



CAP
CENTRAL ARIZONA PROJECT
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CAP Post-NGS Energy Portfolio

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Background

- Board workshops in October 2013 and June 2014 defined CAP energy needs and alternatives
- Continuing Board questions:
 - What is the plan for replacing NGS when it is no longer available?
 - How and when should CAP diversify its energy portfolio?



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Diversified Portfolio



- **Objective:** To combine a variety of assets to reduce overall risk and promote price stability, especially during periods of uncertainty
- **General Rule :** No single source provides more than 15-20% of CAP pumping requirements
 - Requires significant “baseload” resource



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Methods of Diversification



- Sources of generation
- Types of agreement



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Generation Alternatives



Leading sources of generation in U.S. in 2013 (Source: US Energy Information Administration)

Type of Generation	% of U.S. Total	Baseload resource?	Available post-NGS?
Coal	39%		
Natural Gas	27%		
Nuclear	19%	Yes	Yes*†
Hydropower	7%	No	No†
Wind	4%	No	Yes
Solar	<1%	No	Yes
Geothermal	<1%	Yes	No†

Only option readily available to meet CAP's baseload needs

* Long lead time for new construction
† No available resources

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Alternative Forms of Agreement



- Market purchase of electricity
- Purchase power agreement
- Ownership of generation
- Full requirements agreement

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Market Purchase



- Primarily near-term market purchases (next few months) because no robust long-range liquid market in the southwest
 - Day-ahead market purchase (specific amount of electricity for the following day)
 - Firm forward purchase (specific amount of electricity for a given period of time)
- Typically less expensive as suppliers don't have forward risks to cover but **subject to extreme volatility** over the long term
- Typically requires a rate stabilization fund to ensure level electricity costs

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Purchase Power Agreement



Purchase Power Agreement (PPA) is a standard instrument in the electricity market

- Contract between electricity seller and buyer
- Defines all of the commercial terms for the sale of electricity between the two parties
 - Term and termination
 - Schedule for delivery of electricity
 - Penalties for under delivery
 - Payment



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PPA – Firm Energy Price



- Due to the lack of supplier hedging options, could be difficult to procure for a term greater than one year
- Could be used for some of the shoulder months
- Could be high demand product during summer off-peak periods
- Renewables are typically purchased this way



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PPA – Cost Plus Fuel



- Supplier obligated to provide electricity based on the cost of fuel at a predetermined heat rate (generator efficiency) from any source in its portfolio
- Energy could be scheduled into the portfolio as a Peak, Off-Peak or around-the-clock supply
- CAP's off-season/off-peak demand could be attractive to generators, allowing increase in operational capacity factor during summer and shoulder periods
- CAP would have minimal hedging options for fuel
- Costs subject to ROI

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Ownership of Generation



Build new generation source

- Most likely in partnership with others

Purchase a portion of an existing generation facility

- Current projections show excess generation in this region through at least 2024
- SRP and others have purchased natural gas generation in recent years at “distressed asset” prices

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Purchase of Existing Generation



Challenges

- Large capital expenditure
- Exposure to major maintenance & replacement costs
- Transmission path to CAP loads
- Dealing with co-owner
 - Financial stability of co-owner
 - Co-owner’s approach to operation and maintenance
 - CAP may want to use as baseload resource; will the co-owner?
 - Who will act as fuel manager?

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Full Requirements Agreement



Contract with a third party to meet all CAP energy needs

- Requires a stable and financially solvent partner with demonstrated ability to deliver energy
- May require a long term commitment by CAP
- Places all generation risk on partner
- Partner may demand some control of CAP pumps
- Transmission could be a challenge
- Similar to 4-party agreement with SRP that was in effect until October 1, 2011

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Option Summary



This is a summary of some of CAP's options:

Options	Time to Develop
Market purchase – Day ahead	Immediate
Market purchase – Forward purchase – a few months	Immediate
PPA – energy	Six months
PPA – cost plus fuel	Six months
PPA – unit entitlement	One year
Purchase an existing generation plant	One year
Full requirements agreement	Two years + *
Build a new generation plant	Five-seven years

* Assuming transmission is available, which is unlikely

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Sample Portfolio



This is a sample of what a CAP post-NGS portfolio could look like. It is not intended to represent a final portfolio.

Item #	Max MW (ratio)	Term Length	Classification	Source
1	100 (20%)	Up to six months in advance	Peaking/Balancing	Forward or Day-Ahead Purchase
2	100 (20%)	Life of plant	Base load	Build/Buy Generation
3	75 (15%)	30 years	Base load	Unit Entitlement
4	75 (15%)	20 years	Base load	Unit Entitlement
5	50 (10%)	15 years	Shaped	PPA – Unit Entitlement
6	50 (10%)	1 year	Shaped	PPA – Energy
7	50 (10%)	5 years	Shaped	PPA – Cost Plus Fuel

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Should CAP Diversify Now?



CAP is entitled to 24.3% of NGS generation

- Approximately 4.3M MWh annually
- Current cost ≈ \$35/MWh

Comparative costs for generation alternatives

- Natural gas combined cycle ≈ \$66/MWh
- Solar PV ≈ \$130/MWh
- Wind ≈ \$80/MWh

(U.S. Energy Information Administration (2014), average levelized costs based on 2019 in-service date)



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Should CAP Diversify Now?



Every MWh that CAP acquires from an alternative generation source creates another MWh of Navajo Surplus for sale

- Current NGS cost \approx \$35/MWh
- Forecast sales price for Navajo Surplus sold by Western in 2015 \approx \$24/MWh
- Anticipated 2015 losses on Western sales \approx \$15M

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Summary



- CAP will get at least 1-2 years notice before NGS closes
- CAP can assemble a diversified energy portfolio in that time frame to replace NGS
- Not economic to diversify today
 - Cost of alternatives $>$ NGS cost
 - Market price $<$ NGS cost
- CAP continues to monitor energy prices and NGS costs for new opportunities

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Questions?