	Westcoast, station

Source: Pace Global

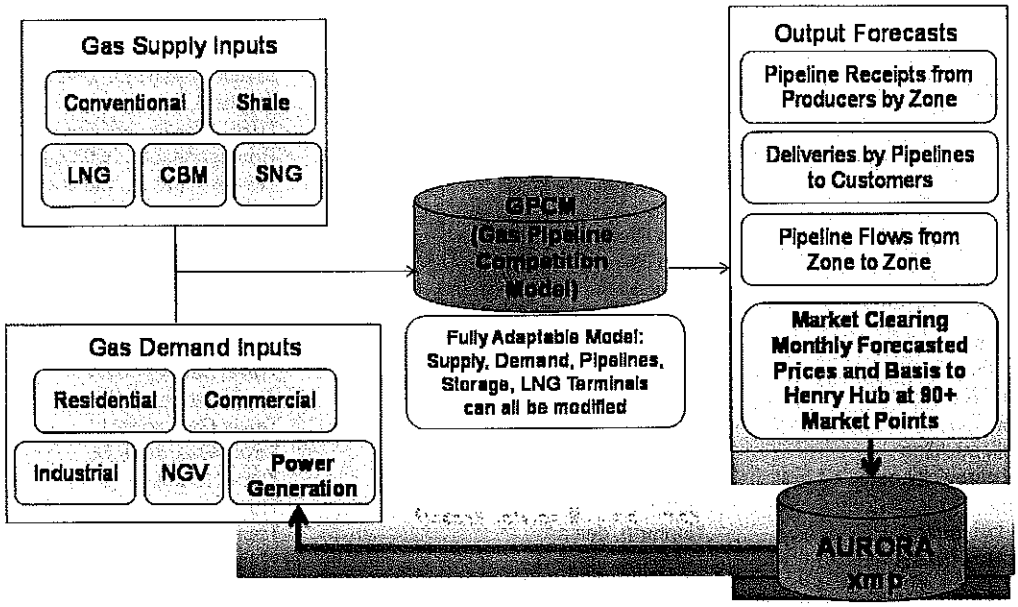
Additional information on GPCM can be found at www.rbac.com.

Natural Gas and Power Analysis Integration

Pace Global integrates its power and natural gas market analyses to account for the impacts of power sector consumption on natural gas infrastructure and pricing. Resulting natural gas demand from the power market analysis is run through GPCM to recalibrate pricing associated with the given consumption levels. This iterative process is performed until the resulting demand and pricing balance. Exhibit 37 presents the GPCM model parameters as well as the iterative process with the power market analysis used by Pace Global.

PACE GLOBAL
A Siemens Business

Exhibit 37: Natural Gas Model Overview and Power Market Integration Scenatic



Source: Pace Global

HOUSE OF REPRESENTATIVES

SB 1200

mining and mineral museum; transfer
Sponsor: Senator Griffin

X Committee on Energy, Environment and Natural Resources

Committee on Appropriations

Caucus and COW

House Engrossed

OVERVIEW

SB 1200 transfers the responsibility of maintaining the Mining and Mineral Museum from the Arizona Historical Society (AHS) to the Arizona Geological Survey (AGS) and makes statutory changes to implement this Act.

HISTORY

Laws 2010, Chapter 277 transferred the responsibility of maintaining the Arizona Mining and Mineral Museum from the former Arizona Department of Mines and Mineral Resources to the Arizona Historical Society (AHS) as part of the Centennial Museum and established the Centennial and Mining and Mineral Museum Advisory Council (Centennial Council). The museum closed on May 1, 2011 for renovations but has not reopened since.

Laws 2014, Chapter 18 required the AHS and the Department of Administration (ADOA) to submit a report to the Joint Legislative Budget Committee (JLBC) with options for the use of the vacant museum building located at 1502 West Washington Street in Phoenix. A report was submitted, which provided four options, approximate costs or proceeds for the options and the preferred option of the AHS and the ADOA. The options included:

1. Reopening the Mining and Mineral Museum - $2,120,300
2. Converting the space into offices - $3,081,500
3. Selling the facility - $2,900,000 (estimated proceeds)
4. Maintaining the status quo - No Cost

The report submitted to JLBC provided that the AHS and ADOA agreed to option 4. The Fiscal Year (FY) 2016 Baseline includes $428,300 to cover the $360,800 facility rent payment to ADOA and the $67,500 salary for the museum curator.

The AHS is Arizona's oldest cultural organization, founded by the Territorial Legislature on November 7, 1864, and charged with preserving Arizona history for the present and future. The AHS, which is governed by a Board of Directors, acquires preserves, maintains and publicly exhibits archival and museum objects pertaining to the history of Arizona, the West and state-based Indian tribes. The AHS's most notable museums are in Yuma, Flagstaff, Tucson, Phoenix and Tempe.

PROVISIONS

1. Changes the name of the Centennial Museum to the Mining, Mineral and Natural Resources Educational Museum (Museum).

2. Transfers the obligation of maintaining and operating the Museum from the AHS to the AGS and repeals statutes relating to AHS management of the Museum.
   a. Declares that the AGS succeeds to the authority, power and duties of the AHS with respect to the former Centennial Museum.
3. Allows the state geologist to do the following in order to operate and maintain the Museum:
   a. Promote the recognition and celebration of the historical, cultural, economic and social contributions made by mining, mineral and natural resources industries;
   b. Apply for and accept grants, donations, gifts, bequests of legacies of real or personal property or any other contributions as specified by the donor;
   c. Accept restricted and unrestricted monies from federal, state and local governments;
   d. Establish and collect entrance fees to the Museum;
   e. Operate a gift shop;
   f. Employ a curator;
   g. Operate educational programming;
   h. Accept services from volunteers; and
   i. Pay necessary costs for operating and maintaining the Museum.
4. Requires the AGS to maintain the items, artifacts and other inventory for display or storage in the Museum and prohibits the sale and disposal of these items.
5. Establishes a separate account in the Geological Survey Fund consisting of monies to be used for the maintenance and operations of the Museum.
6. Transfers the duties of the Centennial Council to the newly established Mining, Mineral and Natural Resources Educational Museum Advisory Council (Advisory Council).
7. Modifies and transfers the membership of the Centennial Council to the Advisory Council, which will consist of the following members:
   a. The state geologist;
   b. One member representing the livestock industry;
   c. Two members representing the mining industry;
   d. One member representing the agriculture industry;
   e. One member representing the tourism industry;
   f. One member representing the timber industry;
   g. One member who is knowledgeable of gems and minerals;
   h. Two public members;
   i. One member of the House of Representatives appointed by the Speaker; and
   j. One member of the Senate appointed by the President.
8. Reduces the term of office for members of the Advisory Council from five years to four years, allows members serving on the Advisory Council to continue to serve until the expiration of the member's current term and specifies all subsequent appointed members will serve four-year terms.
9. Allocates monies from the Arizona Centennial Special Plate Fund to the AGS to pay for maintenance and operations of the museum and requires all unexpended and unencumbered monies remaining in the Centennial Special Plate Fund to be transferred to the Museum account in the Geological Survey Fund.

10. Specifies that this Act does not alter the effect of any actions that were taken or impair the valid obligations of the AHS with respect to the former Centennial Museum in existence before the effective date of this Act and now assumed by the AGS.
11. Requires the AHS to provide a list, the location and assist with the transfer of all Mining and Mineral Museum inventory to the AGS.
12. Requires the state geologist to submit a report of the operations of the Museum, which will include a determination if General Fund monies are necessary for continued maintenance and operations of the Museum, information relating to excess specimens and recommendations of additional uses of the Museum to the Governor, the Legislature and the Secretary of State prior to January 1, 2019.
13. Appropriates $428,300 and one full-time equivalent position from the AHS to the AGS in FY 2016 for use in operating the museum.
    a. Grants a one-year exemption of any obligation for payment of rent to ADOA for use of the building and specifies the appropriated monies will be used for maintenance and repair of the building.
14. Makes technical and conforming changes.

Fifty-second Legislature
First Regular Session

EENR
S.B. 1200

PROPOSED

HOUSE OF REPRESENTATIVES AMENDMENTS TO S.B. 1200

(Reference to Senate engrossed bill)

Page 11, line 2, strike "year" insert "years 2015-2016 and"

Amend title to conform

FRANKLIN M. PRATT

1200-p1-pratt
3/11/15
4:59 PM
H:ajs

Adopted ✓ # of Verbals _____
Failed _____ Withdrawn _____
Not Offered ____ Analysts Initials ___

Attachment 6

ARIZONA HOUSE OF REPRESENTATIVES
Fifty-second Legislature - First Regular Session

ROLL CALL VOTE

COMMITTEE ON ENERGY, ENVIRONMENT AND NATURAL RESOURCES BILL NO. SB 1200

DATE March 16, 2015 MOTION: dpa

	PASS	AYE	NAY	PRESENT	ABSENT
Mrs. Barton		✓			
Mrs. Carter		✓			✓
Mr. Clark		✓			
Mr. Finchem		✓			
Mr. Leach		✓			
Mr. Saldate		✓			
Ms. Steele		✓			
Mr. Bowers, Vice-Chairman		✓			
Mr. Pratt, Chairman		✓			
		9	0	0	0

Angela Diaz
COMMITTEE SECRETARY

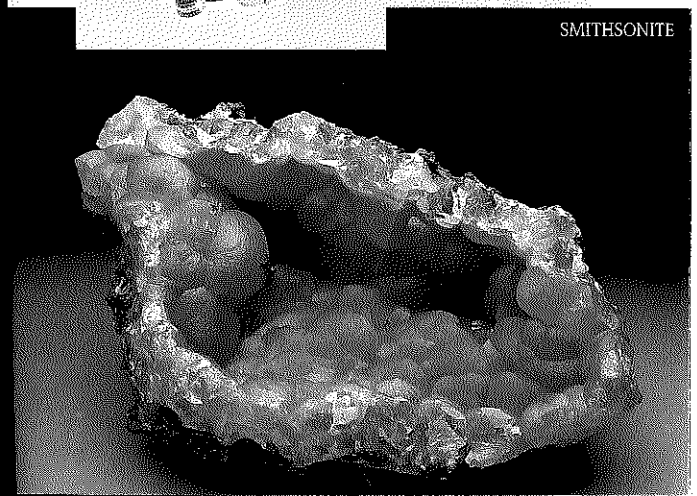
APPROVED:
FRANKLIN M. PRATT, Chairman
RUSSELL BOWERS, Vice-Chairman

ATTACHMENT

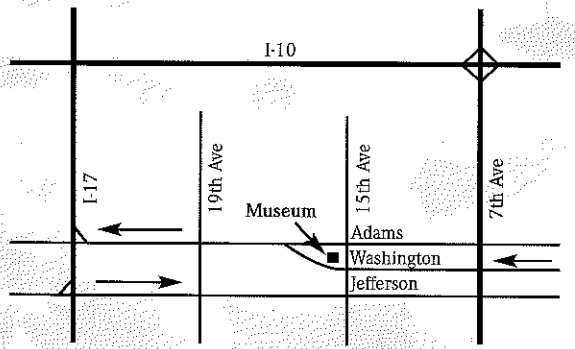
Attachment 7

The Arizona Mining and Mineral Museum commemorates the mining industry that helped build Arizona. Arizona is the Nation's number one mining state with the largest value of non-fuel mineral production.

TURQUOISE



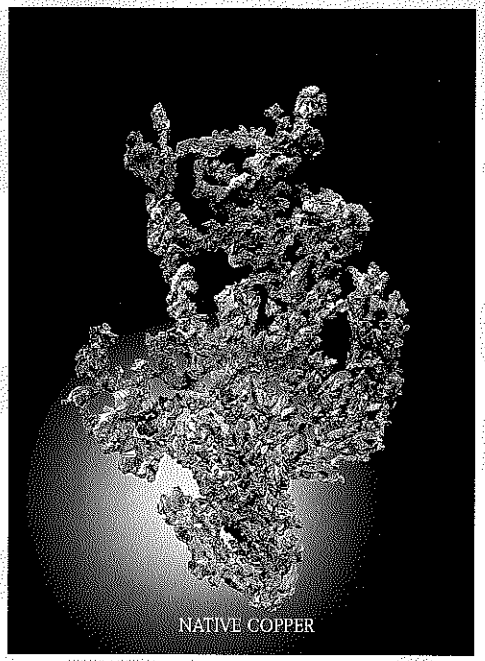
SMITHSONITE



HOURS:
8 a.m. to 5 p.m. weekdays
11 a.m. to 4 p.m. Saturdays
Closed Sundays and State holidays

FACILITIES:
Mineral displays, museum store, outside exhibits, Mineral Resource Information office

ADMISSION FEE



NATIVE COPPER

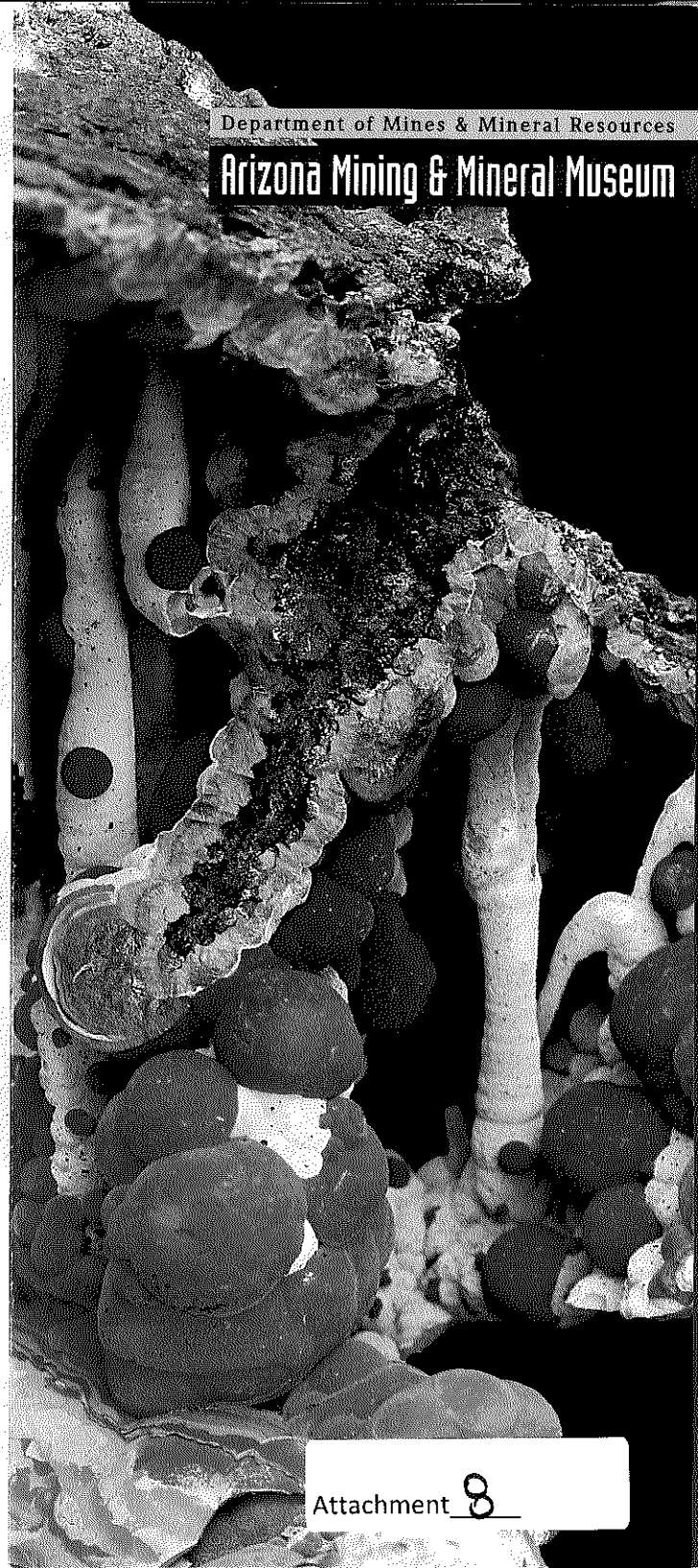
Arizona Mining & Mineral Museum

1502 West Washington
Phoenix, Arizona 85007
602-771-1611 Fax 602-771-1616

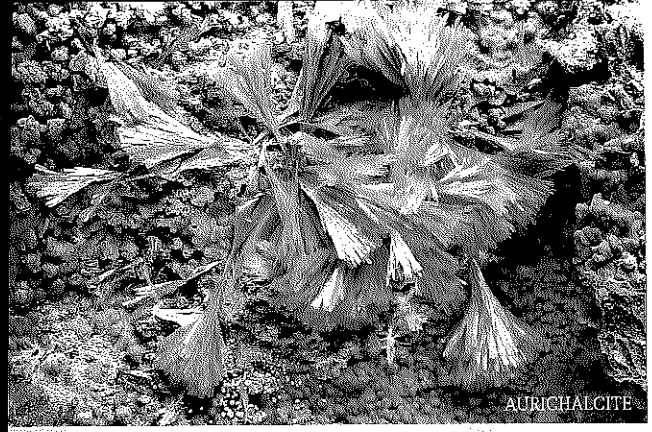
This document is available in alternate formats upon request.

Department of Mines & Mineral Resources

Arizona Mining & Mineral Museum

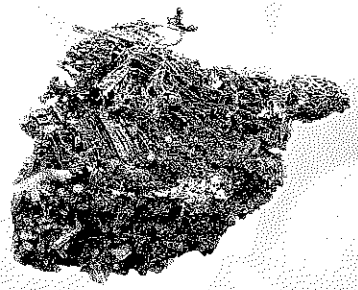


Attachment 8



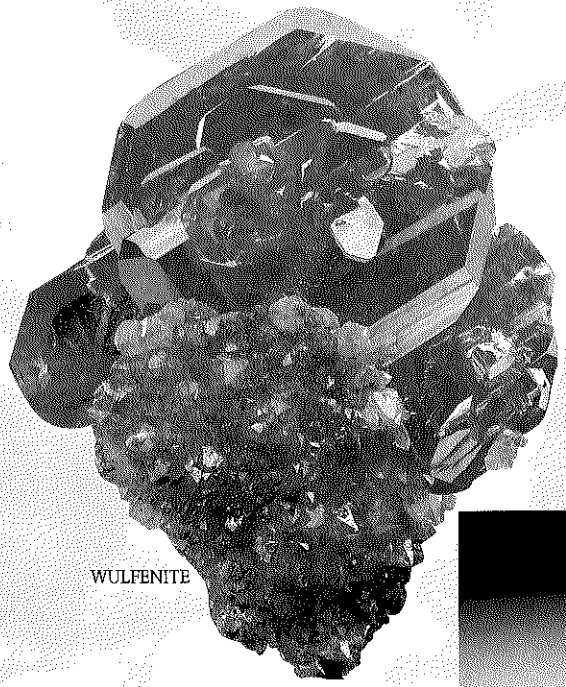
AURICHALCITE

The Arizona Mining and Mineral Museum can trace its origin back to the first Arizona Fair, held in November of 1884! The mineral display was said to "overshadow all else." By the 1917 State Fair, the building that was to house the collection for the next 74 years had been constructed.



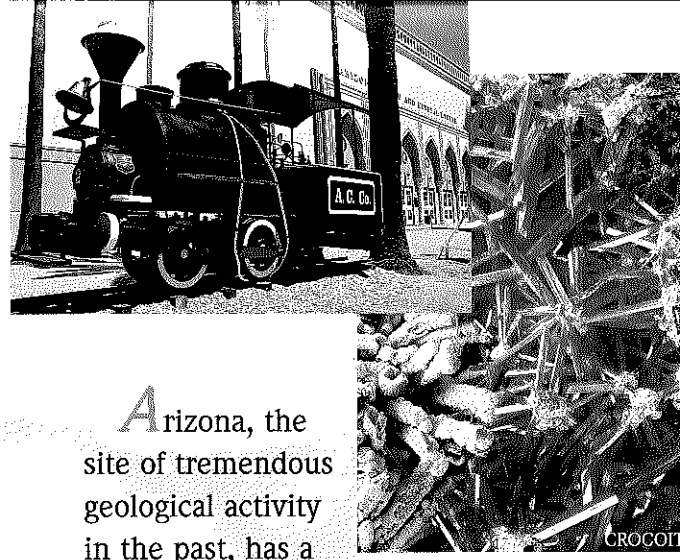
GOLD

In 1973 the Arizona Mining Association turned the collection over to the State Department of Mines and Mineral Resources. The collection, already one of the finest in the world, has been growing and improving since that time. In 1989 the State remodeled the El Zaribah Shrine Building to house the Department offices and the mineral museum. Today, over 18,000 school children and 38,000 other visitors tour each year. The Museum draws mineral collectors and rockhounds from around the world.

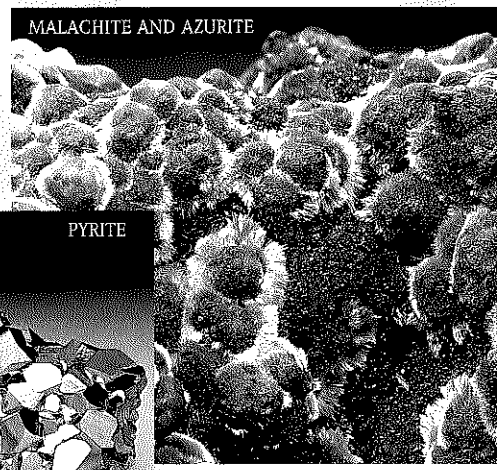


WULFENITE

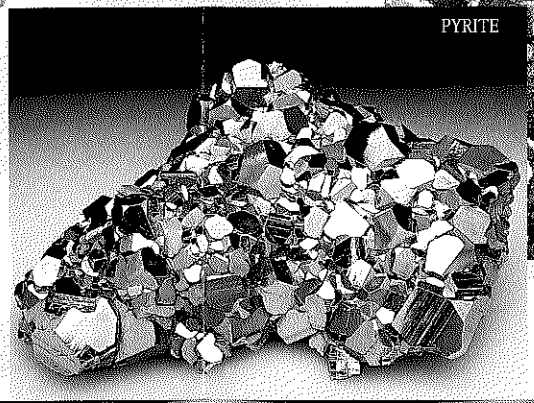
Photos by Jeff Scovil



Arizona, the site of tremendous geological activity in the past, has a diversity of minerals found in few other places on Earth. Appropriately, since Arizona is the Copper State, producing over 65 percent of the Nation's domestic supply, many of the minerals in the collection are copper minerals - turquoise, malachite, azurite, chrysocolla, bornite. Look for their stunning blues and greens in the displays.



MALACHITE AND AZURITE



PYRITE

Pima County Fair
Pinal County
Pinal County Historical Museum
Postal History Foundation
Powell Museum
Power-One
Prescott Film Festival
Prescott Office of Tourism
Provista Diagnostics
Pueblo Grande Museum
Raytheon
REC Solar
Research Corp for Science Advancement
Ridgetop Group, Inc.
Roosevelt Row
Rosemont Copper
Saguaro National Park
Salt River Project (SRP)
Science Foundation of Arizona
Scottsdale Convention and Visitor's Bureau
Sedona Chamber of Commerce
Shamrock Farms
Sharlot Hall Museum
Solar Energy Industries Association
SOLON
Southwest Valley Chamber of Commerce
Space Data Corporation
Spanglerpics
Springerville-Eagar Chamber
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Sunset Crater Volcano National Monument
Suntech
Superior Chamber of Commerce
Syncardia
Tempe Tourism Office
Thompson-Wimmer Inc.
Thunderbird Artists
Tonto National Monument
Town of Camp Verde Parks and Recreation Department
Town of Marana
Town of Payson Parks, Rec, and Tourism Department
Translational Genomics Research Institute
Tubac Chamber of Commerce
Tubac Golf Resort
Tubac Historical Society
Tucson Electric Power
Tucson Festival of Books
Tucson Folk Festival
Tucson Gem and Mineral Society
Tucson Museum of Art
Tucson Rodeo
Tumacacori National Historical Park
Tuzigoot National Monument
United States Geological Survey
Universal Avionics
University of Arizona
University of Arizona - Biomedical Engineering
University of Arizona Cooperative Extension
University of Arizona Dept. of Mining and Geological Engineering
University of Arizona Mineral Museum
University of Arizona Research Park
University of Arizona UBRP & BRAVO!
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ViaSol Energy
Visiongate
W.L. Gore & Associates
Walnut Canyon National Monument
White Mountain Nature Center
Wickenburg Chamber of Commerce
Willcox Chamber of Commerce and Agriculture
Williams Chamber of Commerce
Wilson Electric
Wupatki National Monument
Yavapai County
Yuma Convention and Visitors Bureau
Yuma Marine Corp
Yuma

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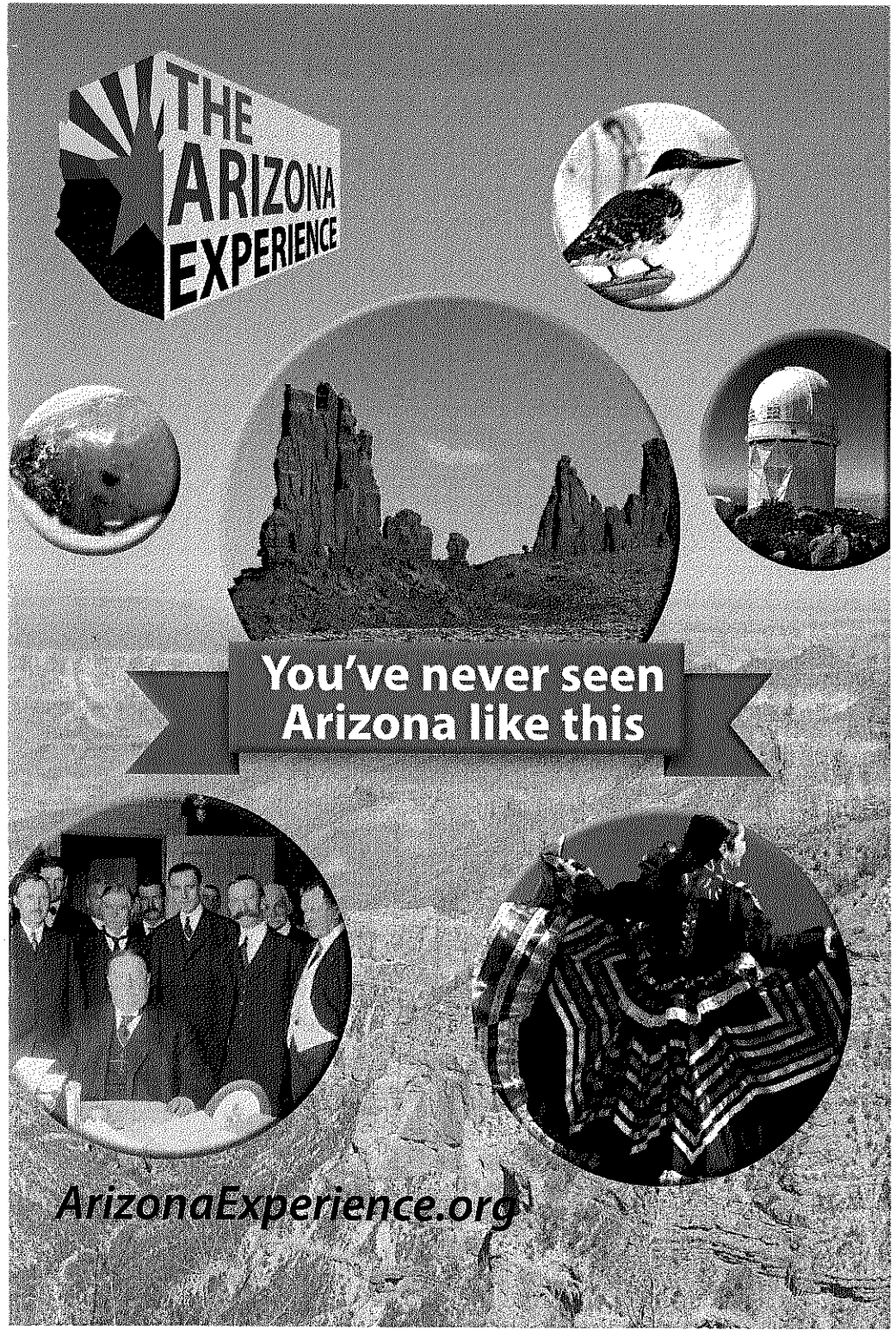
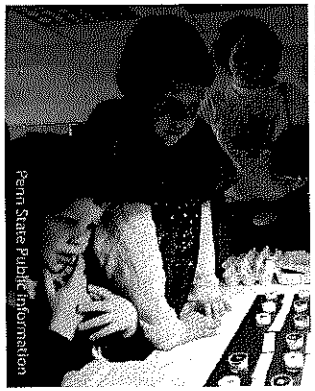
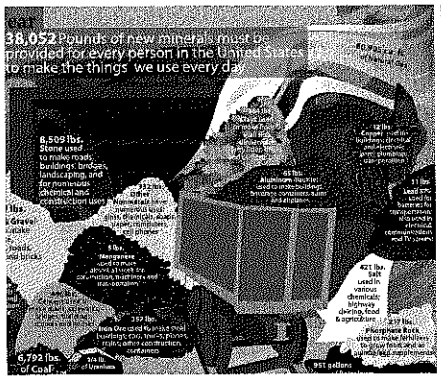
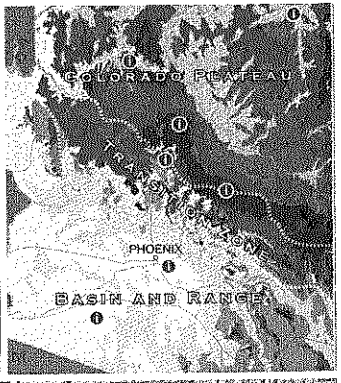
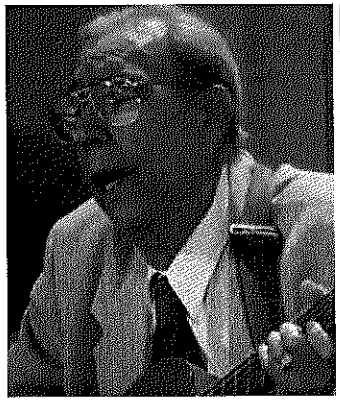
Background: NPS

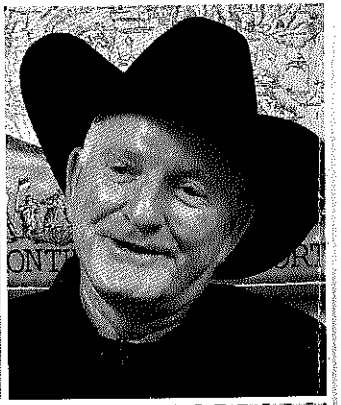












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City of Chandler
City of Coolidge
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Cochise County
Cochise County Tourism Council
Cochise County Treasurer's Office
Coconino County Parks and Recreation Department
Coconino National Forest
Colnatec
Communication Links
Coolidge Chamber of Commerce
Copperstone Gold Project of American Bonanza Gold Corp
Cottonwood Chamber of Commerce
Dairy Council of Arizona
Denison Mines
Desert Messenger
Dr. Ron Blakey
Echoes of the Peaks
Epic Rides
ESRI
FC Tucson
First Solar
Flagship Biosciences
Flagstaff Convention and Visitor's Bureau
Flandrau Science Center
Flinn Foundation
Fort Huachuca
Fort Huachuca Military Library
Fourth Avenue Merchants Association
Frank Lloyd Wright Foundation
Freeport-McMoRan Copper & Gold Inc.
Freescale
Gilbert Chamber of Commerce
Glendale 11 TV
Globe-Miami Chamber of Commerce
Graham County Chamber of Commerce
Graham County IT Department
Grand Canyon National Park
Greater Phoenix Convention and Visitor's Bureau
Greater Phoenix Economic Council
Green Valley Chamber of Commerce
Green Valley News
Greenlee County Historical Society
Havasu National Wildlife Refuge
Heard Museum
Hickman Farms
Honeywell
HTG Molecular
Imperial National Wildlife Refuge
Integrated Solar, LLC
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Leppin Ranch
Lhoist
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Lockheed Martin
Maricopa Agricultural Center
Maricopa Community College
Maricopa County Parks and Recreation
Mayo Clinic
MCAS Yuma
Mesa Convention and Visitor Bureau
Metropolitan Tucson Convention and Visitors Bureau
Microchip
Mining History Association
Mohave Museum
MSDX Inc
Museum of Northern Arizona
Musical Instrument Museum
National Park Service
National Parks Service
Navajo County Historical Society
Nogales-Santa Cruz County Chamber of Commerce
Northern Arizona University
Northern Arizona University Office of Public Affairs
Northern Arizona University – Cline Library
Northern Gila County Historical Society
Northrop Grumman
Orbital Sciences Corporation
Organ Pipe Cactus National Monument
Page/Lake Powell Office of Tourism
Paradise Valley School District
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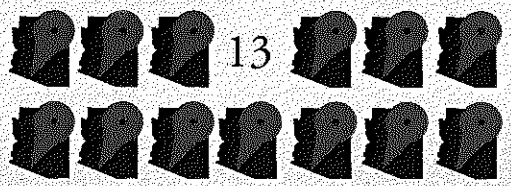
Pearce Sunsites Chamber of Commerce
Petrified Forest National Park
Phoenix Children's Hospital
Phoenix Coyotes
Phoenix Museum of Art
Phoenix Suns
Pima County

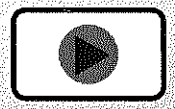
Arizona Experience | *by the numbers*

Lifespan: 3 Years

Interactive maps:



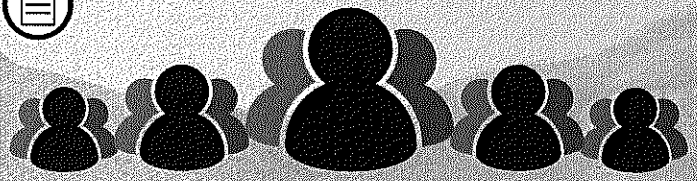
Images:
1,822



Videos:
270+

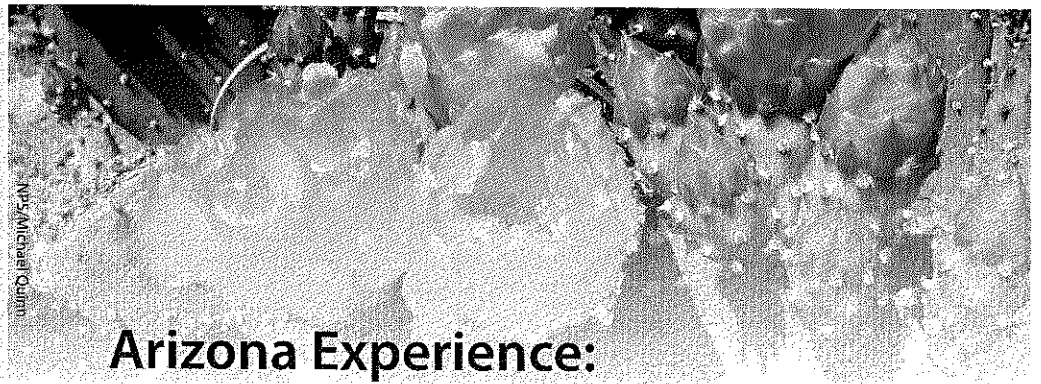
Content providers:
300+

No. of pages:
214



Average monthly visitors:
18,250+

Kristen Henderson/NPS



NPS/Michael Quinn

Arizona Experience:

A window to Arizona's past, present and future

Welcome to the Arizona Experience, an interactive online museum showcasing the people, places and events that define Arizona.

The Arizona Experience was established in 2012 to commemorate 100 years of Arizona statehood. It soon became a valuable state asset and rapidly morphed into a virtual museum engaging the user with a multimedia-rich showcase of the people, places, and events that shaped the Arizona we know today. This free resource is available to anyone, anytime, with special features for students, educators, and travelers.

> "The Virtual Arizona Experience is Arizona...exploring who we are, where we came from and where we are headed."
> — Gov Jan Brewer, {Feb 14, 2012.}

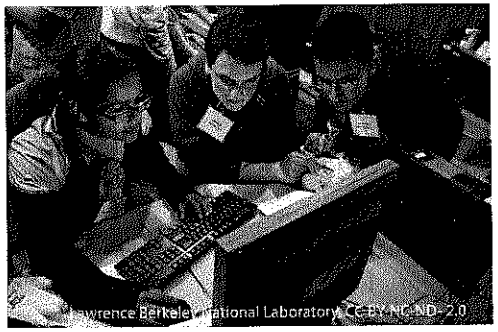
The Arizona Experience design is inspired by museum exhibitions that group artifacts to tell a story, providing points of reference so visitors can glimpse the scope of a subject while creating context that allows for detailed study. Content is arranged in twelve essential themes that tell the story of how Arizona's past shaped her present and explore the people and the circumstances that are determining her future.

Arizona Experience:

A K-12 Educational Resource

The heart of the Arizona Experience mission is to provide K-12 educators with the digital resources to excel in the classroom and to train Arizona's 21st century workforce.

To meet the demand for engaging, effective education, we launched the Teachers' Center, which hosts materials and activities that supplement classroom lessons and online education with ideas for hands-on experiments, observations, and virtual field trips. On select pages, a "Learning" button leads directly to a relevant lesson plan.



LEARNING

With interest in STEM education growing daily, our Teacher Resources page provides a portal to the best digital STEM resources available, from ASU's Ask a Biologist, to NSF's DLESE, to NASA for Educators, and to Arizona's own Arizona-Sonora Desert Museum, among other resources.

"The future is going to be technology, whether it's biotech, materials technology, information technology, software, or alternative energy technology.

—Craig Barrett, Past President, Intel Corporation

Education is a team effort. We partner with the Science Foundation of Arizona, Arizona Dept. of Education, Microsoft Research, Helios, Arizona Sci-Tech Festival, Arizona Geographic Alliance and educators and researchers at Arizona State University, Northern Arizona University and the University of Arizona to deliver the best multi-media, educational product to Arizona's K–12 teachers.

Interactive Maps:

Know Your Place

The Arizona Experience utilizes colorful, interactive maps to make the spatial connection between cities, culture, geography, and natural resources come alive.

One of our most popular features, the Recreational and Cultural Sites map, connects the viewer with more than 500 county, state and federal parks, Native American cultural centers, archaeological sites, museums and theaters. This interactive map approach is ideally suited for communicating spatial information while profiling the remarkably diverse geography that makes Arizona one of the treasures of the American Southwest.

Interactive Maps

- Arizona's Recreation & Cultural Sites Map
- Iconic Arizona Landscapes—virtual tours
- Historic Mining Towns
- Active Mines of Arizona
- Arizona Celebrations
- Habimap
- Arizona Timeline
- Industrial Minerals
- Arizona Volcano Map
- Agriculture—Specialty Crops
- Biota & Physiographic Regions