

**Appendix E**  
Stakeholder Comment Matrix

Comment Matrix for MACS Preliminary Report Issued September 30, 2005, Rev. 2 dated November 21, 2005 with stakeholder follow-up

Org.	Report Chapter	Ind	Comment	Sargent & Lundy/Synapse Reply	Stakeholder Follow-up (NRDC)	Stakeholder Follow-up (SCE)
			<b>COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL ON THE PRELIMINARY DRAFT MOHAVE ALTERNATIVES STUDY (CPUC Docket R.04-04-003)</b>			
NRDC	ES	1	ES-2: The heat rate for IGCC of 9,912 – 11,740 btu/kWh is significantly greater than expected. The Northwest Power Planning Council has estimated IGCC heat rates at 7915 btu/kWh without sequestration and 9290 btu/kWh with sequestration. See: <a href="http://www.nwcouncil.org/energy/powerplan/plan/(05)%20Generating%20Resource.pdf">http://www.nwcouncil.org/energy/powerplan/plan/(05)%20Generating%20Resource.pdf</a> . NRDC recommends that the study team evaluate IGCC using the heat rates used by the Northwest Power Planning Council.	A review of the NWPower Council Appendix for Power Generation indicates that they used an old EPRI report for their Cost & Performance Basis. This report assumes the use of the GE-H turbine which is not yet widely used. As indicated in the report, due to features in the IECM model we could reasonably expect an improvement of about 2% in Efficiency or 70 Btu/kw. Improvements beyond this level require widespread deployment of advanced turbine technologies such as the 7B, H, and G model engines. Procurement of these limited production engines increases the project risk at this time. NW Power Council Staff out of office all week, and could not respond to questions.	NRDC believes it is likely that the H-turbine will be available in the time horizon of the proposed project.	
NRDC	ES	2	ES-2: The difference in construction costs between wet cooling and dry cooling is so small that it would seem logical to choose dry cooling at either location, given the expiration of Colorado River cooling water contract at Laughlin in 2026. NRDC recommends that dry cooling be recommended for future project planning.	The performance is very similar under average conditions, but at peak temperatures will be degraded, which is not fully shown by the model. Hybrid systems can be considered that would provide the best attributes of both. This type of design consideration is usually considered during detailed design studies. However, in general we concur that a dry system should be considered in this case.		
NRDC	ES	3	ES-2 (and elsewhere): It is important to express all generation and demand side management (“DSM”) alternatives in common economic terms. NRDC recommends \$/mWh, levelized over the remaining life of the water supply contract at Laughlin (for resources that would require renewal or replacement during the 17-year study period, or the measure life of longer-lived resources, whichever term is greater).	We will use estimates of resource costs and benefits in 2006 dollars. O&M costs will be provided in \$/kW-yr for fixed costs and \$/MWh for variable costs. Levelized generation costs over project or contract lives are outputs of the integrated resource plan process and are, as such, outside the scope of the current effort.	At a minimum, then, expected project lifetimes and expected equivalent availability factors for each resource are needed, so that the stakeholders can independently estimate project output costs for comparative purposes.	
NRDC	ES	4	ES-4: The Gray Mountain capital costs are shown for 150 mW, not for 450 mW. The site is identified as a 450 mW site. The economics and generation profile of this resource are so exemplary that this is an example of a resource that should probably move forward regardless of the future of Mohave. NRDC recommends that the capital costs be provided for a 450mW site.	The decision to move forward with any project is the subject of the Integrated Resource Plan of SCE pursuant to CPUC requirements. The total costs for 450 MW’s are shown by phase in Section 4.4.1The total cost is merely the sum of those 3 phases.		
NRDC	ES	5	ES-8: The total water requirements for each type of thermal plant should be expressed in common terms: acre-feet per year is the measure used to date for Mohave slurry and cooling water.	We will conform the presentation of this data to employ both the customary units and acre-ft per year.		
NRDC	ES	6	ES-14: SO2 credit prices should be provided for a recent historical (2-5 year) period. The value of sulphur credits from closing Mohave should be treated as an opportunity cost of continued operation.	Recent historical SO2 credit prices are discussed in more detail in Section 4.2 of Appendix I.		
NRDC	ES	7	ES-15: The Draft Report cites prices for CO2 allowances in the European Union at 6-13 Euros/ton in recent years. EU CO2 emission permits are now substantially more expensive; recent prices have been over \$25/ton CO2. The October 11, 2005, closing price was 23.15 euro or \$27.78 at an exchange rate of 1.2 \$/euro	Forward market prices for CO2/carbon were not provided in the PD but will be included in the final report.		
NRDC	ES	8	ES-19: The recognition of greater value associated with on-peak resources is well-stated. There does not appear to be any utilization of this, except on page 11-9, where there is discussion of multiplying the hourly generation for each option by the SCE marginal cost for each hour. This is an appropriate way to recognize these differential values, but this methodology should be more clearly developed in the Draft Report so it is clearly understood.	The calculation of the value of the generation is constrained by the level of detail of the generation data. Based on the data that is available, the hourly generation for an average day in each season will be matched with the average hourly price to calculate the average value of the energy provided.		
NRDC	ES	9	ES-20 It is not really clear whether the transmission issues have been addressed on a contract path or flow-based approach. For some resources, particularly wind, it may be better to consider flow-based transmission availability, and recognize that the resources may not be able to reach market for a few hours per year when multiple contingencies exist on the transmission system. As we discuss below, the transmission cost estimates in Chapter 12 appear to look at retrofits required to maintain full current reliability with full dispatch of the identified resources. It may be cheaper to “underbuild” transmission and shut in supply for a few hours per year; only analysis can show which is the most cost-effective option. NRDC recommends that the Report clearly state the assumptions about transmission costing methodology, and any required retrofits.	The assessment of near-term transmission system availability between the Study Area and SCE’s border uses strictly a contract-based approach. The OASIS system from which the data was obtained is based on contract path, although the ATC is based in part on the results of flow-based analyses undertaken by individual utilities. The load flow studies associated with the “Interconnection” section do use a flow-based approach. Load flow studies have been performed for a range of options with capacities roughly approximating the SCE share of the existing plant. This was the primary criterion for such groupings. We do not imply with those groupings that they are appropriate for development as a group. The load flow analysis is simply an analysis of the injection of a certain amount of power at certain buses in the transmission system and does not consider the source of such generation. The size of the groupings and the location of the power injections is simply meant to be representative of possible alternatives and used to give an idea of the required transmission system upgrades. Whether equity or debt, investors and lenders are going to want some contractual assurances for investing the magnitude of dollars involved. If some large portion of the capacity on the transmission system can be contracted for such that economics are viable, and some small portion is left “risk” to technical flow,perhaps this could be further explored, but is beyond the scope of this study.		
NRDC	ES	10	ES-20: The “Conclusions” require some sort of benchmark cost for Mohave to allow for rational comparison of the alternatives and complements. NRDC understands that this is not part of the scope of the study. However, if in the future the technologies in the report are being compared against the cost of ongoing operation of Mohave, the Mohave costs should include, among other things, the opportunity cost of using SO2 credits instead of selling them, carbon costs associated with ongoing plant operation, and a plant life reflective of Colorado River water for plant operation being unavailable after 2026.	As has been conceded this is not part of the current scope and should be supplied by others.	NRDC believes it would be helpful for SCE to revise the estimates it prepared in the proceeding (for which many of the stakeholders have workpapers) to reflect the two key changes: project life amended to conform to the cooling water supply contract, and CO2 emission costs to conform to CPUC decisions. This would provide a framework for evaluation of the	

					alternatives and complements.	
NRDC	2	1	Overall, Sargent & Lundy conclude that IGCC is feasible at either Black Mesa or Laughlin. The elevation at Black Mesa is not a problem – the lower average temperature more than makes up for the slight derating due to altitude. Water use is dramatically lower for a plant built at Black Mesa using a dry feed gasifier and dry cooling: approximately 1500 acre-ft/yr versus 6800 acre-feet/yr, or almost an 80% reduction in water use.	Dry cooling significant reduces water usage.		
NRDC	2	2	Sargent & Lundy's capital cost estimates are, however, very high. This is in part because they assume the need for a redundant gasifier to ensure 90% plant availability. The final study should present alternative cost estimates assuming that a redundant gasifier is not needed, either because natural gas is used as a backup fuel or because SCE can use system purchases in case of unplanned outages. This should reduce capital costs by roughly \$180/kW or about 9%.	The cost of spare systems for improved performance can range from 5 – 10% depending on the degree to which employed. Your assumption is appropriate on the range of costs. As a conservative designer of generating systems, and based on the recommendations from technology suppliers for currently proposed systems, our recommendation for installed systems stands. Elimination of spares to increase risk is an owner's decision.	NRDC noted at the Oct. 21, 2005, meeting that with a spare gasifier, it probably also makes sense to include duct firing in any IGCC system design, so that when loads (and prices) are high, and all gasifiers are working, additional output can be generated.	
NRDC	2	3	Also, Sargent & Lundy notes that they did not receive vendor data as of the time of this writing. Vendor data must be incorporated into the final report, and NRDC is working with Sargent & Lundy to encourage vendors to respond.	We have still not received any input from Vendors. We have contacted both GE and Conco/Phillips again this week w/ no response.		
NRDC	2	4	The Draft Report says that Sargent & Lundy's cost estimate is similar to values reported in the literature. The final report should make an explicit comparison. Values in the literature typically range from about 1400-1700 \$/kW rather than the ~2000 \$/kW given in the draft for IGCC without CO2 sequestration. (Part of the difference between this figure and \$2000/kW estimated by S&L may be the inclusion of 12.5% EPC fees, the type of coal, and the assumption of a spare gasifier, but in any case, the differences should be explained).	The base estimate is indeed within the range. We will provide additional clarification in the text. Most estimates that are published do not provide owners costs which are a part of all completed projects. The costs published are in line with "in-house" estimates conducted for confidential clients. We also have compared these costs with well known costs for PC-Generation which most experts acknowledge range from 15 – 20% less than IGCC. Current cost estimates for PC units fall in the proper range for our findings.		
NRDC	2	5	2-5: The list of IGCC Demonstration Plants on this page does not include the Beulah, North Dakota plant mentioned on page 8-2 of the Report. This table should list all gasification projects in the U.S. currently operating, along with their output. If some are gasification without combined-cycle generation (simple cycle, or no generation) this can be indicated. The in-service date for each should be shown.	We can provide a more complete listing of Gasification plants in the USA or the world. Beulah is a gasification plant but is not an IGCC plant. Note that there are many key issues that are different for IGCC that are not faced in the design of gasification for syngas generation only. These include the demands of demands for wide variation on load over an hourly basis, and this implication to integration of design and performance.	A list of gasification plants would be useful.	
NRDC	2	6	2-13: Characterizing the Black Mesa coal as sub-bituminous when it has a heat rate of 10,834 btu/lb seems a bit unusual – that is a heat content well within the range of bituminous coal. Obviously the low moisture content affects the HHV, but not the LHV. From the USDOE Virtual Museum of Coal Mining:	The Black Mesa coal is designated as sub-bituminous by the USGS and USBM.		
NRDC	2	7	“The four major types of coal are: 1. Lignite - Brownish black coal with generally high moisture and ash content, and the lowest carbon content and heating value (heating value of 4,000-8,000 Btu per pound). 2. Subbituminous - A dull black coal with a higher heating value (heating value of 8,300-10,000 Btu per pound). 3. Bituminous - A soft intermediate grade of coal that is the most common and widely used in the United States (heating value of 10,000-14,000 Btu per pound). 4. Anthracite - The hardest type of coal, consisting of nearly pure carbon. It has the highest heating value and lowest moisture and ash content (heating value of 14,000-15,000 Btu per pound).”2	The Black Mesa coal is designated as sub-bituminous by the USGS and USBM.		
NRDC	2	8	2-14: The table of water demand is confusing. The total water use for IGCC at Black Mesa with the Shell (dry) gasifier appears to be 282 af/yr for Boiler Feedwater Makeup, and 282 af/yr for Misc. Plant Uses, but the total is shown as 1,476 af/yr. It appears that it should be 564 af/yr. One can get this by adding 282 and 282, or by subtracting the coal slurry feed requirement of 1,356 from the wet total of 1,919.	There is an error in the calculation spread sheet used for this and it will be corrected.		
NRDC	2	9	2-15: Salvage value of the Mohave site may be a complicated issue, but the inclusion of land for alternatives and complements should also recognize the sale value of land at Laughlin if the plant is replaced.	This is an owner's issue.		
NRDC	2	10	2-16: IGCC Performance reflects a much higher heat rate than was expected. See comment and reference to the Northwest Power Planning Council above.	See response to comment NRDC-ES-1		
NRDC	2	11	2-18: The combined effect of higher elevation on plant performance is not obvious. Clearly the capital cost of the turbine will be higher at the higher elevation, and that presumably is captured by the IECM model. Then there is a performance penalty at altitude, offset by a performance benefit from cooler temperatures. It might be more useful to show a year-round weighted heat rate at the hotter and lower (Laughlin) and cooler and higher (Black Mesa) locations.	The capital cost in \$ remains essentially the same for differing plant locations. The difference is in performance (heat rate) and output. As these values change, the normalized cost/kW will change. Typically this is prepared for the Average conditions. As indicated in the graphs, output is sensitive to ambient temperature which can have an impact on dispatch planning.	It would be useful to have the adverse impact on capacity, and the beneficial impact on heat rate associated with higher altitude recognized separately. They appear to virtually offset one another.	

NRDC	2	12	2-22: The note on this page says that high CO2 removal is not feasible until 2020 because of the need for turbines that burn pure H2. This is not correct. BP has announced plans to build an H2 burning turbine system with carbon capture in the UK: <a href="http://www.bp.com/genericarticle.do?categoryId=97&amp;contentId=7006978">http://www.bp.com/genericarticle.do?categoryId=97&amp;contentId=7006978</a>	The reference provided does not provide a detailed technology description for the project. Using the links from the site, the International CO2 Capture program site was found. BP, Shell, and other major oil producers are participants. They are evaluating an array of CO2 capture and enabling technologies that dovetail with EOR that can be used to extend oil reserves and benefit the environment. A key note in their discussions on Barriers states: “ <b>Turbine Vendors not willing to engage in very expensive development without clear market perspectives.</b> ”		
NRDC	2	13	H2 can be diluted with NOx or flue gas recirculation to provide H2 dilution. Ed Lowe of GE said publicly that H2 combustion is not a problem for GE turbines at an EPRI workshop, August 2005. Sargent & Lundy should contact GE and other turbine vendors and report their comments on this issue.	Dilution in the turbine is typically with N2 and/or H2O.		
NRDC	2	14	2-25: The table appears to assume that the current contract rate for water at Laughlin would continue beyond 2026. That is unlikely. The assumptions for the cost of water at both Black Mesa and Laughlin should be made explicit, on a \$/acre-foot basis. Allowing only \$350,000 per year for slurry water and \$90,000/year for cooling water seems implausible. The current use at Laughlin, 14,000 acre-feet per year has a market value of over \$6 million per year at \$400/acre-foot. That is an opportunity cost associated with continued use of that amount, and any lesser amount carries a proportionate opportunity cost. Similarly, the cost of development of C-Aquifer water is expected to be quite significant, and these magnitudes do not appear to capture a plausible level.	S&L was given the costs for water at: \$20/acrefit for Colorado River Water and \$200/acrefit for Slurry Water from the reservation. No time limit was provided. Adjustments can be made to these values by SoCal if needed in their dispatch model.	At the October 21, 2005, meeting, SCE indicated that these values are substantially out of date. Colorado River water has an opportunity cost in the \$400 range, and slurry water is apparently costing \$1,000.	The cost for water to be used in the economic model would be better represented at \$200/acrefit for the Colorado River Water and \$1,000/acrefit for the Slurry Water from the Reservation. This is typical of the numbers utilized when comparing alternatives until actual numbers are developed or needed for fine tuning a final design package.
NRDC	2	15	2-26: The table of projects costs should culminate in \$/mWh.	Calculation of levelized \$/MWh costs is beyond the scope of the current study.		
NRDC	2	16	2-28: It is not clear if duct firing of the system is contemplated or plausible. This is typically a very cheap way to add capacity to a combined cycle coal turbine, and may be applicable (using natural gas, if gasification products are not appropriate) for economies associated with this low-cost capacity. The final report should include an analysis of duct firing.	Duct firing will indeed allow for additional capacity. This is at the expense of efficiency, since the gas does not contribute to the CT output. This concept would require additional capacity in the gasification plant and would add somewhat to the overall capital cost. This is beyond the scope of IECM. S&L can provide an estimate for this approach but we would need a target for additional MW. Such a study is typically performed in later phases of design.	The cost and heat rate impacts for duct firing should be included. Duct firing at NGCC units typically involves an incremental heat rate of about 9,000 btu/kwh, which is BELOW the average heat rate of the IGCC as estimated by S&L. Therefore, it would appear that duct firing not only WOULD reduce the average cost/kw of an IGCC, but MIGHT improve the average heat rate of an IGCC.	
NRDC	3	1	No comments on non-Stirling options; not the cost-effective options.	In light of the Renewables Portfolio Standards, the Chapter 3 discussion focused on the four CSP technologies being promoted internationally: <ul style="list-style-type: none"> <li>• Parabolic-trough</li> <li>• Power Tower</li> <li>• Dish/Stirling engine</li> <li>• Photovoltaics</li> </ul> Of these four technologies, Parabolic Trough technology was included as a viable CSP complement generation based on currently being the most proven solar thermal electric technology and the technology with the highest degree of confidence for the capital cost estimate. <p>Dish/engine systems were included as a viable CSP compliment generation based on having demonstrated the highest solar-to-electric conversion efficiency (29.4%), and therefore have the potential to become one of the least expensive sources of renewable energy. It is noted in the report the dish/engine capital costs are highly speculative since current dish/ engine plants are small demonstration plants. Dish/engine capital costs are projected based on the use of experience curves. The experience curve describes how unit costs decline with cumulative production. For the \$1,500/kW capital cost noted in the report, production of 17,000 dish/engines would be required. The report cautions that use of experience curves is not an established method, but a correlation that has been observed for several different technologies. The report also shows the current capital of a single dish/engine is approximately \$5,000/kW.</p>		
NRDC	3	2	3-27: The discussion of storage to match the Mohave plant load profile is inappropriate. The methodology discussed at page 11-9 is a more appropriate way of valuing resources with different generation profiles.	The basic intent of Chapter 3 was to determine if concentrating solar power (CSP) technology could feasibly replace or compliment the Mohave generation. To this end the load profile of the Mohave Plant was used to determine <i>how much</i> generation would have to be replaced or complemented. Chapter 3 shows CSP technology is not a logical alternative to <b>totally replace</b> the electrical generation of the Mohave Generating Station. One point stated in the report is that CSP is not a logic Mohave generation replacement since thermal storage or a hybrid configuration would be necessary to match the existing Mohave Generating Plant load profile. However, CSP technology is shown to be a potential alternative to <b>complement</b> the electrical generation of the Mohave Generating Station, both as Dispatchable Power Systems and Distributed Power Systems. The capital cost estimate for the Parabolic Trough 100 MW Plant provides a breakout cost for storage – the storage cost can be deducted to obtain the capital cost for a 100 MW Parabolic Trough Plant without storage. The correct mix of generation will have to be determined from a Resource Planning Study, which is beyond the scope of this report.		
NRDC	3	3	3-28: The economic data shown indicates that the Parabolic Trough is not a cost-effective option and should not be studied further.	See previous response to comment NRDC-3-1.		
NRDC	4	1	4-3: The development of 450 mw of highly cost-effective wind generation appears to be possible at Grays Mountain by the Navajo Tribe prior to the date when Mohave could re-enter service. It may be desirable to fast-track this resource.	We cannot comment definitively on the feasibility of completing the entire Gray Mountain development before the restart of Mohave. The development on Navajo lands requires permitting approvals by that entity. Fast-track development would require their concurrence. We leave it to the Navajo Nation to reveal whether fast-track development is possible. The largest projects in the world on flat farm land are 400 MW projects taking 2 years minimum just for		

				construction. It takes 2 years on average to develop a project, and one has never been done of this magnitude on Sovereign Native lands, much less on an elevated plateau with some construction and logistics challenges.		
NRDC	4	2	4-6: NRDC questions the advisability of constructing a cement batch plant ON TOP of the mountain. Due to high winds in this area, it might make more sense to find a more sheltered nearby spot.	While the wind velocities are high in certain areas, nevertheless since cost savings are enabled by producing cement at the site rather than trucking it up, a suitable area for the plant on top of the mountain needs to be found. The wind on this plateau will not effect either the physical integrity or ability of a batch plant to make cement. The very reason the plant needs to be on the mountain is to minimize the transportation distance and time so that the cement will not prematurely set or coagulate in such a way that it becomes defective when delivered to foundation forms.		
NRDC	4	3	Also on p. 4-6, NRDC questions whether a 34.5 kv line from Grays Mountain to Moenkopi would be adequate for 450 megawatts of wind-generated capacity. Typical loadings on 34.5 kv lines are well under 100 megawatts. Either multiple 34.5 kv lines or a single larger line would appear to be more appropriate. The final report should address this issue.	NRDC's comment is appropriate. However, output from wind installations is typically at the 34.5 kV level. We would expect a multiple circuit transmission line to be required for transport of all three phases of the project and will reflect this in the final report.		
NRDC	4	4	4-12: The estimated cost of output appears to be based on conventional independent power plant financing. There is no discussion of the financing options available to the Navajo Transmission Utility Authority ("NTUA"). These options might bring down the cost significantly below the levels shown (or bring up the net revenue to the Tribe). The extensive discussion in Chapter 10 identifies many incentives available to tribal developers that do not appear to be reflected here.	Cost estimates already include both the costs for conventional project financing (levered costs), and the unlevered costs, with the economic assumptions assumptions provided. The unlevered costs represent the amounts to be financed and the conventional project financing costs are provided as an example only. We will present the unlevered construction costs only in the final report. Choosing the proper incentives or the proper way to finance any of these projects is not within the scope of this study, and at any rate depends on a multitude of unknowns that directly flow out of who the participants, investors, and lenders will be, what structure is ultimately chosen for ownership, etc.	NRDC believes that the combination of tribal incentives available to the Navajo, and their ability to leverage those incentives with debt financing may make the Grays Mountain project much more cost-effective than a non-tribal and non-renewable resource with otherwise similar cost fundamentals. NRDC thinks it would be unfortunate if this report did not do a case study of a tribally-owned resource taking advantage of the tribal energy incentives, renewable energy incentives, and tribal job creation tax credit incentives that could be available for this type of project. NRDC sees this option as having great potential to meet the SCE needs while providing tribal revenue and tribal employment that are crucial to the Navajo and Hopi people.	
NRDC	4	5	4-23 It would be useful to combined the load profiles of the Stirling Dish, DSM, and Wind resources to see how, combined, they compare to the SCE system load profile.	The comparison of output and load profiles is the subject of Chapter 11. We can provide a depiction of the combined data in the next draft.		
NRDC	5	1	NRDC has no comments on NGCC.	We have provided details of NGCC as requested in the scope of work.		
NRDC	6	1	6-2: Attachment 1 is information that relates to footnote 2, BPA / Snohomish PUD / Puget Sound Energy conservation transfer.	The footnote will be expanded to more clearly address the "conservation transfer" between PSE and Snohomish, Mason and Lewis county PUDs.		
NRDC	6	2	6-3: NRDC considers the energy efficiency estimate used in the report to be extremely conservative. First, the SWEEP report itself was conservative. Second, the consultants determined that only one-half of the amount identified in the SWEEP study is assumed to be available for development. Third, the benefit:cost ratio is based on long out-of-date energy supply cost analyses that do not reflect higher gas costs, incorporation of carbon costs as directed by the California Public Utilities Commission, or non-energy benefits of energy efficiency investments.	We will review the degree of conservatism more closely. Some aspects of the SWEEP study were admittedly conservative, such as its exclusion of efficiency potential for certain household end uses; but other aspects may not be conservative. We will revisit our determinations and clarify.		
NRDC	6	3	6-9: The decision to limit the analysis to system benefits charge-based energy efficiency programs is too narrow. The "selling" utilities also have rate reform and building code technical support and enforcement assistance available to them, at a minimum. Utilities in the Pacific Northwest have jointly funded Market Transformation efforts through the Northwest Energy Efficiency Alliance (as have utilities in the Northeast through NEEP). Southern California Edison and the other large investor-owned utilities in California are funding a large portion of their energy efficiency programs with funds that otherwise would be used to procure generation.	We will revisit our decision to exclude certain categories of energy efficiency potential in our summary table. The primary purpose of our examination of the SWEEP study was to determine if sufficient energy efficiency potential exists to consider an innovative interstate DSM resource procurement. It was unclear to us how EE programs other than SBC-based utility programs would be a practical alternative for the contractual mechanism contemplated.	Several utilities have adopted "service standards" which are functionally equivalent to energy codes. This is an example of how a "utility" can achieve savings outside of the system benefits charge framework. They can then augment those with SBC-funded incentives to go "beyond code."	
NRDC	6	4	6-10: The decision to limit the analysis to "moderate" as opposed to "aggressive" programmatic efforts is extremely conservative.	Agreed. We seek to demonstrate that even under relatively conservative assumptions the DSM procurement contemplated is feasible. For the purposes of this project, we are less concerned with computing, deriving or even assuming a realistic maximum potential.	The final report should recognize that the entire potential identified in SWEEP could become a potential of programs that result from this process.	
NRDC	6	5	6-12: Despite the conservatisms discussed in the analysis, by the time Mohave could be back in service after retrofit, efficiency that could be cost-effectively acquired in Arizona and New Mexico could replace over 40% of the energy and capacity from Mohave. NRDC suspects that the capacity savings would be even greater, given the on-peak nature of energy efficiency savings. With a typical load factor of 50%, energy efficiency investments provide twice as much peaking relief as baseload resources with similar annual energy production. This should be acknowledged in the final report.	The final report will contain more detailed representations of the peaking benefits of DSM and its impact as a substitute for at least a significant fraction of Mohave.		
NRDC	6	6	6-13: It is unclear whether the "cost of saved energy" represented is measured on a Total Resource Cost ("TRC") basis or a Utility Cost basis. The report should use TRC for consistency with other supply-side resources.	A total resource cost basis is assumed. The final report will clarify all assumptions and clearly define terms used in the illustrative examples.		

NRDC	6	7	However, despite cost of energy saved ranging from \$13/mWh to \$37/mWh, the Draft assumes \$40/mWh for energy savings. When comparing energy efficiency savings to generation savings, several adjustments need to be made. First, in addition to generation avoidance, there is reserves avoidance, transmission avoidance, and distribution and distribution loss avoidance on the system where the measure is installed. Thus, a utility such as Public Service of New Mexico, receiving 10 megawatts of conservation funded by SCE, could probably sell 12 megawatts of generating capacity to SCE and still maintain its pre-conservation reliability. This should be acknowledged in the final report.	Distribution loss savings will be reflected in the final examples used in the final report. We are reluctant to explicitly include other avoided costs in our illustrative example, as a purposeful conservatism used to demonstrate the potential viability without including these additional benefits. The final report will acknowledge the additional potential areas of net benefits.		
NRDC	6	8	6-18: The conceptual 5 x 16 shaping of conservation benefits appears to leave a substantial portion of the on-peak conservation benefits with the selling utility. This is a benefit to the seller, and should be reflected as such in the final report.	The final report will include considerably more detail on the on-peak conservation benefits and how they can be allocated to different parties of the DSM transaction.		
NRDC	6	9	6-26: The fact that conservation savings are available at Palo Verde not only reduces transmission capacity requirements and transmission costs compared with a resource near Moenkopi, but also transmission losses. This should be reflected in the final report.	The final report will acknowledge this.		
NRDC	7	1	No comments submitted as no promising resources identified.			
NRDC	8	1	The Draft Report demonstrates that carbon dioxide sequestration is feasible through the injection of CO2 in enhanced oil recovery ("EOR"), enhanced gas recovery, unminable coal seams, or deep saline aquifers. The most well-established and economical approach in the near term is the use of CO2 for EOR. The final report should include information on the market price for CO2 purchased for use in EOR in various fields. These data should reflect current market conditions as well as future estimates, as the value of CO2 for EOR is much higher at current oil prices than at the prevailing prices used in previous studies.	We will address the market conditions as best we can. However, there is little publicly available information on the price for CO2.		
NRDC	8	2	8-2: Even with a blow-down phase, moving generation-related CO2 to EOR provides global CO2 benefits, assuming that the alternative would be mined CO2. In the first case, one unit of CO2 is released to the atmosphere associated with BOTH power generation AND EOR. Absent such a move, TWO units of CO2 can be expected to be released, one from generation without capture, and one from mined CO2 shipped to EOR and blown down. This should be reflected in the final report.	We will include a statement to this affect in the next draft.		
NRDC	8	3	The gasification plant at Beulah, North Dakota, discussed here, is not reflected in the table of gasification facilities shown on page 2-5.	Table 2-1 on page 2-5 shows IGCC demonstration plants. The Beulah plant is not used to produce electric power. It creates syngas for the chemical industry.		
NRDC	8	4	8-10: With current oil prices at \$60+/bbl, not \$25/bbl, the economics of EOR must be significantly greater than when the underlying studies relied upon by the Draft were prepared. The increase in gas prices should be acknowledged in discussing the economics of EOR. If possible, the analysis should be recalculated to reflect the current market.	We cannot re-do the analysis in the original study as we do not have access to the authors' data and models. We can comment, however, on the change in the market prices. However, it is important to understand that the Bakersfield site produces an oil with more impurities than light sweet crude oil, on which the \$60+/bbl is based; the Bakersfield site prices are likely to remain lower.	There are separate prices in the market for Kern "cracking" and "coking" petroleum production. The "cracking" product carries a higher price, as would be expected. The avoidance of crude transportation costs is an offset to the lower quality of Kern crude.	
NRDC	8	5	8-13: The prices for wellhead natural gas are forecast to exceed the levels provided here, which peak at \$5.50 per mmbtu, based on NYMEX futures, through at least 2010. This should be reflected in the final report.	Again, we cannot re-do the analysis. We can comment, however, on the change in the market prices.		
NRDC	8	6	8-15: The final paragraph on this page is misleading and should be deleted. As discussed in the comment about p. 8-2, while it is certainly true that CO2 will be emitted from the combustion of any oil produced with CO2-EOR, this oil can be assumed to substitute for oil that would otherwise be produced without CO2 capture or with CO2 obtained from a natural CO2 reservoir. In either case there is a substantial net reduction in CO2 emissions due to carbon capture and sequestration from an IGCC power plant.	We will review this issue and reconsider it in the final report. However, in the absence of US GHG policy, it seems unlikely that IGCC CO2 could be considered a direct substitute for natural CO2, because natural CO2 will continue to remain significantly less expensive than that produced as a by-product from an IGCC plant.	The point here was apparently misunderstood.  If the current market for CO2 for EOR results in the production of CO2, injection of CO2, and then blow-down of that CO2, the net effect is an increase in CO2 emitted to the atmosphere.  If, alternatively, an IGCC provided CO2 to EOR, that CO2 were injected, and the wells then subjected to blow-down, exactly the same amount of CO2 would be emitted to the atmosphere as in the first case. The electricity production using the IGCC would occur with approximately zero net additional release of CO2 to the atmosphere compared with the non-IGCC case. The substitution has the same net environmental effect as would sequestration without EOR.	
NRDC	9	1	The analysis of tribal issues should be more robust and reflective of the opportunities identified elsewhere in the report for incentives, tax breaks, and other opportunities to encourage tribal economic development. NRDC is concerned that the Draft Report in this chapter unnecessarily introduces a bias against tribal pursuit of the various options discussed in the report.	We will provide discussion of the cited opportunities in this chapter in the final report.		

NRDC	9	2	The general tone of the Tribal Issues chapter is one of complexity and convoluted, supported by declarative statements and very little data and information, despite the fact that promising opportunities are presented for IGCC, wind, and solar. Nor does the chapter present reasonable findings and conclusions on issues such as job impact analysis, estimation of tribal taxes, tribal acceptance, permitting, royalties and other payments to tribes. In so doing, the Draft Report creates a scenario where costs of alternatives are clear but benefits to the tribes are not calculated. Moreover, the pursuit of any given alternative is effectively discouraged due to its purported “complexity” and its many “difficulties” and “challenges.”	We are attempting to quantify the extent to which the options would provide employment benefits and tax revenue to the tribes. We concluded (with apparent agreement of the stakeholders) that it is not feasible to quantify the royalties or other fees that might be obtained by the Navajo Nation or the Hopi Tribe from land, coal, and water rights. The scope of work did not provide for quantification of any other benefits. We are continuing to work on evaluating the specifics of the land ownership and the water rights that are applicable to the specific alternatives; and to the extent that we are able to obtain additional information with respect to those matters, we will assess the impacts of the information specifically. But insofar as the draft suggests that complexity attends alternatives, we think the draft is accurate: the patterns of land ownership, and therefore land control, and the manner in which water rights are regulated by the two tribal governments and the United States government, are not simple, and to suggest otherwise would be misleading.		
NRDC	9	3	First, the Draft Report fails to quantify the benefits of any given technology. In this way, the tribes do not have a basis from which to weigh each technology in terms of net impact on the reservation. As currently drafted, the Draft Report fails to calculate the tribal taxes and royalties that would apply to these technologies, as well as estimates of investment, operation and maintenance revenue, employment impacts, and secondary business activity benefits. These numbers are necessary to adequately measure the costs and benefits of each technology.	We agree that these numbers will be valuable for ultimate decision making on the options. We are attempting to quantify the extent to which the options would provide employment benefits and tax revenue to the tribes. We concluded (with apparent stakeholder agreement) that it is not feasible to quantify the royalties or other fees that might be obtained by the Navajo Nation or the Hopi Tribe from land, coal, and water rights. The scope of work did not provide for quantification of any other benefits.		
NRDC	9	4	Second, the Draft Report consistently overstates the “issues” for any given technology on tribal lands. In so doing, the Draft Report gives an impressionist’s brushstroke to various nuances of the land use approvals presented by each technology, choosing instead to clump them together and discourage further analysis. Rather than deconstruct these “issues,” the Draft Report draws conclusions based on information not included in the report. For example, a closer look at Table 6.1 reveals at least four straight-forward alternatives on tribal land: IGCC at Black Mesa, Solar 1 and 2, and Wind 1. These four alternatives are all on tribal lands held in trust by the U.S. for either one or both tribes, which would simply require U.S. and tribal approval followed by a straight-forward National Environmental Policy Act (“NEPA”) process. If the Draft Report is referencing other issues not mentioned in the study, then these issues must be identified and discussed in detail for each technology.	Merely because it may be possible to site an alternative on lands wholly owned in trust by the United States for one or both of the affected tribes does not mean that the process of implementing the alternative is without complexity. For example, to the extent that the use of other lands is required, for transmission purposes or for other associated infrastructure, the approval processes that attend the use of those lands must be considered in evaluating the alternative. We are continuing to work on evaluating the specifics of the land ownership and the water rights that are pertinent to the specific alternatives, and to the extent that we are able to obtain additional information with respect to those matters we will assess the impacts of the information specifically. But insofar as the draft suggests that complexity attends alternatives, we think the draft is accurate. If there are particular conclusions whose bases should be better documented, we will be able to consider any that are identified to us.		
NRDC	9	5	In addition, the Draft Report summarily concludes, “to the extent that more land is required for the business activities, the potential approval difficulties increases significantly.” This claim finds no basis in the Draft Report. The Draft Report does not provide any information to determine whether the size of the leasehold makes project approval more difficult. Instead of outlining the reasons for this conclusion, this statement is proffered without supporting evidence or analysis of the characteristics of each of the proposed sites, including, but not limited to, available acreage at the proposed sites, current population – if any – at the proposed sites, and their current use.	This concern apparently flows from an interpretation different from that intended by the PD. The intention was not to communicate that the “size of the leasehold” made approval more difficult. Rather, the intention was to state that if increased land requirements led to a need for lands under different and additional types of ownership or trusteeship, this could trigger additional types of approval requirements and add to the complexity of approval. This will be clarified in the final report.		
NRDC	9	6	Third, the Draft Report notes that siting on or near tribal land, including IGCC at Black Mesa, Solar 1 and 2, and Wind 1, would impact “exceeding complex water rights issues.” This argument is disingenuous. The Draft Report fails to address how a major contributing factor to the water rights issues on and around the reservations is the water requirements for preparation and transport of coal from Black Mesa to the Mohave Generating Station. In fact, the proposed life-of-mine extension for Black Mesa coal and the concomitant water requirements create a major water issue themselves, which is currently before the Office of Surface Mining, Reclamation and Enforcement.	Agreed in part. We will clarify that life extension or renewal of the existing Mohave Generating Station would also raise such issues.		
NRDC	9	7	There is little distinction between the short-run jobs created by resource construction (of an IGCC, wind, solar, or conservation) versus resource operation. Some of these options provide long-term employment for skilled labor in tribal areas, and others provide only temporary activity.	Employment impact analysis, when completed, will present its results in terms of job-year totals and jobs in each year. We believe this will make the distinction sought here.	It is crucial that the final report recognize that the operational jobs provided by alternatives can extend for the life of those measures, while the jobs provided by Mohave extend only to 2026.	
NRDC	9	8	There needs to be more interplay between this chapter and Chapter 10. For example, at 10-25, a 20% federal tax credit is noted for wages paid to tribal reservation residents. This could significantly affect the cost and cost-effectiveness of renewable resource development on tribal lands – perhaps by almost as much as the scheduled-to-expire production tax credit. Similarly, at 10-28, low-interest loan funds are identified as being available to tribes. These may improve the cost-effectiveness of tribal resources. As an example, while the development of Stirling Dish solar resources may, at first examination, make more economic sense in California (avoiding some transmission costs), the transmission advantage may be outweighed by these types of tax incentives. NRDC discusses this below under Chapter 10, Financial Issues.	Agreed. The final report will cross-reference such opportunities shown in Chapter 10.	As indicated above, a case study of a project, such as Grays Mountain Wind, showing potential incentives available for that project from various sources would be very useful to the stakeholders.	
NRDC	10	1	This is an outstanding assemblage of tax and other incentives available to support renewable energy development, innovative coal resources, and tribal energy. Perhaps the greatest value in the final report would be to assemble some hypothetical packages of incentives that might apply to the specific resources identified as promising by the Draft Report: a) IGCC, with or without CO2 capture b) Wind generation on tribal lands	We will consider the possibility of preparing such a matrix.		

			c) Stirling Dish generation on tribal lands d) Energy efficiency measure installation in Arizona and New Mexico employing tribal members Such a matrix would allow for approximation of the savings, below otherwise-applicable costs, that could be achieved because of the unique combination of technologies and tribal enterprise participation.			
NRDC	10	2	Without suggesting that this is an explicit prospect or an exclusive list, the following all seem potentially applicable to NTUA development of the Gray Mountain wind farm. If all were applicable, more than one-third of the project cost might be mitigated, making it more competitive in supplying replacement energy than non-tribal resources.	We will try to look at this in more detail.		
NRDC	10	3	a) EPACT Loan Guarantee, P. 10-13 b) EPACT Section 202 Tax Credit, P. 10-12 c) EPACT Section 2602 Grants, P. 10-19 d) EPACT Section 2603 Grants, P. 10-19 e) Taxpayer Relief Act Grants and Bonds, P. 10-23 f) Indian Employment Tax Credit, P. 10-25 g) Community Development Entity, P. 10-26	We will attempt to perform this analysis.	This package is an example of the combination of incentives that might be available to a tribal resource using a renewable energy source.	
NRDC	11	1	This is an extremely important part of this Draft Report, and it should not be relegated to the minor standing that it has been accorded in the Draft Report.	The item has its own report section. We therefore do not believe that it has been relegated to minor standing.		
NRDC	11	2	The most important characteristics of any alternative or complement resources are reliability, cost, and load shape. Resources that reliably provide power during peak hours and peak months are more valuable than baseload resources. This chapter provides key data to evaluate the resources on an economic basis. Absent full deployment of an hourly dispatch planning model, the data provided by this chapter is absolutely essential to compare individual resources and portfolios of available resources to the SCE system needs and to Mohave. No resource is flawlessly reliable. Even a dependable resource like Mohave has unscheduled outages. Ultimately, however, it can be measured in dollars – the value of resources that provide power at particular times of the day and year can be quantified.	The choice of “peaking” vs. “base load” resources will be made in the integrated resource plan process that is beyond the scope of this study. The consultants’ report will provide input data for this process.	NRDC assumes that this means that all resources will now stand alone, and the fact that one or more do not provide energy of the same shape as Mohave will no longer be a criteria for ranking or scoring resources. All ranking and scoring will be done in the IRP process.	
NRDC	11	3	11-2: The Draft Report appears to rely on a period when gas prices were significantly lower than now forecast. For example, the evening prices of \$10/mWh and afternoon prices of \$35/mWh are now more like \$70 and \$100. Use of the 2002 load shape is just fine – the load shape has not changed much. But current and forecast prices must be used.	We used 2002 because a full set of load and price data was available for SCE for that year. For later years only the aggregate California data is available. It makes sense to use that to reflect higher natural gas costs and energy prices, although predictions are for some price declines over the coming years.	NRDC agrees that there is some backwardization in the natural gas markets (a situation in a commodity market is when longer-term futures prices are lower than shorter-term prices). However, even in the furthest out years, prices exceed what was used in the PD.	
NRDC	11	4	11-5: The statement that “...a resource with a better match to the load profile would be even more valuable” is unambiguously true. However, a resource with a clear on-peak load profile, even if NOT matched to the SCE system load profile, is even MORE valuable on a per-kWh basis. There are much deeper markets for shoulder-period and off-peak power in the West than for coincident peak power of the type that certain resources discussed in the Draft Report can clearly provide to SCE.	The choice of “peaking” vs. “base load” resources will be made in the integrated resource plan process that is beyond the scope of this study. The consultants’ report will provide input data for this process. Units that provide base load power only do so because of a merit dispatch system. If the merit process values generation correctly, then lower-cost generation runs more. It covers load during peaking hours as well as non-peaking hours, therefore it obtains value for every peaking hour in the same measure as a peaking resource. It also obtains value during non-peak hours. Thus it is the concept of “value” that may be differing in the perception of the commenter. We understand that, during peaking hours, variable costs of certain resources, such as solar resources, may be lower than variable costs of fossil resources, such as coal resources. This will be reflected in the dispatch of these units.		
NRDC	11	5	11-6: The fact that the wind energy resource on and near tribal lands is high in summer and in late afternoon should be compared to wind resources in other regions – where the load profile may be MUCH less favorable. SCE has data for existing wind resources as to their diurnal and seasonal load shape. NRDC believes that the resources identified in the Draft Report are superior to most in the West.	We do not understand how this proposed task would relate to our scope of work or to decisions on the specific options under study.		
NRDC	11	6	11-7: The discussion of DSM load shape is relatively weak. NRDC suggests that the authors consult published sources of DSM load shape, including the extensive work on more than 1000 DSM measures by the Northwest Power and Conservation Council’s Regional Technical Forum, available at: <a href="http://www.nwcouncil.org/energy/rtf/crd/recommendations/origappendix.htm">http://www.nwcouncil.org/energy/rtf/crd/recommendations/origappendix.htm</a>	The final report will contain more discussion of DSM load shape detail and the illustrative examples will include the assumptions we make about this load shape for the purpose of assessing DSM alternative benefits.		
NRDC	11	7	11-8: If SCE funded DSM programs in Arizona or New Mexico, it is likely that the load shape of the resulting savings would be similar to the utility overall load shape, as depicted on 11-1, 11-3, and 11-4, not like that of Mohave. If the energy delivered to SCE were of the same shape as Mohave (making it a “replacement” as narrowly defined), the load shape benefits would remain with the host utility. The economic value of this should be incorporated into the cost-effectiveness of the proposed program. The methodology discussed on 11-9, using hourly values, is an appropriate way to do this.	See the response to NRDC 11-6 above. We will address the allocation of the benefits associated with DSM load shapes in the final report.		

NRDC	11	8	11-9: The approach to cost-effectiveness set forth here is a very appropriate short-cut, compared with the more complex use of a system dispatch planning model. Multiplying hourly output by hourly energy price, and indexing value to “1” would allow ranking of resources. The notion to assemble some resource portfolios is also excellent. It is not reasonable to think that a single resource would be used to replace Mohave, nor is it desirable to do so from a system reliability and fuel diversity perspective. The DSM savings profiles can be derived from the Northwest Power Planning Council RTF work, if not available elsewhere. Alternatively, valuing a full portfolio of DSM measures at the system average load profile for the host utility (e.g., PNM, not SCE) would be a reasonable shortcut.	It must be noted that the scope of this study is, in general, to provide inputs to an integrated resource plan. The resource plan, not a part of the current scope, will rank the resources and no “short-cuts” will be made. We do not propose to make any such ranking evaluations in this report. Furthermore, while the notion of studying a “portfolio” of resources may have merit, this is beyond the scope of this study.																		
NRDC	12	1	NRDC is generally very impressed with both the quality and quantity of analysis that has been devoted to transmission issues. Some questions about issues raised on specific pages are provided below. First, NRDC is concerned about the analysis of transmission availability and how it could influence resource development.	Agreed in part; the approach is conservative because the use of a contract path reservation construct implies such conservatism; but reserving over OASIS is the only currently-available mechanism to secure incremental transmission from a new resource (other than obtaining rights on a new line or purchasing rights from existing users of firm service). Using OASIS to reserve transmission may lead to a somewhat inefficient utilization of transmission, but it is somewhat economically-based. The PD has not drawn any conclusions concerning economic viability that are linked to current transmission availability. Also, see responses below for comments NRDC-12-2 to NRDC-12-8.																		
NRDC	12	2	The approach used to determine transmission availability appears to be extremely conservative, and non-economic in nature. It is likely that the development of new resources in Arizona will make additional transmission facilities desirable to facilitate the flow of power and meet historical reliability criteria. However, it does not necessarily follow that such investments are essential to the economic viability of potential generating projects.	The criteria employed are typical for transmission system planning. The approach is not conservative. This is a technical evaluation based on NERC and WSCC reliability criteria. These are upgrades required to interconnect a facility.																		
NRDC	12	3	First, the criteria apparently used looks at the four most congested hours per year on the transmission system. Given the methodology discussed in Section 11.4 for valuation of generation, it is entirely plausible that some of the proposed resources might be more valuable without transmission system augmentation than if the costs identified in Section 12 are incurred. For example, hypothetically, if failure to invest in the \$544 million of identified transmission resources in Case 3 at page 12-26 meant that up to 1,000 megawatts of renewable generation were shut in for four hours per year, it would be possible to measure that loss of output against the market for those hours, and determine if the transmission upgrades were cost-effective. Given a 10% annual charge rate applied to this investment, the value of the power would need to be more than \$54 million per year for those four hours before the upgrade would be cost-effective. This would appear to work out to over \$13,000 per megawatt-hour for the shut-in generation, as shown below:	Assigning the [significant] costs of certain Palo Verde – west 500 kV upgrades to Mohave alternatives is somewhat misleading; the costs for these types of upgrades are likely to be shared across many parties if the upgrade is actually undertaken. Regarding the \$544 million investment in Case 3, Sargent & Lundy agrees with the underlying view that such costs are high. However, we plan to re-run this case with the solar generation amount connected to the 500 kV system. Upgrade costs similar to those of Case 2 (\$170 million) are expected. The technical criteria employed are those customarily used in load flow studies. The interconnection study evaluates upgrades required to tie into the network. Transmission service options are not evaluated in the load flow study.																		
			<table border="1"> <tr> <td>Cost of Transmission Upgrades</td> <td>\$544,200,000</td> </tr> <tr> <td>Annual Charge Factor</td> <td>10%</td> </tr> <tr> <td>Annualized Capital Cost</td> <td>\$54,420,000</td> </tr> <tr> <td>Megawatts of Generation Shut In:</td> <td>1,000</td> </tr> <tr> <td>Annual cost per megawatt</td> <td>\$54,420</td> </tr> <tr> <td>Hours per year shut in (assumed as the underlying reliability criteria)</td> <td>4</td> </tr> <tr> <td>Cost Per Megawatt-hour of Transmission Upgrade</td> <td>\$13,605</td> </tr> <tr> <td>Typical Needle-Peak Value Per Megawatt-hour In Southern California</td> <td>\$50 - \$500</td> </tr> </table>	Cost of Transmission Upgrades	\$544,200,000	Annual Charge Factor	10%	Annualized Capital Cost	\$54,420,000	Megawatts of Generation Shut In:	1,000	Annual cost per megawatt	\$54,420	Hours per year shut in (assumed as the underlying reliability criteria)	4	Cost Per Megawatt-hour of Transmission Upgrade	\$13,605	Typical Needle-Peak Value Per Megawatt-hour In Southern California	\$50 - \$500			
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NRDC	12	4	Clearly one key issue is the number of hours per year that the transmission system fails to provide reliable service. If it is a contingency condition that creates a need for additional capacity, it may be cost-effective to develop this type of resource without firm transmission capacity, use what capacity is available on an as-available basis, and shut the generation in for a few hours per year. Other key issues involve losses on the transmission system during periods of congestion, loop flow, and other factors that are not as simple to understand or measure.	Agreed, in general. However, any conditions of “firm capacity” requirements imposed by SCE, or the CPUC must be clearly understood if SCE is to include a resource that has less than (e.g.) the transmission security that SCE’s Four Corners Generation Station output has. Also, in the same way that the CA ISO considers a connection to Four Corners as a “pseudo-tie”, Mohave alternatives could conceivably incorporate similar transmission arrangements. Further investigation is required to determine this. We will attempt to speak with the CA ISO operators on this issue. Also, see response to comment NRDC-12-3.																		
NRDC	12	5	Another way of looking at this is from a system reliability perspective. Any generation added to a utility system at any hour reduces the loss of load probability (“LOLP”) for that system. Numerous studies have shown that even sporadic resources like wind, operated on an as-available basis, improve system reliability. It would be useful to measure the contribution to system reliability that these potential resources offer, both with and without transmission augmentation. It is possible that the \$544 million in transmission upgrades identified for Case 3 would do less for system reliability than an equivalent amount invested in energy efficiency, wind generation, solar generation, or other alternatives. In order to measure the need for and value of proposed transmission augmentation, it is necessary to know what the cost is, what the reliability benefits are, and what contribution to reliability could be achieved for the same cost by investing in other alternatives. The relatively simple project-by-project, path-based analysis in Chapter 12 only provides insights, not actual data for this type of analysis.	Chapter 12 load flow studies are not “path-based” analyses, but rather the results of transmission network load flow calculations. The calculation of the reliability benefits of the transmission upgrades is beyond the scope of the current effort.	The point being made here is that even without any transmission upgrades, addition of generation that is available for some hours of the year (even unpredictable hours) increases system reliability. Assume, for an example, that a required transmission upgrade to provide “firm” service to a 400 mw wind farm costs as much as 100 mw of wind generation. It is useful, for example, to compare addition of 500 mw of wind generation with no transmission upgrades to addition of 400 mw of wind generation with																	

					accompanying transmission upgrades. Both have the same capital cost. Both have similar operating costs. One or the other provides a greater contribution to system reliability. It is impossible to know which without a LOLP study. It may be that having an extra 100 mw of generation adds more to reliability than having an extra 400 MW of transmission.	
NRDC	12	6	OASIS – 12-7: It is our understanding that “contract path” measurement of transmission availability tends to understate the physical capacity that is available in part because the contract paths are based on single-contingency ratings, and many hours of the year, none of the contingencies are being experienced. In other regions (and in the gas industry) “best-efforts” transmission service is being offered, which provides firm service only when it can be provided without impairing any contract path commitments. Generally, it is available when generating units are down and/or transmission contingencies are not being experienced. It may be very attractive for wind or solar generation, where the 30% - 40% capacity factor may not justify development of firm transmission services. In the rare case when best-efforts service is unavailable, the units would be subject to curtailment. In those situations, given their low running costs, they might use financial mechanisms to displace a thermal resource to gain access, but the number of hours involved is probably quite small. The high degree of availability for hourly non-firm capacity shown at pages 12-12 to 12-14 suggests that this could enable the addition of these renewable resources to the SCE portfolio without the expense of transmission upgrades discussed at pages 12-23 through 12-30. Has the option of providing non-firm transmission service to as-available generating resources been examined?	The scope of work includes examination of shorter-term and/or non-firm transmission service. The cost of such an alternative is likely lower than the cost of securing firm service. The scope of work does not include determining which form of transmission service should/would be selected for any Mohave alternative.		
NRDC	12	7	Load Flow Studies – Page 12-26: The cost of augmenting transmission for the package of generating resources identified in 12.7.4.3 seems to address BOTH “normal” and “contingency” operating conditions. Can these be separated, with an estimate of the number of hours associated with “contingency” operating conditions? If the number of hours when contingency operating conditions AND high SCE loads would force curtailment of firm service to retail customers is very small, then demand-response measures may be less expensive than the \$544 million in transmission upgrade costs. If this is the case, then the demand-response option to meet contingencies should logically be considered as an alternative to transmission construction. There is no examination of demand response options, because this study is focused on supply options to replace or complement Mohave, but if transmission obstacles exist for only a few hours per year, then adding demand response to a portfolio may be economical.	It may not be necessary to build additional transmission if an optimum portfolio of resources is chosen. This could be the case if there is an ability to rely on any other SCE-region peaking resource, not just demand response. This aspect should be considered as part of SCE’s integrated resource planning, but is beyond the scope of the current effort. Also, see the response to comment NRDC-12-3.		
NRDC	12	8	Four Corners – P. 13-31: The ownership rights that SCE currently has for Four Corners were not considered as a possible source of transmission access for any of the Mohave alternatives. This reasoning does not appear to be explained.	The Four Corners transmission rights are required to transmit SCE’s share of the power from the Four Corners resource.		
			<b>Subject: Comments on MACS Preliminary Draft dated September 2005</b> <b>This e-mail provides stakeholder comment on behalf of the Hopi Tribe on the MACS Preliminary Draft (“PD”) dated September 2005</b>			
Hopi	General	1	We recognize that the PD is incomplete in several material respects, and does not at this time propose conclusions. Our comments on the MACS are necessarily limited by these circumstances. However, at this time, we suggest that the following points be considered:	Sargent & Lundy will improve the conclusions presented in the final report taking into account stakeholder comments.		
Hopi	ES	1	The Executive Summary could be improved if the data on plant performance, capital costs and other factors were made more uniform among the alternatives studied. While different considerations are applicable to each technology examined, it would be useful to make the table data as comparable and uniform as possible to avoid confusion.	We plan to provide summary data for each alternative side-by-side in a table for more convenient comparison.		
Hopi	ES	2	The analysis of Energy Efficiency / DSM appears to be based upon the 2002 SWEEP study. We recommend that the MACS report use care to identify this source and to avoid language in the report suggesting that the MACS study is producing new “findings.” ( See, e.g., MACS Preliminary Report page ES-9: “... we find that by 2010 there is at least 2,394 GWh of energy per year and 408 MW of capacity available from these two states alone.”)	We will revisit the language used. It was not our intent to introduce any new “raw” findings since we are not conducting a ground-up potential study. However, it is our intent to critically examine the study, and use a “refined” estimate if appropriate; e.g., a more conservative estimate to ensure no exaggeration of the actual technical potential. In particular, the absolute level of technical potential is not necessarily required to be precisely determined in order to address the fundamental “DSM resource procurement” option being considered.		
Hopi	6	1	We recommend that the MACS consultants address more clearly the existing legal and structural barriers to the Energy Efficiency / DSM proposal under examination.	The final report will more clearly address the regulatory and institutional barriers present. We are not aware of any particular legal barriers other than those that are considered as part of the regulatory-institutional construct (i.e., the way that State law empowers Commissions to address the ratepayer impact of regulated utilities’ actions including power transfers across state boundaries).		
Hopi	6	2	We would like to better understand how the Energy Efficiency / DSM proposal generates revenues and jobs on or near the Hopi reservation. See, e.g., Chapter 6 of the PD (Energy Efficiency/Demand Side Management Technology) and Table xx at page 10-49.	We will address this to the extent feasible in the final report.		

Hopi	9	1	With respect to Chapter 9, Tribal Issues, we appreciate the work performed by the MACS consultants. We agree that the issue of acceptance of a particular energy project is a matter uniquely within the province and jurisdiction of the Native American tribe whose interests are affected, and involves numerous factors and considerations. Given the level of specificity of the draft PD, we agree that further study of this area by the MACS consultants would not add sufficient additional value to the MACS project.	Agreed, but we are open to further analysis if the stakeholders agree and are committed to supporting the work.		
Hopi	10	1	With respect to Chapter 10, Financial Issues, we recommend that the MACS consultants review their conclusions regarding recommended ownership structures of various energy technologies. In particular, given the level of specificity contained in the draft PD, it may be premature to conclude, for example, that a particular technology is, or is not, suited to tribal ownership. Such decisions are best made in conjunction with particular project and project financing proposals. See, e.g. MACS Preliminary Report, Table xx and page 10-49.	Agreed. The PD reflects what we believe to be reasonable <i>generic</i> conclusions that can be considered as starting points, subject to reconsideration when a specific project and its details are ready to examine. This point will be reflected in the next draft.		
Hopi	12	1	With respect to Chapter 12, Transmission Issues, we recommend that the MACS consultants consider more directly the impact of the data on transmission availability to the prospects of actual development of projects in the study area. Consideration should also be given to incorporating this information into the Executive Summary.	The consultants will not opine on the prospects for actual development of projects as part of this study. The prospects for actual development of projects will result from review of the output of the integrated resource plan process, which links development of projects to load demand forecasts and other variables.		
Hopi	Appendix I	1	The consultants should consider whether the natural gas price forecasts they have employed in the study remain valid. In particular, the consultants should consider whether the permanent impacts of hurricanes Katrina and Rita on domestic natural gas production are adequately addressed in existing gas price forecasts.	We can undertake an update of the natural gas price forecasts, but there is still the question of how long lasting the current hurricane impacts are.		
			<b>NAVAJO NATION COMMENTS</b> Re : Initial Comments of the Navajo Nation on the Preliminary Draft of the Study of Potential Mohave Alternative/Complementary Generation Resources			
Navajo	General	1	Because the PD is concededly incomplete, and because the Navajo Nation has had no opportunity to review the comments of other stakeholders or to review the PD following the study preparers' incorporation/resolution of stakeholder comments in the study document, the Navajo Nation respectfully requests that it be accorded an opportunity to comment on the Draft when it is more complete and before the document is finalized.	We expect to issue a second draft report taking into account stakeholder comments.		
Navajo	General	2	First, the central and most important criticism of the PD is that it fails to examine how any of the so-called "alternatives" would really operate in place of Mohave . As the study preparers should be aware, SCE ran simulations with and without Mohave to demonstrate the cost of losing it (the so-called "Mohave-In" and "Mohave-Out" scenarios) . This is precisely the type of comparison that needs to be run regarding potential "alternative" resources . Even that may not be sufficient because the simulations presented focus on annual dispatch and costs . On a daily basis, the intermittent nature of some of the "alternatives" will be more evident . As presently prepared, the PD is nothing more than a detailed shopping list of potential technologies. Beyond this central criticism, most of the costs and performance for the "alternatives" is based on bench testing and demonstration plants . A high level of uncertainty, skewed significantly upwards, must be applied to these values as a consequence . With respect to the conservation "alternative," this is really not an "alternative ." SCE does not have the ability (or the obligation) to insure that all consumers minimize their electricity consumption . As Paul Joskow of MIT has argued, telling utilities to discourage electricity consumption is like telling a butcher shop to sell vegetables . Because of these flaws, the PD fails to identify any viable "alternative" to Mohave.	This is the subject of integrated resource planning and is beyond the scope of this study. While these may be valid points in terms of how final decisions would need to be made, these tasks are beyond our scope of work. The consultants can perform such analyses if desired by stakeholders and if they were committed to providing the necessary information, we would also need additional information from SCE in order to prepare a proposal for doing so. Re DSM: The Consultants disagree with this comment. The particular DSM concept evaluated in this study is a novel one, as are some of the other alternatives being considered, and will require considerable development. However, the proposal is not for "all consumers [to] minimize their consumption," but for SCE to acquire cost effective efficiency resources. The only novelty here is that the resources lie in another utility's service territory. There is a long and successful history of utilities, including SCE, implementing cost effective DSM.	In essence, the electric power market in the west is fungible. If SCE (or anyone else) implements DSM programs in New Mexico, the generation now serving that load would be available to the market (including SCE). The DSM option being examined simply formalizes the transactions in advance – in exchange for contributing to the cost of the DSM, SCE receives the right to purchase the displaced generation at a defined price. Yes, the institutional arrangements are non-typical, but they are not unprecedented, and they are not particularly complex (particularly compared with multi-utility agreements for joint ownership and joint operation of thermal plants like Mohave).  The DSM options are not intermittent; they have well-defined, predictable, and highly reliable load shapes. Because they avoid the need for generation, associated losses, and associated reserves, they provide much greater system capacity benefits than an equivalent amount of generation.	
Navajo	General	3	Moreover, in considering whether certain potential generation resources are or may be "alternatives" or "complements" to the continuing operation of the Mohave Generating Station ("Mohave") post-2005 — the period when Mohave must operate consistently with the requirements of a federal court Consent Decree if it is to operate — the PD fails adequately to define the concepts of "alternative," "replacement," and "complement" in the context of D .04-12-016. That failure begins with the PD's failure to note that Mohave is currently providing "baseload" power to its California customers and the vast majority of the identified "alternatives" are peaking power options . The PD's failure to make this distinction results in a series of inaccurate "apples to oranges" comparisons throughout the PD.	We propose to identify each resource as an "option." Their employment as "alternatives or replacements" or "complements" depends on the decision on whether to continue operations at the existing Mohave plant. We identify whether the options can provide base load power or are only peaking power plants by identifying, where applicable, the generation profile of each option. As an example, Chapter 3, CSP Technologies, clearly identifies the base load profile of the Mohave Plant and the limitations of CSP to provide base load power.		

Navajo	General	4	Moreover, as will be explained below, the vagueness and imprecision with which the PD uses those key terms fosters serious misunderstanding of the issues confronting the stakeholders and the CPUC, and of the very purpose of the Mohave Alternatives/Complements Study ("the MACS Study"). The PD should be modified to clarify the meaning of the terms "alternative," "replacement," and "complement," and to provide frequent reminders throughout the revised study document of the relevant definitions and distinctions. Without such clarification, the study will run afoul of the purposes and principles of D .04-12-016.	See response to Comment Navajo-General-6.		
Navajo	General	5	In D .04-12-016, the Commission found that the continued future operation of Mohave as a coal-burning plant "is a matter of economic life or death" for the Navajo Nation and Hopi Tribe and other affected persons." (D.04-12-016, Finding of Fact No. 25.) With that in mind, the Commission ordered SCE, as a primary matter, to continue negotiations with the goals of securing coal and water supply agreements and thus continuing Mohave's coal-fired generation operations. "This decision authorizes [SCE] to make necessary and appropriate expenditures on [Mohave] for critical path investments required by the 1999 Consent Decree to allow Mohave to continue operations post year-end 2005 ." (Id., p . 2 .) The Commission then ordered SCE to study the energy options or alternatives "to work in concert with Mohave's continued operation" or, secondarily, to replace Mohave's output and Mohave's economic benefits to the Navajo Nation and Hopi Tribe if and only if "Mohave cannot continue as a coal-fired plant." (Id.)	See response to Comment Navajo-General-6.		
Navajo	General	6	As a matter of Commission policy, then, SCE is to do all it can to resolve coal and water supply issues and keep Mohave operating as a coal-fired facility. While the MACS Study is intended to examine options that can complement Mohave, consideration of energy options to replace Mohave, when Mohave is capable of continuing to operate, violates the spirit and the letter of D.04-12-016.	D.04-12-016 Finding of Fact No. 19 [p. 67 of the Decision] states "Edison should investigate alternative resources to first allow for a meaningful comparison of Mohave's costs with other alternatives, including the WEC solar and the NRDC IGCC proposals, and also to replace the output from Mohave if the Commission ultimately determines that keeping Mohave open as a coal-burning plant is not in the public interest, or complement the generation from Mohave if it returns to service." This does not subordinate the replacement options to the complement options.	The "public interest" is an economic concept. The integrated resource planning model is the only logical way to determine what portfolio of resources provides the best set of resources for the public interest.	
Navajo	General	7	Even if it were determined for any reason that SCE should not go ahead with the post-2005 operation of Mohave, it would be inconsistent with D .04-12-016, and grossly imprudent, to permit SCE to decommission the Mohave plant instead of requiring SCE to sell its interest in Mohave to enable the plant to continue to operate through another owner/operator (although without SCE customers receiving 56% of Mohave's low-cost electric generation output).	This statement, while perhaps true, is not material to the study scope.	This issue would appear to provide Peabody and the Tribes with a competitive market advantage – by refusing to negotiate acceptable coal and water agreements, it could force the Mohave partners to sell the plant to Peabody and the Tribes at a below-fair-market value. The prohibition imposed on the study consultants to have no role in the future of Mohave should also apply to study stakeholders and commentators.	
Navajo	General	8	In sum, the only scenario in which the resources considered in the MACS Study could be "alternatives" to or "replacements" for Mohave would be if a permanent shutdown of the plant were required because the stakeholders currently addressing water and coal issues in pending confidential negotiations were unable to reach agreement resolving those issues – a result that is not in the economic interest of any stakeholder.	This statement, while perhaps true, is not material to the study scope.		
Navajo	General	9	The MACS Study should make crystal clear that in light of the findings of D .04-12-016, the resources considered in the MACS Study are, as a practical matter, unlikely to be "alternatives" or "replacements" for Mohave but may be "complements" to Mohave. Moreover, those proposed resources that would utilize, among other things, the site, the water supply ' and the transmission capacity applicable to Mohave are not realistic "alternatives" and should be dropped from the study, or the study should clarify that such resources are not realistic proposals.	It is not clear that certain technology options, such as IGCC, using the same water and fuel sources as the existing plant would necessarily be "unrealistic." The integrated resource plan process may show this to be true but that conclusion is the subject of that process and that determination is not within the scope of the current effort.	NRDC agrees that resources that use the Mohave site or the Mohave water supply cannot logically co-exist with Mohave. This makes them strictly alternatives, but not complements. It does not affect whether the resources are realistic proposals. If they are technologically feasible and economically desirable, they belong in the IRP process.	
Navajo	General	10	In addition, the Commission's order to consider energy alternatives — whether as a complement to Mohave's continued coal-fired operations or as a replacement for it in the event Mohave must permanently shut down – explicitly required that the study consider only those options "that will provide the fullest possible benefit to the Hopi and Navajo ." (Id., p . 53 .) While it is unclear that any of the options considered in the Study will provide significant "benefit to the Hopi and Navajo," the study preparers cannot ignore the Commission's clear instructions on this matter. Accordingly, the study preparers should consider and quantify based on detailed analysis how and the extent to which each of the proposed resources will provide benefit to the Navajo Nation and Hopi Tribe. No such analysis is contained in the current PD.	We are attempting to quantify the extent to which the options would provide employment benefits and tax revenue to the tribes. We concluded (apparently with the agreement of the stakeholders) that it is not feasible to quantify the royalties or other fees that might be obtained by the Navajo Nation or the Hopi Tribe from land, coal, and water rights. The scope of work did not provide for quantification of any other benefits.	NRDC believes that the Study has concentrated on resources that would provide considerable economic benefit to the tribes. A large number of alternative resources in the state of California, in the Pacific Northwest, and in Baja California will need to be considered in SCE's IRP process. These other resources do not have the same potential to benefit the tribes, and are therefore outside the scope of this study as we understand it. Examples of this might be construction of an IGCC unit using petroleum coke at the site of the Kern River oilfields, with direct utilization of the CO2 for EOR. Such a resource might be beneficial to SCE, economic, environmentally acceptable, and easier to construct, but	

					would not have the benefits to the tribes that is the focus of this study.	
Navajo	General	11	At the same time, the MACS Study must balance options that provide the greatest benefit to the Navajo Nation and Hopi Tribe against the "interests of Edison's ratepayers," 1 The current Mohave use of Colorado River water as its cooling water is available pursuant to a contract with U .S. B.O.R. that contains a condition that requires the burning of Black Mesa Coal from the Navajo Nation and the Hopi Reservations . Any alternative that assumes such water is available without use of such coal is not a valid alternative .including the need for SCE to secure low-cost and reliable energy sources for its customers . (Id., p. 53 .) Surely, the key ratepayer considerations for the MACS Study will be the long-term cost of energy, the ability of energy sources to shield ratepayers from the natural gas and electricity market volatility, and the reliability of an energy source . On the subject of cost of its energy alternatives, some have described the economics of a Stirling solar dish option as "quite good" without providing even a dollar range, and the record in Application ("A .") 02-05-046 (in which D.04-12-016 was issued) demonstrated an enormous disparity between the low cost of an upgraded Mohave and an unproven, comparably-sized Stirling solar dish . Moreover, the study must make clear that "clean fossil-fuel generation" — facilities fueled by natural gas — are hostage to volatile natural gas prices. Almost five years after the 2000-2001 California Energy Crisis, natural gas prices in the West and nationwide have yet to stabilize over the long term, and natural gas today is selling at over \$10/MMBtu . In contrast, record evidence in A .02-05-046 demonstrates that the all-in cost of energy from Mohave is likely to be less than \$46/MWh . The economics of Mohave are clearly far superior to the alleged "quite good" economics of any other resource options considered in the MACS Study.	This study will not make comparisons of Mohave and the retained alternatives. That comparison is part of an integrated resource planning process which is outside the scope of this study.	The IGCC option at Laughlin would appear to meet the criteria specified by the Navajo. An NGCC probably would appear to not meet this condition, unless it operated on syngas manufactured from Black Mesa coal.  In any event, the study appears to conclude that dry cooling is preferable at all locations for newly constructed resources.	
Navajo	General	12	Nor is there any merit to the notion urged by NRDC that the MACS Study should consider certain energy options — such as energy efficiency, renewables, or "clean fossil-fueled generation" — in a combined form as a portfolio of options to replace the energy output of the Mohave. (See Letter from Jody London (representing NRDC) to Paul Klapka (of SCE) dated September 14, 2005 .)2 NRDC appears to find fault with Mohave as a baseload resource, but without good reason . For example, NRDC claims that the wind generation alternative at Moenkopi can be a source of peak power and would therefore be "much better than a baseload power plant" such as Mohave. NRDC does not, however, explain how it determined that peak power sources are more valuable than baseload power plants, particularly in periods like the present and the foreseeable future in which natural gas prices are at unprecedented high levels.	A "portfolio" would arise as the result of an integrated resource planning process outside the scope of this study.		
Navajo	General	13	In terms of providing consistent, reliable sources of energy, baseload power sources supply the great majority of customers' demand for energy . If, on the other hand, SCE does in fact require additional peak power, one cannot conclude from this that SCE does not require its existing baseload power from Mohave . It would be highly imprudent and unduly limit SCE's ability to choose from options if it were to instruct Sargent & Lundy to bundle peak power sources with baseload resources that would replace any portion of Mohave's output, as well as being in violation of the Commission's orders in D .04-12-016.2	It is not clear why this would be in violation of that Order, but that is an issue for the stakeholders. As for the substance, based on our experience in utility planning, it is customary to evaluate alternative resource options as part of a balanced portfolio that takes into account the availability and costs of the various options and how they fit with the existing resources and expected load of the utility. Our current assignment is to provide SCE with data on the various options that would allow it to perform IRP analyses of various combinations of the options, not just any particular "bundle." Such an analysis is usually done in combination with existing committed resources and the various other options available to the company. Also, see the response to comment Navajo-General-12		
Navajo	General	14	To consider multiple resources in different combinations, as suggested by NRDC, would involve the consideration of multiple new and different "alternatives" combined together — something well beyond the scope of the study as originally defined. Moreover, while it may be theoretically possible that some combination of investments could be made to replace Mohave, each such combination would have to be subjected to the same cost comparison as a single studied "alternative ."	If such analysis were needed, we agree that it is beyond the scope of work. Such work could be performed with agreement and cooperation from stakeholders as well as additional funding. Also, see the response to comment Navajo-General-12		
Navajo	General	15	One important point that the Sargent & Lundy should incorporate into the MACS Study is the recent proposal by Senator James Inhofe (R-Okla .), chairman of the Senate environment committee, to temporarily waive the United States Environmental Protection Agency's ("EPA's") air pollution limits in order to meet the nation's energy needs in the aftermath of Hurricane Katrina and the anticipated worsening energy constraints in the aftermath of Hurricane Rita. NRDC's emphasis on sources that meet seasonal and time of day peak period ignores other factors that can increase costs far above peak power . Moreover, NRDC's emphasis here fails to take into account uncertainties such as natural disasters that can quickly send energy costs upward — uncertainties and increased costs for which ratepayers will have to pay . In the face of both supply and price volatility and uncertainty, Mohave's long history of providing cheap, reliable energy underscores the fact that Mohave is an extremely valuable asset to SCE and its customers.	It is possible to review this proposal and determine whether it is sufficiently specific to be used as part of the analysis. However, estimating the probability of a similar event occurring, and the corresponding emissions allowance values, would probably be a large task. Furthermore, as it is a proposal for a "temporary waiver," it is unlikely to have long term effects on the options being studied. Therefore, temporary changes and waivers to environmental regulatory limits are not considered in this study.		

Navajo	General	16	The Navajo Nation urges SCE and the study preparers to comply with the letter and spirit of the Commission's clear directives in D .04-12-016 to continue to pursue the continued operation of Mohave as a coal-fired facility, consider energy alternatives complementing Mohave, and consider energy alternatives to replacing Mohave if and only if it is clear that Mohave must be permanently shut down. SCE should therefore reject, as premature, the NRDC request that the energy options it proposes be considered on a portfolio basis.	It is not clear what this comment would have us do that differs from our current scope of work. The continued operation of the Mohave plant is not the subject of speculation or opinion of the study preparers.		
Navajo	General	17	1. The MACS Study could be significantly improved if it contained an "apples and apples" comparison of Mohave and the six posited "alternative" resource options. Since Mohave is a 1,580 MW plant, then there should be a comparable 1,580 MW option for each of the six other resources evaluated by the study . If some options cannot meet that level of output, then the Study should explain why not and should explain whether that failure disqualifies the option as an alternative . For instance, for solar technology the Study includes a 425,000 KW option, but not a 1,580 MW option. The problems (or benefits) of enlarging each of the options to 1,580 MW should be described . The Study should also include a Table that directly compares \$/KWh (all-in cost including fuel cost) for each options based on that option's meeting the entire 1,580 MW demand . For Mohave cost, the Study should use as a proxy the \$46/MWh cost cap proposed by the Navajo Nation in the CPUC evidentiary hearing conducted in A .02-05-046.	The study only considers the 885 MW portion of the Mohave plant. The cost of scale on page 2-12 addresses this issue in general terms. The IECM data does not allow for plants of greater than about 1350 MW. As can be seen in the trend line, the cost of scale becomes fairly linear at the limit of the data presented.  The levelized cost comparison is the result of an integrated resource planning model that is not within the scope of the current study.	There is no reason to believe that the current size of Mohave is economically optimal, nor that SCE's 56% share of Mohave is optimal. The IRP process is the logical place to optimize a resource portfolio.  NRDC does not agree that the levelized cost comparison is a result of the IRP. Because substantially all of the resources (except NGCC, which we consider non-viable) have variable running costs that are lower than the system lambda for SCE during off-peak periods, essentially all of these resources would operate to the limits of their availability. Therefore it is relatively straightforward to calculate levelized costs for each resource independent of the dispatch model of an IRP.	
Navajo	General	18	45. Additional comments. Certain Tables should be developed that treat each of the alternative/complements equally, being sure to look at the needed power presently developed by Mohave for SCE of 885 MW and comparing that output with the alternatives considered and the costs associated with each.	Cost comparisons will be made on a per unit basis.	A unit basis is appropriate.	
Navajo	ES	1	8. The first paragraph of the Executive Summary incorrectly states the ownership interests of the Mohave co-owners . The Navajo Nation understands that Salt River Project has a 20% interest, and the Los Angeles Department of Water and Power has a 10% interest. (PD, p. ES-1.)	We will correct errors in ownership percentages stated as required.		
Navajo	ES	2	The nature of the informational requests made to the Navajo Nation by the study preparers have been extremely broad and included some materials that the Nation views as proprietary and/or confidential . Moreover those requesting information seemed to assume that they had little or no duty to conduct their own search of various public information sources . The Nation has provided some information to date and continues to be willing to provide information it deems relevant to this inquiry . Materials such as those noted above will provided when copying is completed .	We look forward to receiving those materials. We understood at the beginning that the original information requests were broad. We have offered to attempt to narrow them and have done so in some regards. We have attempted to respect the fact that some of the information requested was confidential or proprietary and have offered to attempt to further narrow the requests through brief discussions with relevant staff. We have made searches for publicly available information and are using some such data; generally, we are seeking additional information that we believe may be available to the Navajo Nation and the Hopi Tribe. If any information we seek is known to be available from specific public sources, we would be glad to try to obtain it from such sources.	It is unfortunate that some stakeholders have not been willing to cooperate with the consultant team. NRDC has attempted to provide all information available to us that would assist the project team.	
Navajo	ES	3	9. The Executive Summary is probably the most important part of the study and should concisely identify all the resource options considered in the study, and provide Tables that summarize all the options considered in the study . Such tables should include Mohave information in the first column with the various options studied to the right.	We will provide concise tables in the executive summary. Inclusion of data for the Mohave plant is beyond the scope of the current effort.		
Navajo	ES	4	10. The study should clarify what EPC Fees are. (See p. ES-2, Table ES-2 .)	EPC fee is substantially profit to the EPC contractor in return for the guarantees on schedule and performance that are made.		
Navajo	ES	5	11. On p. ES-3, where is the water coming from for the IGCC water consumption and other systems identified later in the text?	We assume that if built at the existing site cooling water comes from the Colorado River allocation and coal slurry water comes from the "C-aquifer." At the Black Mesa site, dry cooling would be employed and slurry water would come from the "C-aquifer."	The cost of these water supplies needs to be updated to be consistent with the information provided at the October 21 meeting.	
Navajo	ES	6	12. Under solar generation, the term "annual generation" (p . ES-3) is noted — for comparison, what are the numbers for Mohave? The study should consider the Mohave energy going to California which is 66% of output, when the LADWP share is added to the SCE share.	Chapter 3, CSP Technologies, shows the Mohave annual generation. This chapter discusses California Renewable Portfolio Standards (RPS) where retail sellers of electricity are required to increase their procurement of eligible renewable energy resources such that 20% of their retail sales (on a MWh basis) are procured from eligible renewable energy resources by 2017. The report indicates an 885 MW plant at 72% capacity factor (equivalent to Mohave Generating Plant capacity factor) produces approximately 5,600,000 MWh of electricity per year. If all the generation is procured by California, 1,120,000 MWh will theoretically have to come from renewable energy resources by the year 2017. The 1,120,000 MWh represents 180 MW of power at 72% capacity factor.	The 20% requirement is a percentage of retail sales, not a percentage of any individual generating resource. SCE has retail sales of approximately 97 million megawatt-hours, and 20% of this would be approximately 20 million megawatt-hours.  The size of Mohave has no bearing on the amount of renewable generation that SCE is obligated to obtain. That is dictated by the Company's load, and by its pre-existing compliant renewable resources.  In the IRP process, the optimal mix of renewable resources can be ascertained, and the economic viability of Mohave then examined in light of that result.	
Navajo	ES	7	13. At p. ES-4, under the solar table CAPX and operating costs should be identified.	We will identify these as necessary.		
Navajo	ES	8	14. Within Table ES-6, clarify whether the MW identification noted is gross or net.	MW output is net.		

Navajo	ES	9	15. At p . ES-6, Table ES-8 identifies input, output, capacities, etc . at various ambient temperatures. What is the net-net estimate for these items?			
Navajo	ES	10	16. At p . ES-9, the study addresses energy efficiency/DSM . The plant output for the three Mohave co-owners other than SCE is 44% of plant output . Where is this loss going to be made up?	Any items pertaining to co-owners' shares are beyond the scope of the current effort.		
Navajo	ES	11	17. At p. ES-10, while the Navajo Nation is pleased to see the suggestions regarding the use of renewable resources as Mohave complements, as mentioned, the NFPI was shut down in 1995 . More importantly, the growth rate of renewable resources in the area of the Navajo and Hopi reservations is too slow . As a case in point, the Surface Mining Control and Reclamation Act requires miners to re-vegetate mined lands. In the west, that law requires them to wait 10 years to prove establishment of that vegetation, while in the east miners only need to wait 5 years. Moisture, or the lack of it, is the biggest factor.	While we indentified the maximum potential of other renewables as part of this study, it is, in fact, our belief that such a project is not a reasonable alternative. We will clarify this conclusion in the next draft of the report.	NRDC concurs that biomass resources on tribal lands are not viable alternatives or complements. However, we note that a 20 MW biomass plant has been approved for construction in northern Arizona, which will use fire-damaged forest products.	
Navajo	ES	12	18. At p . ES-11, carbon sequestration is discussed with respect to IGCC and NGCC technologies. First, we understand that carbon sequestration is not expected to be commercial until 2020, and thus ask why it is being addressed in the study. Second, if carbon sequestration is expected to be so effective, why can't Mohave be retrofitted to utilize such technology? Third, the uses for CO2 are identified in the PD, but not very well. Will there actually be a market for CO2 when it becomes a commercial process — or will there be a flood of the stuff? For example, how can it be assumed that enhanced oil recovery in Kern County will economically support CO2 injection and a CO2 pipeline from Mohave, when two enormous natural gas pipelines to Kern County already support enhanced oil recovery from steam injection obtained from cogeneration facilities.	Re "not expected to be commercial until 2020": We believe that this is a misunderstanding. The PD states that 90% carbon capture depends on turbines capable of burning pure hydrogen and that such turbines are not expected to be commercial until 2020. However, capture of a portion of the CO2 is technically feasible now. Certain types of potential CO2 sequestration, such as CO2-EOR, have been commercialized for many decades. Re retrofitting: The decision to retrofit Mohave or any substitute power plant to capture carbon dioxide is expected to be largely a decision based on the economics of such technology, but its evaluation was not part of the scope of this study. The costs to retrofit the Existing Mohave Station would be excessive and would require considerable auxiliary power to operate.  Carbon sequestration was mandated in the scope of the study. S&L believes that maximum removal of CO2 cannot be implemented with limited risk until 2020. Lower levels of CO2 removal are possible sooner.  Re markets for CO2: There currently does exist a market for CO2 gas in the Permian Basin, as mentioned in the PD. The extent to which that market can absorb additional CO2 gas should carbon capture occur on a widespread scale is not known. Certainly, preliminary studies such as the California study discussed in the PD indicate that there is a significant potential market for CO2 gas. Whether that market is flooded or not will depend on the supply of CO2 gas to the region which in turn depends on variables such as the availability of transport (i.e. pipelines), the extent to which generators employ capture technology and the real and opportunity costs of carbon capture. While worth considering, these are highly speculative and we cannot provide an answer to this question with any level of certainty. Re Kern County: The PD does not conclude that EOR in Kern County would economically support CO2 injection and transport from Mohave. Indeed, the information presented should not be construed as sufficient basis to support such a statement. The PD simply states that the ability of Mohave to access the proposed Kinder Morgan pipeline is currently unknown.		
Navajo	ES	13	19. At p. ES-17, employment impacts to the mining and generating sector will be felt. We see no multiplier of jobs and income to the areas being affected by using these different generating methods.	These multipliers are intended to be quantified as part of the employment impact study task, which is still underway.	Any multipliers should apply equally to IGCC construction jobs, IGCC operator jobs, wind and solar construction jobs, wind and solar operation and maintenance jobs, and to energy efficiency implementation jobs. Many non-Mohave options are likely to be more labor-intensive than Mohave, and have higher local multipliers..	
Navajo	1	1	20. At p . 1-2, what is the margin of error for the IECM model, i.e ., how far off is the model from actual information – 5%, 10% or 15%, or more?	For screening studies of this type, cost is typically -20+30%. A similar assumption can be used for the IECM model. Greater levels of accuracy require extensive engineering and proposals for major equipment from vendors.		
Navajo	1	2	21. At p. 1-3, in discussing the solar technology, what is the need to discuss the Power Tower, when none are still operating any more? Conversely, Para 1 .3.2 suggests that the Parabolic Trough and the Dish Engine are the choice technologies – why not discuss them more?	We have identified the various possible technologies. We attempt to impartially analyze each to come up with conclusions regarding technical feasibility. We therefore cannot simply reject or give less attention to certain technology options. We believe are discussions of each technology are appropriate.		
Navajo	2	1	6. The PD provides no explanation where the IGCC plant at Mohave would obtain its 7,093 acre-feet of water.	The source would have to be the same as existing sources; if allotments from those existing sources were already used for other purposes the plant would not be feasible. We assumed that all water for providing slurry feed would be from the C-Aquifer. All other water needs would come from the Colorado River.	As indicated above and in the PD, the actual amount of cooling water required would be much smaller, assuming dry cooling.  If located at Black Mesa, the amount required would be dramatically lower.	
Navajo	2	2	22. Integrated Gasification Combined Cycle Technology (IGCC). At p. 2-4, below Figure 2-3, the preparers state : "The use of IGCC systems has limited market penetration to date ." This is an important statement . Although the technology seems to be good few have been built and continue to operate today . Is this technology too expensive?	This is a qualitative statement. The relative cost of IGCC is typically about 20% more than from a PC boiler. However, the attributes of a plant that is being built today that could have a 50 year life span may justify the added costs. This is an owner's decision.		
Navajo	2	3	23. At p. 2-5, Table 2-1, the text above the table indicates that only four (4) IGCC plants have been built in the USA . The Table shows five (5) . Which is it?	Five IGCC plants build. Pinion Pine was never operated successfully. Others were operated but shut down for economics at the end of the demo period.		
Navajo	2	4	24. At p. 2-9, what is the justification for escalating cost 3%?	Inflation rates over the long-term average approximately 3%.		
Navajo	2	5	25. At p. 2-13, how does the ash fusion temperature affect an IGCC unit?	For gasification processes that produce molten slag, the gasifier must operate at a temperature sufficient to melt the ash. This may require additives to "flux" the ash. For gasifiers that produce a "dry" ash they must operate below the ash fusion temperature to avoid slagging conditions.		
Navajo	2	6	26. At p. 2-27, where is Appendix Y? Information was only given for appendices A-L	This is a typographical error (place holder during writing). It should be Appendix A.		
Navajo	2	7	27. At p. 2-29, where did the \$70,000 labor cost come from, and does it include benefits, etc.?	This is an average value that S&L has used in a number of recent studies to cover aggregate labor costs for a complete facility covering all site labor including benefits. It is easier to adjust an average value than to construct a detailed job-by-job level budget.		
Navajo	2	8	28. At Table 2-15, are the staffing figures in man-months?	Yes, as indicated these are in man-months.		

Navajo	3	1	29. Solar Technology. At p. 3-2, the PD should swap around Power Tower and dish/engine.	This change will be made.		
Navajo	3	2	30. At p. 3-4, the PD should swap around Power Tower and dish/engine.	This change will be made.		
Navajo	3	3	31. At p. 3-9, the PD should swap around Power Tower and dish/engine .	This change will be made.		
Navajo	3	4	32. At p. 3-13, although it is not practical to store 885 kW for 15 to 16 hours, Mohave runs 24-7 at 1,580 MW at a certain efficiency. The plant delivers power continuously unless it breaks or the system breaks . Just because the sun doesn't shine at night (in Arizona) is not an adequate basis for favoring solar technology over coal technology . The two systems do not deliver the same product . The study must compare apple to apples, not apples to oranges.	Solar technology is not necessarily favored over coal technology nor does Chapter 3 state that. The basic intent of the study was to determine if concentrating solar power (CSP) technology could feasibly replace or compliment the Mohave generation. The report clearly identifies the baseload profile of the Mohave Plant and the limitations of CSP to provide baseload power.		
Navajo	3	5	33. At p. 3-16, where is all this water coming from and how is it being paid for, and to whom?	The determination of the location of water sources other than the "C-aquifer," "N-aquifer," and Colorado River is beyond the scope of this study. Determination of the legal availability of water from these sources is the subject of negotiation and is beyond the scope of this study.		
Navajo	4	1	34. Wind Technology . It should be clarified, once again, that developing the technology would engender a potential complement technology to Mohave . The study should address who would be the owner of this technology either on or off the reservation(s). If off, how do the Tribes benefit from the technology? If on, is there a benefit? Personnel assigned to this type of operation (a maximum of 14) are significantly less than the 230-350 presently working at the mine and power station. How, is this job loss offset — or is it?	This is a decision the Navajo and NTUA will need to make. What structure do they want to use to develop wind? Bring in private capital or do it themselves, or partnership structure? Wind will not provide the same level of permanent employment as the 230 currently employed at Mohave. It will provide tax and lease revenue to the Nation, and it will provide a lot of construction employment.		
Navajo	4	2	5. The PD describes the NTUA Gray Mountain Wind Site, but does not clarify whether that site is considered a replacement for Mohave, or a complement for Mohave . If NTUA is anticipating this site in addition to Mohave, there may be an opportunity cost to the Nation if it is used instead to replace lost capacity at Mohave rather than market the energy elsewhere or use it on the Navajo Nation Reservation.	Decisions about "replacements" or "compliments" depend on the decision regarding closure or continued operation of the existing Mohave plant. That decision is beyond the scope of this effort. We provide expected output profiles of the various technology options and compare these the existing plant, pointing out whether the options can, in fact, mimic the output profile of the existing plant. Decisions about going forward with any of the various options will take this into account in an integrated resource planning effort, which is outside the scope of the current effort.		
Navajo	5	1	35. Natural-Gas Combined Cycle Technology (NGCC) . The study should be reformatted and this technology should be either ahead or right behind the IGCC technology — there are too many similarities between the two processes.	We appreciate that IGCC and NGCC can be thought of as similar, since they are both combined-cycle technologies. We do not feel, however, that the chapters need necessarily be together. The aspects of the IGCC technology that require discussion are, of course, associated with the gasification system. This is sufficiently complex that the form of discussion of the chapters is significantly different.		
Navajo	5	2	36. The land needed for the NGCC plant is minimal (30 to 46 acres) depending on whether or not the plant has CO2 sequestration and whether the plant uses mechanical cooling as opposed to air cooling . As mentioned before, a considerable amount of water is needed for these plants — where will it come from? Construction for the site is dependent on the schedule for permitting, etc. Where is the fuel supply coming from and how does it affect costs?	We assume that water at the existing site will be available from the same sources as currently used. We understand that water rights are tied to the use of coal from the Black Mesa mine. Nevertheless, it is technically possible to construct an NGCC plant on the Mohave site. Assessment of the possibility to transfer the water rights to a new NGCC plant is not directly in the scope of our effort, however, we will point out that this issue is a significant potential barrier to the development of such a product at that site. Fuel will come from existing natural gas trunk pipelines either located west or south of the site. Costs will depend on the cost of natural gas.		
Navajo	6	1	37. Energy Efficiency/Demand Side Management Technology (EE/DSM) — Though creative, the question arises : How practical will it be for California to implement this proposal?. How likely is it that out-of-state utilities would be willing to sell their excess power to another power company, unless there is a lot of money put on the table ? That said, SCE customers will want to know why they aren't getting a break on their power bill . Sure, it's great for a customer of an out-of-state utility to get a rebate for buying an energy efficient washing machine/refrigerator — but that's a one time shot . How will the out-of-state utility keep its customers happy? If fuel prices go up, how will the out-of-state utility justify that increase?	The final report will include clearer and expanded DSM-alternative illustrative examples that will address the economic issues noted here. Practicality, risk, and the allocation of any/all net economic benefits of a DSM alternative - across SCE and utility partner ratepayers and shareholders - will be addressed.		
Navajo	7	1	38. Other Renewable Energy Technologies. This technology is not an "alternative ." Geothermal is wonderful if the water is hot enough and the only possible place is in the New Mexico portion of the Navajo Nation, at the Bisti area (a federally designated wilderness area), which might be difficult to develop . As for biomass, that is not a good idea for use in the desert . The study preparers suggest that if the forest products group in Navajo, NM was still operating, there may be an opportunity . We don't believe so. The PD also mentioned the co-fired biomass/coal feedstock technology, but how much heat loss is involved?	We concur with the Navajo assessment of the biomass and geothermal potential in the area. Since no data exist concerning the volume of wood waste from forest products plant, we concede that it may very well be true that no significant potential may have existed. With regard to co-fired biomass technology, the greater moisture content of the biomass does lead to greater heat loss to the power plant stack. However, if the biomass feedstock is sufficiently cheap, this concern can be alleviated. Also, if forest levels remain the same through replanting, then over time, the net greenhouse gas emissions of the biomass fired is zero.		
Navajo	8	1	39. CO2 Sequestration . Unfortunately, the recovery and disposal of CO2 is not an available option. The PD notes that where CO2 is used for enhanced oil recovery, the outcrops of the reservoir must be at great distances from the input point . It further notes that there is a "blow down" effect when CO2 gas is no longer needed, releasing the CO2 to the atmosphere, but at a later date . It appears that the marketing of CO2 will be difficult.	Currently, there is not a specific market for CO2 from an IGCC or NGCC unit. However, that does not mean that one could not develop in the future. (particularly under some sort of GHG policy.)		
Navajo	9	1	40. Tribal Issues. The chapter is superficial. The Study should include a Table in this section (and moved to the Executive Summary) that would explain that the jobs will not be gained by some of these "alternatives ."	The tribal issues identified in the scope of work included acceptance, permitting, employment impacts, tax revenues, and income from royalties, fees and the like for land, water, and coal. We are working on the employment impacts and tax revenues and have reported (with apparent agreement from the stakeholders) that acceptance and permitting issues, as well as estimating income from royalties, fees, and the like were not feasible due to the confidential nature of past data and current negotiations. If there is an alternative way to address those issues that would be acceptable to the stakeholders, we are open to revisiting them.		
Navajo	9	2	3. The PD makes no mention of the Navajo Nation Water Code and the Water Code Fee Structure, despite the fact that early on the Navajo Nation's representatives explained the central position the Navajo Nation Code had in this inquiry . The drafters were specifically referred to the Navajo Nation Code.	We are cognizant of both the Navajo Nation Water Code and the Hopi Tribal Water Code; during the preparation of the draft we purchased the complete Navajo Nation Code; and, shortly before the draft was circulated, the Hopi Tribe furnished us with a copy of the Hopi Tribal Water Code. Both Codes make it clear that any decisions affecting the water rights of either tribe will be governed by the pertinent tribal authorities. However, with respect to the Navajo Water Code fee structure, the Navajo Code says only that "reasonable" fees may be assessed (22 NNC sect. 1307); we hope to obtain further information with respect to its present or anticipated fee structure.		
Navajo	9	3	4. The PD makes several comments about needing additional information from the Tribes to facilitate its economic evaluation. However, it is not clear what information is needed . 3 There have been IMPLAN studies of the Three Canyon Project, a water project, and Navajo-Gallup Water Supply Project . The Kyl Study (U.S. B.O.R.H.D.R. Western Navajo and Hopi Water Supply Study, Need Alternatives and Impacts (May 2003) also included much of this information.	We have provided lists of types of information that would be helpful and have offered to discuss those needs and what information would be available with tribal government staff or others that might have that information. We have requested copies of economic impact studies, such as the IMPLAN studies mentioned, because they might provide some of the necessary information. If they are made available, those studies may provide some of the information we seek, and we will be glad to make use of that data. If they are available publicly, we will seek to obtain them, but would appreciate more complete citations, including identification of the authors.		
Navajo	10	1	41. Financial Issues . A lot of valuable information complied here . It appears this should be in the division of economic development master plan.	We believe this to be a comment internal to the Navajo and is not relevant to our report.		

Navajo	10	2	2. The PD frequently states that IGCC technology is not conducive to a tribal enterprise. However, it contains no argument or explanation about why a tribal enterprise is impossible. For example, the Navajo Nation has recently received an offer from AEC to investigate an IGCC facility that would be a tribal enterprise. While the Navajo Nation will not opine on that specific proposal, the Study should tone down and rethink, or better explain, its anti-tribal enterprise position .	The PD does not state that a tribal enterprise is impossible, but points out certain reasons why a third-party enterprise organization might be preferable. However, we will make this distinction more clearly and note that a tribal enterprise is possible and that the specifics of any proposal should be evaluated in the tribe's actual decision.		
Navajo	10	3	7. Contrary to the mandate of D.04-12-016, the PD provides no economic analysis from a Tribal perspective. Instead, it provides its economic analysis only from the SCE ratepayer perspective. This inadequacy in the PD may lead to faulty decision-making . While two options may have similar cost from the SCE ratepayer perspective, they could have vastly different economic impacts on the Tribes. It would be very helpful if the final MACS Study included an analysis of the economic impacts of each of the considered options from the perspective of the Tribes.	For the economic impacts of each of the options on the Tribes, please see response to comment Navajo 9-1, above.		
Navajo	11	1	42. Generation and Demand Profiles. This section of the Study seeks to address the letter of NRDC discussed above, which seeks the combination into a portfolio of multiple resources to replace Mohave. For the reasons stated above (General Comments), this section should be deleted from the Study.	This task is required by our original scope of work, and is not in response to the NRDC letter cited.		
Navajo	12	1	43. Transmission Issues . This is an important part of the PD in that it identifies the existing circuit, its existing load and potential additional capacity available.	We have attempted to be as specific as possible regarding circuits and loading in our load flow studies.		
Navajo	Appendices	1	44. Appendices A through J . Just the back up information from the research developed.	We will use the appendices to report supporting data and provide certain important analyses and reports important to the study effort.		
			<b>SIERRA CLUB COMMENTS FROM ROB SMITH, ROBERT TOHE, AND ANDY BESSLER</b>			
Sierra Club	General	1	The Sierra Club supports this alternatives study to the MGS and urges Sargent and Lundy to explore the possibility of combining an aggregate collection of renewable energy alternatives to replace the total energy collection of MGS. Such a combination is found in the Potential Mohave Alternative/Complementary Generation Resources at 12.7.1 under the Interconnection Feasibility Methodology portion	Collections or "portfolios" of technology options may be appropriate. However, selection of the elements of any "portfolio" will be the subject of an integrated resource planning effort beyond the scope of this effort. We have provided certain combinations in Section 12 in order to assess the impact of multiple projects on transmission requirements. We will augment this discussion with the impact of single projects at Gray Mountain (450 MW) and IGCC at Black Mesa.		
Sierra Club	General	2	The Sierra Club supports Case 3 and Case 4 in which a combination of power plants would be built using solar Sterling Dish technology and wind turbines to replace nearly 1000 MW of electricity for CA ratepayers. However, further study needs to also include with these combinations, the MW replacement from conservation measures to reduce the total amount of power to replace the power Mohave produced.	Analyzing portfolios of options is outside of the scope of work.		
Sierra Club	General	3	In June 2005, Governor Schwarzenegger announced his groundbreaking initiative to reduce California's greenhouse gas (GHG) emissions to 1990 levels by 2020. Because of this, on October 6, 2005, the CPUC passed their " Policy Statement on Greenhouse Gas Performance Standards." By compiling [sic] with this statement on reducing greenhouse gas, the Mohave Alternatives Study should prioritize the case studies to weigh more heavily on wind and solar sterling [sic] dish technology rather than coal-fired plant replacements.	Our analysis estimates the opportunity cost of CO2 emissions by projecting CO2/carbon allowance prices under probable federal policy scenarios. The alternatives will be presented with the total costs and revenues associated with each, including carbon policy compliance costs. Carbon cost data based on national policy are fairly rigorous and more-or-less readily available, whereas the policy development in California involves considerable uncertainty (the policy statement was posted very recently—Oct. 6, 2005—and directs Staff to investigate numerous aspects of the standard). However, we will address this initiative qualitatively and, if possible, quantitatively.		
Sierra Club	General	4	The Sierra Club supports alternatives that promote wind and solar energy development on tribal lands that would, at the same time, meet the electrical needs of California ratepayers and help rebuild the tribal economies of the Navajo and Hopi Tribes.	This report is meant simply to provide data concerning solar and wind projects. Whether this data supports or impedes development of such projects will be determined by others.		
Sierra Club	General	5	In addition, the Sierra Club urges Sargent & Lundy to articulate the possible scenario of funding wind and solar energy projects on Navajo and Hopi lands through transfers of sulfur dioxide allowances from Mohave owners to the tribes. The challenges of tribal laws supporting energy development for alternatives could be overcome with financial support from investment from Mohave owners based upon a cash inflow to tribal governments and small business investment companies operated by tribal governments. The cash flow could be directed to economic planning efforts at the Hopi village and Navajo chapter level and as investment to the tribes to develop the alternatives listed in Case 3 and/or 4. This type of investment would not impact California ratepayers and would respect tribal sovereignty by allowing the tribes to direct clean energy development on tribal lands.	While we have not specifically researched this issue, it is our general understanding that any revenue from the disposal of such allowances or cost savings from eliminating the need to purchase them would flow through to SCE's retail ratepayers under traditional ratemaking. If the situation is different for SCE or MGS, we would appreciate clarification of that. Otherwise, we are not aware of a scenario under which transfer of those allowances to the tribes would be permitted by California regulators. Conversely, if the allowances and revenue from their disposal is the property of SCE and does not flow through to rate payers, SCE would need to make a corporate decision about their disposal.		
Sierra Club	9	6	Unfortunately, the analysis of tribal issues found in Chapter 9 fail [sic] to adequately address tribal opportunities for renewable energy development and should be more specific about the opportunities identified elsewhere in the report for incentives, tax breaks, and other opportunities to encourage tribal economic development. Like NRDC, Sierra Club is concerned that the Draft Report in this chapter unnecessarily introduces a bias against tribal renewable energy development.	We will provide a discussion of the cited opportunities in this chapter in the final report.		
			<b>SCE COMMENTS</b>			
SCE	General	1	1. In the body of the report it says S&L did this and S&L did that Synapse did this and Synapse did that It is recommended that the report not be personalized, the wording should be generic. It's OK to say in one place that work was divided between the two companies and then define the scope for each company, but then it should not say who did what thereafter. Use a neutral word such as "it" to replace S&L or Synapse.	We will eliminate references to S&L and Synapse except as specified and replace such references with general descriptors such as "the consultants," or will employ the passive voice.		
SCE	General	2	2. There are a number of spelling and grammatical errors in the report. It is assumed that they will be corrected for the next issue.	We will of course strive to eliminate such errors in the next draft of the report.		
SCE	General	3	10. As a general comment, any place in the report that general information exists that could be focused in on the specific projects and locations under discussion, it would be helpful.	We will address this in the process of preparing the second draft of the report.		
SCE	General	4	For some of the technologies you show various units of use, such as gpm or annual gallons or acre-feet. Acre-feet is the number that most stakeholders are going to be interested in. You should show gpm and annual acre-feet for each technology. The capacity factor that the annual consumption is based upon should be noted.	We understand that acre-ft are the units most familiar to interested users and will ensure that gpm and acre-ft/yr are shown for all water usage.		
SCE	ES	1	1. Page ES-1, 1 <sup>st</sup> paragraph: LADWP now only owns 10% of Mohave and SRP now owns 20% of Mohave (LADWP sold half of their original ownership in Mohave to SRP a few years ago).	We will clarify the ownership of the plant in the next draft of the report.		
SCE	ES	2	2. Page ES-2, Table ES-2: What year dollars are shown (this comment applies to all dollar references in the report)? You should state this fact once in the beginning of the report if possible and appropriate.	We will employ year 2006 dollars.		
SCE	ES	3	3. Page ES-2, Table ES-2: What about O&M costs? All of the other economic tables for the other technologies show O&M costs also. O&M costs should be included in this table also. When you show the O&M cost, you should also state what fuel cost was assumed for coal, natural gas, etc.	We will ensure that O&M costs are stated for all options. Fuel costs are the subject of a separate effort within the scope of the study. We will use the fuel price projections for coal and natural gas to develop the fuel cost in \$/MMBTU terms for each option.		

SCE	ES	4	<p>4. Page ES-3, Table ES-4: The report is inconsistent between the various technologies. The report should be made consistent. For example, in this table you show Annual Capacity Factors and Annual Generation. These two items are not shown for the IGCC. It might be useful to include a summary table similar to the one shown below including all of the items for each technology and indicate what might not be applicable to any specific technology.</p> <table border="1"> <thead> <tr> <th>Item</th> <th>IGCC</th> <th>SOLAR</th> <th>WIND</th> <th>CCGT</th> </tr> </thead> <tbody> <tr> <td>Unit Size, MW</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Net Output, MW</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Capacity Factor, %</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Annual Generation, MWhrs/yr</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Heat Rate, Btu/kW-hr</td> <td></td> <td>N/A</td> <td>N/A</td> <td></td> </tr> <tr> <td>Capital Cost, \$ or \$/kW</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>O&amp;M Cost, \$/kW-yr or \$/kWhr</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Fuel Cost, \$/ton or \$/MMBtu</td> <td></td> <td>N/A</td> <td>N/A</td> <td></td> </tr> <tr> <td>Land Use, Acres</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water Use, gpm &amp; Acre-Feet/yr</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total Staffing</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Transmission Requirements</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Any other item you</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Transmission Requirements: This item may require two entries to describe transmission requirements from the new generation to the existing transmission system(s) and any potential upgrades, immediate or in the future to the existing transmission system(s).</p>	Item	IGCC	SOLAR	WIND	CCGT	Unit Size, MW					Net Output, MW					Capacity Factor, %					Annual Generation, MWhrs/yr					Heat Rate, Btu/kW-hr		N/A	N/A		Capital Cost, \$ or \$/kW					O&M Cost, \$/kW-yr or \$/kWhr					Fuel Cost, \$/ton or \$/MMBtu		N/A	N/A		Land Use, Acres					Water Use, gpm & Acre-Feet/yr					Total Staffing					Transmission Requirements					Any other item you					<p>We will present the coordinated table with the data as requested in this comment. We will present fixed and variable O&amp;M costs as \$/kW-yr and \$/MWh, respectively.</p> <p>Synapse and S&amp;L will coordinate the drafting of the final transmission section and will address the overlap of 1) transmission requirements arising out of the load flow analysis, and 2) the availability of transmission arising from the OASIS and studies' review tasks.</p>		
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SCE	ES	5	5. Page ES-3, Table ES-4: Water Requirement-see comment No. 4 [SCE-General-4] (Water Use) above.	See response to comment SCE-ES-4.																																																																								
SCE	ES	6	6. Page ES-4, Table ES-4: You show a Total Staffing number of 26 for the Dish/Stirling Engine. Is this sufficient to operate and maintain 17,000 units especially when you show 62 per unit and 82 total for the solar trough technology?	This number has been updated based on input from Stirling Energy. The revised staffing is: 118 Administrative = 4 Technical Services = 2 Operations = 12 Maintenance = 100																																																																								
SCE	ES	7	7. Page ES-4, Table ES-5: See comment No. 6 (Annual Generation) above.	See response to comment SCE-ES-4.																																																																								
SCE	ES	8	8. Page ES-4, Table ES-6: See comment No. 6 (O&M Cost) above.	See response to comment SCE-ES-4.																																																																								
SCE	ES	9	<p>9. Page ES-5: It is suggested that it is more appropriate that the technical explanations shown deleted below be included in the body of the report rather than in the Executive Summary.</p> <p><del>“Combined cycle technology has been used to generate power for a number of years. Combined cycle technology in the power industry is primarily a combination of the Brayton and Rankine cycles. The combustion turbine operates on the Brayton cycle and the bottoming cycle, which is made up of the heat recovery, steam generator, steam turbine, and related balance of plant systems, operates on the Rankine cycle.”</del></p> <p><del>“For a combined cycle power plant, the combination of multiple power cycles is performed to improve the overall efficiency of the total power plant. In general, a simple cycle combustion turbine (i.e. Brayton cycle) has an efficiency in the range of 19% to 38% on a higher heating value basis. The efficiency range is quite broad due to the firing temperature of the combustion turbine, the pressure ratio, and the blade and component design of the machine. The Rankine cycle power plant efficiency is typically in the range of 32% to 39% on a higher heating value basis. The Rankine cycle efficiency is generally a function of the cycle configuration, the steam conditions, the equipment design, and the cooling source. The combination of these two power cycles, representing the combined cycle power plant, generally provides efficiencies in the range of 48% to 52% on a higher heating value basis.”</del></p>	We concur and will succinctly summarize the technology options in the Executive Summary and provide more detail as required in the body of the report.																																																																								
SCE	ES	10	<p>10. Page ES-6, Tables ES-7 and ES-8:</p> <p>A. Why did you choose to show performance at 67 °F rather than the ISO standard of 60 °F? Wouldn't it be more appropriate to use the ISO condition?</p> <p>B. Using the 125 °F design condition is appropriate for what the maximum power reduction would be, but it is probably not appropriate for a summertime design temperature. You should leave the 125 °F results in the table, but it is also suggested that you use the ASHRAE 5% design summer dry-bulb temperature of 108 °F for that area (Needles, CA). The 108 °F temperature would provide a more “realistic” output for the summertime since the 125 °F temperature might only occur for one or two hours per day and not every day during the summer months. The wet-bulb temperature that corresponds to the 108 °F temperature is 77.9 °F which is based on previous cooling tower sizing applications for Mohave.</p>	<p>We determined that 67 °F is the annual average temperature at the site.</p> <p>We will run the case of the ASHRAE 5% design dry-bulb temperature using the data provided here (108 °F dry bulb, 77.9 °F wet bulb).</p>																																																																								
SCE	ES	11	11. Page ES-8, Table ES-10: What was the assumed fuel cost?	We will provide the 2006 fuel cost here as provided by Synapse.																																																																								
SCE	ES	12	12. Page ES-8, Table ES-12: Water Requirement-see comment No. 4 (Water Use) above.	We will provide the data in acre-ft as requested.																																																																								
SCE	ES	13	<p>13. Page ES-8, last paragraph: The first sentence is too personal for this type of report. It is the use of the word “we” that makes it too personal. It is suggested that the sentence (and everywhere else in the report where the text is similar) use a more neutral approach as suggested below:</p> <p><del>As part</del> Part of the Study analysis, <del>we were tasked</del> included a task to undertake a review of energy efficiency/DSM resources available in western US states outside of California.</p> <p>This same type of wording change should be used to replace the company names, S&amp;L and Synapse, as noted in comment No. 1 above and all other personal terms such as “us,” “our,” etc..</p>	We will correct this in the final report.																																																																								

SCE	ES	14	<p>14. When reviewing the Executive Summary, the following technology outputs have been noted:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Item</th> <th>Mohave</th> <th>IGCC</th> <th>Solar</th> <th>Wind</th> <th>CCGT</th> </tr> </thead> <tbody> <tr> <td>Unit Size, MW</td> <td>885</td> <td>630/595</td> <td>300/425</td> <td>61-150</td> <td>500/1,000</td> </tr> </tbody> </table> <p>Yet, nowhere in the Executive Summary does it explain why the unit sizes chosen are so disparate, especially when technologies such as the Dish/Stirling solar and wind could be made to match almost any output closely. This disparate output should be explained in the Executive Summary.</p>	Item	Mohave	IGCC	Solar	Wind	CCGT	Unit Size, MW	885	630/595	300/425	61-150	500/1,000	We will summarize the rationale for each unit size here in the Executive Summary in the next draft of the report.		
Item	Mohave	IGCC	Solar	Wind	CCGT													
Unit Size, MW	885	630/595	300/425	61-150	500/1,000													
SCE	ES	15	15. Page ES-11, Subsection ES.4.1 Financial Incentives: This section includes a lot of text, but no “meat and potatoes.” For all of the incentives listed the question is asked “So, how much?” In other words, what is the range of percent for these incentives that could be applied to either capital and/or O&M to reduce costs? Some numbers or potential examples here would be very helpful.	We will provide some examples in the next draft.														
SCE	ES	16	16. Page ES-13, Subsection ES.4.4 Fuel Prices: Same comment as No. 17 above, a lot of text, but no numbers. You need to quote actual fuel costs here in dollars and cents and the basis for the numbers presented.	We will provide summary numbers in the ES of the next draft.														
SCE	ES	17	17. Page ES-14, 1 <sup>st</sup> paragraph: You state “Coal prices, generally, on the other hand, are likely to increase gradually (in real dollars) from present time until 2025, but at a modest rate compared to that of natural gas.” It is agreed that this is probably true, but does not have any real bearing on Mohave or this study. For “normal” coal plants, they can receive coal from multiple sources which is not true for Mohave. Also, “normal” coal contracts are for shorter terms than would be for Mohave. It’s expected that the new coal contract will be similar to the existing coal contract in both duration and price and that the price will be fixed for the contract term with some provisions for price increases. Thus, the Mohave coal price will be “more fixed” until it expires in 2026 and will not be subject to market forces as are the contracts for other coal plants.	Agree that the specific coal supply contractual arrangements for any plant will take precedence over general market factors. However market prices do influence contract prices. Other factors such as fuel price increases for the mining equipment is also likely to be passed through in contract prices. Mohave (Black Mesa) coal may have a price fixed for some period. Explanatory language will be added pointing out that this projection does not apply to Black Mesa, but to open market coal and mines that can ship to open markets.														
SCE	ES	18	18. Page ES-17: The following text should be deleted and rewritten when the data becomes available. <del>“The Hopi Tribe has informed us that it does not at present have a tax code; and, under the Hopi Tribe’s Constitution, a referendum vote of the Tribe’s members would be necessary to change that situation. We are working to schedule opportunities to review with relevant tribal government personnel the manner in which such taxes are or may be applied and determined and any anticipated changes or trends. After collection and verification of this basic information on the tribal taxes that would apply to the technologies that may be considered for tribal land (IGCC at Black Mesa, Solar 1 and 2, and the four wind sites), we will use that information, along with the investment and O&amp;M estimates for the technologies to estimate the tax payments that would be due under identified provisions.”</del>	Agreed.														
SCE	ES	19	19. Page ES-18: Ditto the comments above regarding rewriting when data is available; <del>“The purpose of our employment impact analysis is to convert estimates of the initial, direct purchase of goods and services by the relevant technology options into total employment impacts in the local region, taking into account all the secondary purchases and activity. This conversion will be done with a custom economic model for the counties that include the Navajo Nation and Hopi Tribe reservations, a total of six counties. To obtain the best possible accuracy, we will also need information and advice from the economic development entities within each tribe and information regarding the operation of tribal employment preference laws, as well apprenticeship or other job development programs. The custom economic model for this task has been obtained and the basic county economic data is available. Sargent and Lundy has provided some but not all of the data on direct employment and goods and services for construction and O&amp;M. Discussions are under way with the Navajo Nation and the Hopi Tribe to obtain and understand (1) historic economic and demographic data, (2) tribal employment preference programs and their impacts, and (3) other relevant programs, especially apprenticeship and job training programs. Our ability to provide timely employment impact results will depend on receipt of the additional data collection.”</del>	Agreed.														
SCE	ES	20	20. Page ES-19, ES.6 Load and Generation Profiles: After the first paragraph, a graph/chart with would be helpful to visualize what is being said. The text should then be modified to help explain the graph/chart and vice versa.	We will consider how this could be done.														

SCE	ES	21	<p>21. Page ES-20:  “Our analysis demonstrates that <u>shorter-term</u><sup>A</sup>, or non-firm service, is available from most source points examined, but not necessarily during all periods. Thus, alternative or complementary sources located in the Study Area connecting up to the grid in the near-term might need to rely on <u>shorter term transmission</u><sup>B</sup> availability. <u>It is important to keep in mind, however, that the value of OASIS information is limited because of its time frame; it is not predictive beyond the near-term time periods, at most a few years out.</u><sup>C</sup>  <u>Sargent &amp; Lundy also performed load flow studies of various generation alternatives. Please see Section 12.8 for details. Costs shown in section 12.8 for required transmission upgrades may be reduced if transmission upgrades detailed elsewhere in the report are performed by others.</u><sup>D</sup>  In addition it is important to consider that new <u>transmission line proposals or works in progress</u><sup>E</sup> add significant capacity to into-CA (and likely intra-Arizona) transaction paths. To the extent these lines are built, it is possible that most alternatives or complements could secure access to import into SCE territory.”</p> <p>A. The definition of “shorter-term” should be provided.  B. The definition of “shorter-term” should be provided unless it is the same as noted above. Also, some explanation needs to be provided in this summary regarding “long-term” including specifics.  C. What about long term? Some explanation needs to be provided in this summary regarding “long-term” including a definition and specifics.  D. Some data, costs or specific values, if possible, should be added in the overall table for the various technologies above (see comment 6 above). The reference to this table (or data values) should also be made here.  E. It might be good to provide some examples here to illustrate your point.</p>	Definitions and clarifications will be included in the final report.		
SCE	2	1	22. Page 2-8, Under the limitations for the model, you have noted a bullet item regarding “No SCR for enhanced NOx reduction ....” and also have an item under the Combustion Turbine Model Limitations “- Does not consider SCR”. Are these two items a duplication of the same thing? Please clarify in the report.	We will clarify this in the next draft report.		
SCE	4	1	<p>3. Wind projects  A. Do the listed projects already have PPA’s?  B. Is the power currently available to be purchased by CA or not?  C. Were the projects just looked at to get a range of costs for other projects that could be constructed to potentially supply power to CA? The current write-up begs this question, please clarify.</p>	<p>Sunshine is the only project which is advanced enough to have a PPA. Foresight is negotiating with APS but has not executed a PPA as of yet. None of the other projects has a PPA at this time.</p> <p>Yes, all of the power from these wind projects could be sold into the CA market given mutually agreeable transmission arrangements.</p> <p>These projects were chosen using the following criteria</p> <ul style="list-style-type: none"> <li>• On Hopi or Navajo lands or near them</li> <li>• Category 3 wind resource or better</li> </ul> <p>These sites are specific sites that have the required wind resources, not sites that were looked at simply as surrogates for obtaining estimates of the range of costs that would be incurred in the construction of a wind power plant.</p>		
SCE	7	1	23. Page7-16, Agricultural residues: We assume the first bullet is also indicating wheat straw rather than “what straw”.	Yes, that is correct.		
SCE	7	2	24. Page 7-23, 7.2.3.3 Utah: The first sentence on this page should indicate Utah, not “New Mexico”.	We will make this correction.		
SCE	9	1	6. Tribal Issues: It would be highly desirable if some assessment or ranking of likely tribal benefits among the various projects could be included in the report. If no specific dollar amounts are available, perhaps a high, med, low income ranking based on different categories of potential direct & indirect income (e.g., coal royalties, lease income, tax income, employment income, indirect income, etc.) could be developed for each type of resource to be able to directly compare them in one table.	Agreed. However, quantification is not likely to be feasible except for tax revenue and job impacts. See response to Navajo 9-1.		
SCE	12	1	4. Transmission: When the report states that that transmission is not available during all periods, it would be helpful to specifically identify those periods and amount of transmission that is actually available to wheel power into CA, to clearly understand the results of the study.	The final report will include additional appendix material which will list the periods in which transmission is not available, or is available at lower levels. These tables will support the set of summary ATC tables in the PD.		
SCE	12	2	<p>5. Transmission: In the next issue, it would be helpful if conclusions could be grouped into three scenarios:  A. Those projects/locations that could wheel power into CA now, based on existing transmission;  B. Those projects/locations that could wheel power into CA if reasonably certain new transmission project re constructed, along with a time frame of when that might occur.  C. Those projects/locations that could wheel power into CA if all proposed transmission is built, along with some information on the status and challenges facing the less likely routes so a reader would be able to assess the ultimate likelihood of their success. For example, there is currently insufficient funding to construct the Navajo Transmission Project even through Phase 1.</p>	<p>The results in the current report provide this detail. We cannot make judgments as to what overloads will be eliminated due to system upgrades without actually rerunning the studies. For part B, a review of the possible transmission projects identified revealed two that are “reasonably certain” to be completed. These are the Palo-Verde Devers #2 (2009) and East Colorado River Path 49 Short Term Upgrades (phase angle regulation + VAR compensation) (2005-2006) (approx. 4,000 MW transfer increase total). These projects can be added into the model and the cases re-run. We expect to treat the part B cases as derivatives of the part A cases and will provide summary conclusions about the differences made to the part A results by the “reasonably certain” project in our discussion in the report.</p> <p>In order to provide some detail related to part C, we will present a list of potential transmission projects and provide information regarding the status and likelihood of completion of such projects. We will not run any load flow studies based on the likelihood of these projects. If all or most of the transmission projects are completed, it is reasonable to expect that the generation projects will be able to interconnect.</p>		
SCE	Appendix I	1	7. Emissions Valuation: The emissions valuation discussion is currently quite general. It would be helpful if it were more specific to the projects and locations being analyzed. For example, when discussing non-attainment in NV, most of the non-attainment areas listed do not include the MGS site. Knowing what actually applies at the MGS site would be helpful. Further there are two sites under consideration for combustion sources, the MGS site and the mine site. However, no analysis of the mine site was included. Is it in attainment for all pollutants? If so, that would be helpful to mention.	Discussion of emissions regulations that apply to the IGCC alternative located at the Black Mesa Mine site will be included in the final report. The final report will also include more location-specific information.		

SCE	Appendix I	2	8. Emissions Valuation: It should be noted that power generation sources are not under the jurisdiction of Clark County, but are under the jurisdiction of the Nevada State Department of Environmental Protection (NDEP). When discussing future NV only trading regulations, talking to the NDEP for additional insight would be helpful since it is believed that there are only 10 (approximately) potential point sources available to include in any type of trading program and most are significantly controlled making a state-only market infeasible due to liquidity issues. When discussing H <sub>g</sub> , it might be helpful to compare MGS post-control and new IGCC/CCGT emissions to the levels likely to be included in a trading program, since they may be below the threshold of currently contemplated programs.	For the final report, we will be talking to the NDEP and the AZ Dept. of Environmental Quality and will provide any insights they provide. Valuation of emissions of a post-control MGS is beyond the scope of this project. It is not clear what is meant by "the levels likely to be included in a trading program", however we do document the parameters of the Clean Air Mercury Rule.		
SCE	Appendix I	3	9. Emissions Valuation: Similar to the transmission comment above, it would be helpful to clearly identify which emission credit programs currently exist that are applicable to each of the listed technologies and sites vs. mixing that discussion with potential future regulations. It is believed that only the Acid Rain SO <sub>2</sub> program would apply to combustion sources at either the MGS or mine site. To the extent that future regulations could be adopted, a date range of when that might occur would be helpful to include.	Agreed		
			RE: COMMENTS BY THE GRAND CANYON TRUST ON THE PRELIMINARY DRAFT MOHAVE ALTERNATIVES STUDY BY: ROGER CLARK AIR & ENERGY PROGRAM DIRECTOR GRAND CANYON TRUST (928) 774-7488			
Grand Canyon Trust	General	1	We have read and fully endorse comments to the Preliminary Draft submitted by the Natural Resources Defense Council.	Our responses to NRDC's comments are provided elsewhere in this document.		
Grand Canyon Trust	9	1	The Mohave Alternatives Study should describe existing issues of inequity that have resulted from historic patterns of energy development on tribal lands. We recommend that the development and analysis of alternative energy scenarios evaluate their ability to create equitable and sustainable benefits with and for native people.	This task is beyond the scope of work provided for in this project.		
Grand Canyon Trust	9	2	For example, energy development on tribal lands has fueled decades of rapid suburban growth in prospering cities throughout the West. However, fewer than half of the homes of people who live on rural tribal lands where energy is produced have electricity and running water. Unemployment chronically exceeds forty percent within the region's Indian reservations. The health of native and non-native residents is damaged by air and water pollution caused by years of mining and converting oil, uranium, coal, and natural gas into profits that are exported to distant centers of commerce. While Navajos and Hopis have received some royalties and employment from mineral extraction on their lands, most of the benefits have gone to outside utilities, investors, and ratepayers in the form of cheap energy.	See response to comment Grand Canyon Trust-9-1.		
Grand Canyon Trust	9	3	The economic drain caused by the exportation of energy profits is exacerbated by the lack of native-owned businesses and equity in capital investments on tribal lands. For example, the Navajo Nation is both the region's and the United States' largest reservation (in both population and area). However the per capita income for the Navajo Nation is less than \$8,000 per year, while the estimated total personal income amounts to more than \$1.2 billion annually. Of that \$1.2 billion, the Navajo people spend less than 30 percent on their reservation. The resulting net loss or economic leakage from the Navajo Nation is more than \$800 million per year	See response to comment Grand Canyon Trust-9-1.		
Grand Canyon Trust	9	4	Energy development in the region has too often come at the expense of the tribes. The Mohave plant has generated billions of dollars in electricity and shareholder profits for more than three decades. Those gains, however, have been derived from externalized expenses paid for by indigenous people and the environment. The cost of electricity from Mohave has been kept artificially low by, among other things, dumping millions of tons of pollution into the atmosphere in violation of the Clean Air Act, purchasing coal from tribes at prices well below market rates, and mining groundwater for a coal slurry line that has depleted springs and wells on the Hopi and Navajo reservations. As a former tribal chairman concluded, "they have taken our coal and water and given us polluted air in return."	See response to comment Grand Canyon Trust-9-1.		
Grand Canyon Trust	10	1	The Mohave Alternatives Study should explore possible applications of revenues derived from sulfur dioxide allowances when Mohave shuts down. For example, these "windfall" revenues could provide investment funding for tribes to develop alternatives such as wind. The amount available could be equal to the annual amount that the owners of Mohave will receive from the sale of approximately 50,000 tons of sulfur allowances that they will receive when it shuts down on December 31, 2005 (a value of at least \$40 million annually at current prices of more than \$800 per ton).	While we have not specifically researched this issue, it is our general understanding that any revenue from the disposal of such allowances or cost savings from eliminating the need to purchase them would flow through to SCE's retail ratepayers under traditional ratemaking. We are not aware of a scenario under which transfer of those allowances to the tribes would be permitted by California regulators.		
Grand Canyon Trust	10	2	The Mohave Alternatives Study should evaluate opportunities for underwriting investments in alternative energy generation through long-term procurement agreements with owners of Mohave and other utilities in the region. These opportunities may include purchases preferences for minority or economically depressed sources as well as for purchasing power from sources that meet California's newly adopted performance standards for reducing greenhouse gas emissions.	We will explore this issue and discuss it in the final report.		
			TURN COMMENTS ON PRELIMINARY DRAFT STUDY OF POTENTIAL MOHAVE ALTERNATIVE/COMPLEMENTARY GENERATION RESOURCES			
TURN	General	1	TURN is generally pleased with the quality and scope of the work that has gone into the Mohave Alternatives study to date. The individual technologies are properly investigated with respect to gross costs, operation and maintenance costs, water and land use requirements, labor to build and operate, transmission upgrades necessary, ownership considerations and tax implications. However, the authors have not presented the results of any significant analysis that would pull all of these considerations together to provide policy makers and other stakeholders with an opportunity to readily compare the bundles of options available as an alternative to the refurbished Mohave plant. TURN believes that without this next level of analysis, the study will have limited use in this proceeding.	This is beyond the scope of this study. The study's results were meant to be used as inputs into SCE's IRP.		
TURN	General	2	Detailed comments by TURN on the draft study will be offered when a more complete analysis of various Mohave replacement scenarios has been completed. We recognize that creating such scenarios will require significant work and recommend additional time, if necessary, for the authors to complete the analysis in a form usable by stakeholders. Absent such additional work, any decision to proceed either with Mohave refurbishment or alternatives would not be based on sufficient information. Further, the study of the C-Aquifer is also incomplete at this time making haste on this study unnecessary and ill-considered.	We expect to have all of the required analyses completed in the next draft report.		
TURN	General	3	TURN has serious concerns about one major assumption used by the study authors. The effort to consider alternatives which exactly mimic the daily and seasonal supply of power from Mohave is not useful. A baseload power supply, such as provided by Mohave, may not be the best form replacement power for the SCE system. It is well known that SCE projects excess off-peak resources in its portfolio during the coming years and has identified a need for peaking, not baseload, generation to fill unmet needs. Failing to incorporate this reality into the MACS report will only skew the analysis and provide a false portrait of the true cost of alternatives. For example, adding thermal storage to potential solar systems to mimic the Mohave supply curve does not add ratepayer value but will adversely skew the costs of these technologies to make them appear less attractive.	Based on our experience in utility planning, it is customary to evaluate alternative resource options as part of a balanced portfolio that takes into account the availability and costs of the various options and how they fit with the existing resources and expected load of the utility. Our current assignment is to provide SCE with data on the various options that would allow it to perform IRP analyses of various combinations of the options, not just any particular "bundle." Such an analysis is usually done in combination with existing committed resources and the various other options available to the company. The basic intent of Chapter 3 was to determine if concentrating solar power (CSP) technology could feasibly replace or complement the Mohave generation. To this end the load profile of the Mohave Plant was used to		

				determine how much generation would have to be replaced or complemented. Chapter 3 shows CSP technology is not a logical alternative to totally replace the electrical generation of the Mohave Generating Station. One point stated in the report is that CSP is not a logic Mohave generation replacement since thermal storage or a hybrid configuration would be necessary to match the existing Mohave Generating Plant load profile. However, CSP technology is shown to be a potential alternative to complement the electrical generation of the Mohave Generating Station, both as Dispatchable Power Systems and Distributed Power Systems. The capital cost estimate for the Parabolic Trough 100 MW Plant provides a breakout cost for storage – the storage cost can be deducted to obtain the capital cost for a 100 MW Parabolic Trough Plant without storage.																																
TURN	General	4	In order to ensure that this document is useful for policy makers and stakeholders, TURN strongly recommends producing another version of the draft report showing a range of replacement generation scenarios for Mohave developed using the professional judgment of the study authors. These scenarios would include various mixes of alternatives to meet the actual replacement power needs of the SCE system (not merely a facsimile of the Mohave profile). The scenarios should be based largely on the data already presented by this draft study and must incorporate all costs of each technology at a given site including those for site acquisition, water supplies and power transmission. Tax implications, such as production tax credits and special funding available due to recent federal legislation, should be incorporated in order to realistically assess the actual costs of delivered power from each scenario. These scenarios should be constructed based on this data and then optimized for two key variables – total ratepayer cost and total level of economic benefits to the Navajo and Hopi Tribes. In particular, the study authors should identify scenarios which provide at least the same level of economic benefits to the Tribes as is received from the jobs and royalties associated with the Black Mesa mine. The goal of this exercise, in TURN’s view, should be to ensure that the replacement of Mohave by a package of alternatives results in no net revenue loss while providing cost-effective power to serve California ratepayers.	This is beyond our scope of work.																																
TURN	2	1	Heat Rates for IGCC The heat rates reported for the IGCC plant appear quite high (low overall efficiency) using the DOE model. An effort should be made to generate comments from IGCC technology vendors on the model results. TURN recognizes that the IGCC equipment vendors have not been forthcoming with useful data in this study process but believes it may be to their advantage to do so, even on a limited basis, at this time. Using high heat rates will potentially skew alternative comparisons and is not “conservative” as stated on page 2-15.	S&L believes that the high heat rates is conservative and avoids being overly optimistic about efficiency. We have noted areas where the efficiency may increase by 2 to 4% depending on degree of integration not covered by IECM and by using dry feed technologies. S&L has contacted the vendors repeatedly, with no success.																																
TURN	2	2	Possible IGCC sites On page 2-14 three alternative projects are listed, one at the Mohave Generating Station site and two at the Black Mesa site. The difference in the Black Mesa projects was slurry versus dry delivery of coal. In Table 2-6 “Water Demand for IGCC at Mohave GS and At Black Mesa Mine” summaries of water use for all three alternatives are presented but it is unclear how the total for the dry delivery (Shell technology) is calculated.	The dry feed systems don’t include water as a slurry feed with the coal. Typically the technologies feed ~ 65% solids or add 35% water to the coal.																																
TURN	2	3	The study authors must grapple with the following question -- is there enough water quality data at this point to assume that the C-Aquifer water will be suitable for the IGCC technology boiler?	The study assumes minimal water conditioning for the well water delivered to slurry the coal. If there are harmful (corrosive, etc.) compounds in the water that must be removed first, this would add some cost and increase content due to treatment techniques.																																
TURN	2	4	Additionally, the use of Colorado River water for cooling purposes cannot be relied upon past 2025. Given this reality, any power plant sited at the Mohave Generating Station site should be assumed closed after that date or have dry cooling installed either initially or at some time in the future before that date. This limitation needs to be factored into the annual cost considerations for power from this site.	We have provided costs for either contingency to SoCal and they can plan as appropriate in their production model.																																
TURN	2	5	On Table 2-10 (page 2-24) it is unclear how the figures for the “Total Expected Costs” are tallied. In particular, why does the “90% CO2 Removal” column have substantially larger costs for the dry cooling option versus the wet cooling one?	Costs are represented on a normalized \$/kW basis. Since CO2 removal systems produce less energy from the same “turbine model” equipment, the relative cost per unit energy is magnified by higher actual cost and fewer kW to amortize the cost against.																																
			Solar																																	
TURN	3	1	The variable O&M figures for the Parabolic Trough, Power Tower, and Stirling Engine appear quite high (\$0.03/kWh - Table 3-2). What is the source for these figures?	As with the capital costs, the O&M costs are speculative since the last commercial-scale CSP plant was built in 1990 (the SEGS IX parabolic-trough plant) and the current dish/engine (Stirling) and concentrating photovoltaics plants are small demonstration plants. The cost estimates presented are based primarily on NREL data and publicly available CSP technical information and represent the upper range of projected O&M costs. Parabolic Trough O&M costs include SEGS O&M historical data.																																
TURN	3	2	On page 3-26 an O&M cost of \$0.011/kWh is shown for the Stirling Engine which is inconsistent with the \$0.03/kWh figure given in Table 3-2.	The \$0.03/kWh is the correct one.																																
TURN	3	3	The water usage for the Parabolic trough and Power Tower are very high with virtually all use for cooling. In the text you describe a dry cooling alternative at modest additional cost (4-8% of capital cost) which would seem a far more likely choice given the locations for these plants. Table 3-5 should reflect these lower usages.	<table border="1"> <thead> <tr> <th></th> <th>Parabolic Trough</th> <th>Power Tower</th> <th>Dish/engine (Stirling)</th> <th>Concentrating Photovoltaics</th> </tr> </thead> <tbody> <tr> <td>Cooling Tower Makeup, (gal/yr)</td> <td>0 (based on air-cooled system)</td> <td>0 (based on air-cooled system)</td> <td>0</td> <td>0</td> </tr> <tr> <td>Rankine Cycle Makeup, (gal/yr)</td> <td>90,000,000</td> <td>90,000,000</td> <td>0</td> <td>0</td> </tr> <tr> <td>Mirror Washing, (gal/yr)</td> <td>11,000,000</td> <td>11,000,000</td> <td>6,000,000</td> <td>6,000,000*</td> </tr> <tr> <td>Total (gal/yr)</td> <td>101,000,000</td> <td>101,000,000</td> <td>6,000,000</td> <td>6,000,000</td> </tr> <tr> <td>Total (acre-ft/yr)</td> <td>310</td> <td>310</td> <td>18.4</td> <td>18.4</td> </tr> </tbody> </table> <p>This information will be included in the next draft report.</p>		Parabolic Trough	Power Tower	Dish/engine (Stirling)	Concentrating Photovoltaics	Cooling Tower Makeup, (gal/yr)	0 (based on air-cooled system)	0 (based on air-cooled system)	0	0	Rankine Cycle Makeup, (gal/yr)	90,000,000	90,000,000	0	0	Mirror Washing, (gal/yr)	11,000,000	11,000,000	6,000,000	6,000,000*	Total (gal/yr)	101,000,000	101,000,000	6,000,000	6,000,000	Total (acre-ft/yr)	310	310	18.4	18.4		
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TURN	3	4	Finally, the study authors should verify cost data on dish stirling pricing by reviewing the recently-executed PPA between Stirling Energy and Southern California Edison. SCE should make this PPA available to the study authors for this purpose.	Stirling Energy was requested to provide cost information, however they indicated this information is confidential. SCE was requested to provide the executed PPA and they also indicated that the information is confidential.																																
TURN	Appendix H	1	Forecasted Natural Gas Prices TURN questions the forecast of declining natural prices (in real terms) “over the next several years”. Ignoring the current problems in the Gulf, in the last year the US has doubled the number of rigs drilling for natural gas and the production response has been nil. Canada and Mexico are seeing increases in demand and LNG is not anticipated to impact supplies until at least 2009. With these price pressures, what mechanisms did the authors believe would cause natural gas price declines?	The decline in NG prices is directly based on the most recent pattern of Henry Hub natural gas futures through 2010. Thus it reflects market consensus expectations. We will investigate whether recent future prices have changed significantly.																																
			<b>PEABODY ENERGY</b>																																	
Peabody	2	1	On p. 2-22, the table in the draft report indicates that, for a 500 MW GCC plant operating at 100% capacity, the emissions of CO2, in lbs/MMBTU, without CO2 capture would be 200; with CO2 removal but without shift conversion would be 142; and 90% CO2 would be 17. Are these figures the same whether the plant is located at Black Mesa or Mohave? And what is the equivalent figure for CO2 emissions for a 500 MW NGCC plant without CO2 removal?	It can be assumed that the CO2 emissions at Black Mesa are the same as at Mohave.  We will provide CO2 emissions for the NGCC plant for comparison. Emissions data for all plants will be summarized in the Executive Summary in a manner amenable to comment SCE-ES-4 regarding consistency																																

				of summary data reporting.		
Peabody	2	2	Also, on p. 2-22, the draft report states that it is not likely that it will be technically viable to remove a high degree of CO2 from the syngas until 2020. Does this statement match up with the 90% CO2 removal in the chart?	The CO2 removal data in the chart is what is possible from the gasification technology. The issue on technical viability resides in the ability to procure a combustion turbine that will burn hydrogen-only fuel with confidence.		
			<b>"JOHNSON JOHNNY L" &lt;JLJOHNSO@SRPNET.COM&gt; SRP COMMENTS RE: MACS PRELIMINARY DRAFT REPORT</b>			
SRP	ES	1	In the first paragraph, SRP's and LADWP's percentage interest are reversed;	We will make this correction.		
SRP	ES	2	in the second paragraph, should you note that the study only investigated these technologies as potential alternatives to replace or complement SCE's share of Mohave, not the entire plant?	The scope provided to the consultants directed us to consider only the SCE share of the plant.		

Org	Section	Index	Comment	Response
SCE	ES	1	Page I. The formatting of the Contents for the Executive Summary is inconsistent with the actual Section and the paging needs to be corrected	Formatting will be corrected.
SCE	ES	2	Page ES-20. Starting with page ES-20, the Section numbering needs to be revised.	Formatting will be corrected.
SCE	ES	3	Page ES-4. It is suggested that a table be inserted immediately prior to Section ES.1.2 summarizing the project sizes discussed in Section ES.1.1.	Table to be inserted as requested.
SCE	ES	4	Page ES-5, Table ES-1. Please include a line showing the total staffing required for this alternative.	Total staffing to be inserted
SCE	ES	5	Page ES-6, Table ES-3. Please include a line showing land use for this alternative. It is also suggested for illustrative purposes that, in addition to showing the acreage, you convert the acreage into square miles and to state how big the site would be. For example, later in the report you show a land use of 34,000 acres for one of the wind sites. In addition to showing the 34,000 acre number if you showed that this was equivalent to 53.1 square miles and 7.3 miles on each side, readers would have a more visual picture of the size of the area required for a wind farm.	Land use illustrative data will be inserted. It should be noted that only about 11,000 acres is included in Phase 1 of Gray Mountain, and that only if all 3 phases actually get built would it occupy 34,000 acres. It should also be noted at 450 MW's it would be one of the larger wind sites in the world.
SCE	ES	6	Page ES-7, Table ES-4. See comment [SCE-ES-5] above. Show 4.1 square miles and 2 miles per side for the parabolic-trough and 3.3 square miles and 1.8 miles per side for the dish/Stirling engine.	Land use illustrative data will be inserted.
SCE	ES	7	Page ES-7, Table ES-4. The total staffing at 118 shown for the Dish/Stirling engine does not match the staffing from page 3-27 at 26.	Data will be reconciled. 118 value is correct based on information from SES.
SCE	ES	8	Page ES-8, Table ES-7. The staffing figures seem low. Does this include just routine maintenance/repair, and if so is the study making consistent assumptions among the different options about using outside contractors rather than FTE for routine maintenance/repair?	Most Wind Projects execute long term parts and services agreements with OEM's when purchasing wind turbines. Most of the O&M expense is included in these LTSA's and only a few people including the OEM's dedicated staff at the project are required for modern wind farm O&A.
SCE	ES	9	Page ES-8, Table ES-7. This is the only table in which you show the average and peak construction jobs for any alternative. It is suggested that either you delete this information from this table or provide the same information for each of the other alternatives.	We will delete the construction job data here to make the presentation in the Executive Summary consistent with the other technology alternative.
SCE	ES	10	Page ES-8, Table ES-8. See comment [SCE-ES-5] above.	Land use illustrative data to be inserted.
SCE	ES	11	Page ES-9, Table ES-9. It is suggested that you expand this table to also show the performance at 20 °F, 108 °F and 125 °F and that you footnote each temperature to explain: <ul style="list-style-type: none"> <li>• 20 °F would be the minimum site design temperature</li> <li>• 67 °F is the average annual site temperature</li> <li>• 108 °F would be the site design temperature</li> <li>• 125 °F would be the maximum site design temperature</li> </ul>	We will expand this table to include the data provided in the body of the report for the temperatures mentioned for both configurations of the plant (cooling tower, air-cooled condenser) and provide the requested footnote.
SCE	ES	12	Page ES-12, last paragraph. The analysis indicates that energy efficiency in Arizona and New Mexico could replace over 40% of the energy and capacity from the Mohave Plant. Has the likely potential that SRP which owns 20% of the Mohave Plant and supplies power in Arizona would probably utilize much of the potential energy efficiency to make up for their loss of energy and capacity from Mohave?	The potential for SRP, or other utilities, to achieve additional energy efficiency beyond the 40% cited is already reflected in the conservatism used to define the "readily achievable potential" listed in table 6.4 and referenced on page ES-12. The "readily achievable" potential excludes a significant amount of additional efficiency which could be tapped by internal SRP (or other utilities') programs if they so choose. The comment on page ES-12 will be expanded to further explain the conservatism from the DSM resources (e.g., to implement the DSM option) could lead to increased congestion charges "into CA", such as currently noted in the transmission chapter at page 12-4, in particular footnote 5 on that page. The analysis was not detailed enough to be able to make any definitive statements about PV generation that might have to be "bumped" or the interactions between into-CA path capacity, PV hub generation levels, and the absence of Mohave generation.
SCE	ES	13	Page ES-30, bullet on Alternative Locations of Options. Even with the DSM alternative, wouldn't some of the existing PV generation have to be bumped off line in order to handle the additional flow of energy? There may need to be some qualitative discussion on this distinction of power coming from the PV area.	The analysis was not detailed enough to be able to make any definitive statements about PV generation that might have to be "bumped" or the interactions between into-CA path capacity, PV hub generation levels, and the absence of Mohave generation.
SCE	ES	14	Page ES-32, Table ES-20. Nothing has been mentioned about the schedule requirements for the various alternatives/complements. This table would be a good place to add a line and summarize the schedule (lead time) requirements for the various options.	Schedule data will be included.
SCE	ES	15	Page ES-32, last paragraph. You state "...DSM, while this option has a high initial cost, it has virtually no operating costs..." In the analysis starting on page 6-16, an assumption is made to set the cost of DSM at \$70/MWh. If this is the basis of considering this to be "...a viable option for replacing/complementing Mohave..." why isn't this shown in Table ES-20 as a Total Operating Cost? You need to have some stronger basis for considering this to be a viable option considering all of the negatives of out of State, never been done, cost basis, other competing Mohave Owners, etc.	The noted sentence will be deleted from the final report, and edits will be made to the DSM aspects of table ES-20 and the related text. Updated DSM information for Table ES-20 and subsequent DSM-related text was developed just prior to issuance of the November 22nd draft and did not make it into the version sent to stakeholders. The final report will address this. We note here that the DSM option is unlike the other alternatives listed and is difficult to characterize in a way that allows for apples-to-apples comparison. The final report text and table information will reflect this.
SCE	ES	16	Page ES-35, first paragraph. In this paragraph, you state that "...a pipeline from the existing Mohave site to Bakersfield, California..." This phrase implies that the pipeline would go directly from Mohave to Bakersfield which is probably not the case. Siting the pipeline would probably be easier if it were to go due south from the plant approx. 25 miles and intercept Interstate 40 and follow along I-40 towards Barstow in order to avoid impacting the Mohave National Preserve which is due west of Mohave. You may want to rephrase your statement. Would the longer route also increase the pipeline capital cost?	The route chosen for the pipeline is as described in SCE's comment. The capital cost shown is for that route. Sargent & Lundy will provide a longer description of the pipeline route similar to that provided in SCE.
SCE	2	1	Page 2-3, Figure 2-3. The title of the slide should read "IGCC Schematic of Generic IGCC Power Plant".	Title will be corrected.
SCE	2	2	Page 2-15, first paragraph in Section 2.2.4. You state that "It is assumed that all pumping and transportation costs are included in the price of the water." This is an incorrect assumption. Edison estimates that the C-Aquifer well field, two pump stations and 109-mile pipeline capital cost will be approx. \$200 million and that the annual O&M costs will be approx. \$14 million per year (in 2005 dollars) exclusive of any APS or NTLA costs to provide power to the pipeline and well field.	We assumed that the capital cost and power costs mentioned would have to be recovered in the price of water.
SCE	2	3	Page 2-42, Table 2-23. Although the Maintenance Staff and Maintenance Labor Costs are probably reasonable estimates, but done differently the data shown in Table 2-23 makes them look inconsistent. Note that the Maintenance Staff varies from 20, 40, to 40 for the three CO2 removal scenarios, however, the Maintenance Labor Costs vary from \$4.56, \$6.54, to \$9.36. Would you please double check this data.	The Maintenance staff for the case of CO2 removal without shift conversion should a value of 30. This was a typographical error.
SCE	4	1	Page 4-10, Section 4.1.5. See comment 3 above. For this section it is suggested that you also include the square miles and miles per side for each alternative in each place where you provide the required acreage.	Illustrative data will be provided as requested.
SCE	6	1	Page 6-10, second paragraph. The two electric utilities in the state of Nevada have merged and are one utility at this time.	This will be reflected in the final report.
SCE	6	2	Page 6-11, third paragraph. See comment 10 above. Based on the fact that SRP owns 20% of the Mohave Plant's output and provides power to the State of Arizona, shouldn't this be taken into account as to the estimates of energy and capacity available within the State of Arizona? It would seem logical that they would want to replace any lost capacity and energy (if economically viable by this means) before contemplating type of power purchase arrangement with Edison.	The potential for SRP, or other utilities, to achieve additional energy efficiency beyond the 40% cited is already reflected in the conservatism used to define the "readily achievable potential" listed in table 6.4 and referenced on page ES-12. The "readily achievable" potential excludes a significant amount of additional efficiency which could be tapped by internal SRP (or other utilities') programs if they so choose.

SCE	7	1	Page 7-12, third paragraph. There is a reference to the "Bitsi" area. Is the correct spelling "Bisti"?	We will provide the correct spelling.
Mills	10	1	I believe Table 10-19 overstates the financial impact of a loan guarantee. The table assumes that the loan guarantee allows the debt/equity structure to change to 90% debt/10% equity. However, the debt/equity structure is governed primarily by the debt service coverage ratio in a wind farm project. A project with only 10% equity will most likely require a much higher revenue stream to meet the debt constraints than a project with a more even debt/equity ratio. I've attached a paper that explains this in more detail. See Table 3 for the impacts of a loan guarantee on wind projects. I'll be happy to clarify if this raises more questions. Thanks for the opportunity to comment.	We agree that the issue raised needs to be considered and we will do so.
SES	3	1	We have reviewed the material provided on the solar analyses (specifically Ch. 3). We have not seen the appendix material on solar, so I'm not sure how some of the numbers are derived. We also provided Synapse some additional information regarding employment and O&M costs that do not seem to be reflected in the Ch 3 write-up.	The solar appendix is a placeholder and will not be present in the final report.
SES	3	2	On p 3-4 and again on p 3-9 and 3-24, reference is made to the PPA for 500-850 MW for SCE. In early September, we signed a similar PPA with San Diego Gas & Electric for 300-900 MW. Timing for this project is similar to that of SCE.	We will mention both PPAs.
SES	3	3	There is an internal conflict in O&M figures for dish Stirling systems -- on p 3-14, for example, O&M costs are cited at \$3/kw-yr plus \$0.03/kWh. In Table 3-13, O&M costs are shown as \$0.011/kWh total. I'm not sure how either of these figures was derived, but we believe O&M costs will be closer to the \$0.011/kWh figure (possibly closer to \$0.015/kWh). This number includes the fact that we will need more than the 26 folks shown for staffing the plant. We calculate needing about 60 full-time mirror washers (probably all in addition to the 26 people listed).	The \$3/kw-yr fixed, \$0.03/kWh variable is Sargent & Lundy's estimate. Personnel levels in the report reflect the staffing levels indicated by SES.
SES	3	4	Finally, on page 3-18, you refer to the AZ RPS. (It's actually called EPS in AZ, for Environmental Portfolio Standard.) You should check, but believe the AZ Corp. Commission has just recently approved a new, higher EPS -- growing to 5% by 2015 and 15% by 202	We will correct the terminology and check for newly revised EPS parameters.
NRDC	ES	1	As requested by Sargent & Lundy, the contractor preparing the draft "Study of Potential Mohave Alternative/Complementary Generation Resources," ("Draft Report") the Natural Resources Defense Council ("NRDC") provides these comments on the Draft Report. NRDC continues to be encouraged by the analysis and findings in the report. In particular, the tables in Chapter 10 that evaluate the package of incentives, tax relief, and other financing options for the various technologies are helpful.	The Consultants appreciates NRDC's recognition of our efforts.
NRDC	ES	2	Operations and Maintenance ("O&M") Costs for Solar Dish. In follow-up comments on the response matrix, NRDC questioned the different O&M costs used for dish solar technology. At one point the report uses \$.011/kwh, while at another point it uses \$.03/kwh. Stirling Energy Systems has confirmed that the \$.03/kwh figure is higher than the company is projecting. This final report should reflect the lower O&M cost for solar dish technology.	See comment SES-3-3.
NRDC	ES	3	Presentation of Data in Summary Tables. The summary tables are helpful, but should contain an all-in \$/MWh cost so that each technology can be compared on an apples-to-apples basis. The report says this is beyond the scope and would require other inputs like a discount rate. NRDC suggests that the contractors could perform a sensitivity analysis if they do not want to pick a discount rate.	The comparison, as has been stated, will be made as part of the integrated resource plan process. While one could perform some calculation based on some assumptions for discount rate and generation over some assumed time period, and perform sensitivity analyses varying the assumed discount rate, the proper place to make the comparison is in the integrated resource plan process.
NRDC	ES	4	Greenhouse Gas Requirements. The discussion of emissions valuation cites the California Public Utilities Commission's ("CPUC") decision on the "GHG adder" (D.04-04-024, Conclusion of Law 7) but does not have the final requirement for utility modeling of the value - which is \$8/ton CO2 in 2004 escalated at 5% per year (based on the CPUC's adopted avoided costs). Even Appendix I is missing this link. This should be corrected. Also, it is unclear whether in fact the contractors are factoring the cost into a comparison of the resources - both because they do not indicate what value is being used and because there is not a full \$/MWh cost for each resource and it is unclear if this is included in the	Footnote 104 on p. 33 of Appendix I addresses the E3 CO2 price escalation. On p. ES-24, we will insert "escalated by 5% annually" after \$8 in the last sentence of the 2nd bullet point. Emissions values have not been included in the variable operating costs of the different technology options. These values, however, should be included as inputs to SCE's IRP model.
NRDC	ES	5	Inclusion of Energy Efficiency Information in Summary Table. The energy efficiency information in table ES-20 is missing. This should be corrected in the final report.	Updated DSM information for table ES-20 and subsequent DSM-related text was developed just prior to issuance of the November 22nd draft and did not make it into the version sent to stakeholders. The final report will address this. We note here that the DSM option is unlike the other alternatives listed and is difficult to characterize in a way that allows for apples-to-apples comparison. The final report text and table information will reflect this.
NRDC	ES	6	Explanation of transmission analysis. The transmission discussion in the Executive Summary should be more explicit about whether the analysis is contract path or flow-based approach. It may be a matter of specifying on p. ES-27 that transmission is flow-based up to California border, and contract path within California.	An additional sentence on page ES-27 will be included in the final report, summarizing the "flow-based" vs. "contract path" characteristics of the different pieces of transmission analysis.
NRDC	ES	7	Opportunity Cost of Water. The Draft Report does not outline the opportunity costs of water used to transport coal to the Mohave plant and the financial benefits accruable to the tribe due to the reduction thereof. By replacing Mohave's generation output and liberating significant water resources previously used for coal transport, the various technology options provide a potential stream of annual revenue in the tens of millions of dollars. The various technology options use substantially less than the 1.4 billion gallons annually currently used for coal transporting activities. The Draft Report should reflect these substantial potential savings.	Estimating opportunity costs relating to water and land consumption is beyond our scope of work. However, in the final draft, we will note the existence of such costs.
NRDC	9	1	Tribal Issues. NRDC appreciates the steps that have been between the first and second drafts of the report to address the concerns NRDC raised on the first draft. NRDC believes that the final report could be strengthened in this area in several ways. First, the Draft Report fails to quantify the benefits of any given technology for the Hopi Tribe. In this way, the Hopi do not have a basis from which to weigh each technology option in terms of net impact on the reservation. As currently drafted, the Draft Report fails to calculate the tribal taxes and royalties that would apply to the various technology options with respect to the Hopi Tribe, as well as entertain estimates of investment, operation and maintenance revenue and secondary business activity benefits. This information is critical to portray the costs and benefits of each technology for the Hopi. If this cannot be done because certain data or information was not provided to the contractors, that should be so indicated in the final report.	The November 22 draft notes that there are no Hopi taxes in effect at this time. With regard to royalties for both tribes, the November 22 draft explains why royalty estimates were dropped as part of this project. We do not understand the reference to "estimates of investment" and of "operation and maintenance revenue," but note that the November 22 draft includes estimates of both investment and O&M outlays for the technology options. The extent to which either investment or O&M outlays would translate into direct revenues for either tribe (aside from tax revenue which is addressed) is either a royalty issue (which has been dropped from the study) or a secondary economic impact issue. Secondary economic impact analysis is underway, but has been delayed due to technical difficulties being experienced by the model vendor. This portion of the work will be available shortly for stakeholder review.
NRDC	9	2	Second, although the current draft goes a long way towards eliminating the consistently overstated "issues" in the previous draft, the latest Draft Report should further differentiate the "issues" from the "processes." Potential issues include site approval on checkerboard lands or fractional allotments. In those instances, development is complicated by required approval of potentially numerous interested parties. On the other hand, environmental review under the National Environmental Policy Act is a process intended to inform the decision maker of the environmental effects of any given activity, potential mitigation measures, and alternatives. It is an opportunity to present environmental, cultural, economic social impacts of the various technology options that might otherwise be ignored. The smaller the footprint of a given technology option in terms of adverse effects, the less cumbersome the process becomes, and vice versa.	In the final draft, we will make the distinction between issues and processes.

NRDC	9	3	Third, NRDC is unable to comment on employment impacts due to the exclusion of this topic from the Draft Report.	Secondary economic impact analysis is underway, but has been delayed due to technical difficulties being experienced by the model vendor. This portion of the work will be available shortly for stakeholder review.
Hopi	ES	1	Further Refinement of Study Conclusions is Recommended. Reference is made to the Study Plan at Section 1.2 of the draft report. In particular, Decision 04-12-016 required as follows: "Both the IGCC and renewable energy projects should include consideration of any enhancements to transmission system that may be necessary to bring power into California. The final plan should be sufficiently detailed, including cost components, proposed counterparties and generation on-line dates, to allow this Commission to affirm a specific resource plan during Edison's next long-term planning process. Ownership arrangements involving the Hopi and Navajo should be given consideration in the feasibility study. The current draft should do more to address these core requirements. Some particular areas of concern are as follows:	See responses to subparts 1a-1d directly below
Hopi	ES	1a	First, the report should contain a frank and direct assessment and evaluation of the impact of transmission constraints on the ability to build and finance alternative or complementary projects, and on the critical question of the timing of both any anticipated transmission upgrades and the timing of new powerplant investments. In particular, the study seems to avoid directly addressing the impact of the lack of longer-term transmission service on the feasibility of the examined projects, including the impact of transmission constraints on the ability to attract investment capital. The report also does not address fully when additional long term transmission capacity is reasonably likely to be available within the study area. Thus, the report concludes, at ES-30, that "Existing conditions appear to limit the availability of long-term (i.e., one or more years) firm service from Arizona supply sources, without new transmission upgrades. Shorter-term service of more limited duration is	The report addresses the impact of transmission constraints on potential alternatives or complements to Mohave, but it is beyond the scope of work to address investment community risk given the transmission issues. The report also addresses the cost of transmission upgrades required to connect alternatives or complements to the grid and includes cost estimates for some of the major upgrades that might be required to allow for longer-term firm transmission. An exhaustive analysis of all regional transmission construction costs necessary to ensure any of the complements or alternatives firm long-term access is beyond the scope of work.
Hopi	ES	1b	Second, the report's handling of grant and tax incentives should be integrated into estimated project costs to better reflect the anticipated net cost of developing the generation alternatives. Particularly in the area of IGCC development, where capital costs are higher but significant grant and tax incentive offsets are available, the summary financial data does not appear to present a scenario that contains cost adjustments for tax and grant assistance that is reasonably likely to be obtained. Conversely, if the availability of such tax and grant assistance is highly speculative, the report's conclusions should expressly take that risk into account in reaching conclusions about the realistic possibility that any alternative or complementary project identified in the MACS study is a realistic Mohave alternative or complementary project.	Information on tax incentives and grants to offset capital costs is available in the text of the report and in the executive summary. It is very difficult to ascertain with any certainty whether or not a particular incentive will be available to a particular project. As stated in the report, some incentives are competitive and thus one would have to have an idea of all other competing projects in order to ascertain the likelihood that a specific incentive might be available. Such an analysis is beyond the scope of work of the project.
Hopi	ES	1c	Third, I do not believe the MACS report should rely on wind projects already under development as alternatives or complements to Mohave. To the extent the wind projects examined in the MACS report were in development already, the report fails to identify alternatives or complements to Mohave consistent with the spirit of the CPUC directive. Stated differently, projects that were already in development were in development regardless of Mohave operations. It would be an improper result to classify existing projects under development -- which were proceeding without regard to Mohave's status -- as replacements or "complements" to Mohave. Categorizing existing wind projects already under development as complements or alternatives to Mohave substitutes those projects for Mohave in a pernicious way that provides no net benefit to the Hopi or the Navajo in terms of revenue or employment, and in many ways offers no additional generation capacity to California ratepayers.	None of the projects cited has a completed power purchase agreement. Therefore it is still possible for SCE to obtain one and use the associated capacity and energy as an alternative or complement to the existing plant.
Hopi	ES	1d	Fourth, the report should frankly and directly acknowledge that the Demand Side Management/Energy Efficiency Technology examination does not meet the specific criteria set out by the CPUC for further consideration as a complement or alternative to Mohave. The reasons why this conclusion must be reached include, but are not limited to, the following: (1) the legal and structural impediments that remain to implementation of the DSM/EE proposal render it an unrealistic near-term alternative or complement to Mohave; (2) there is no structure for creating meaningful monetary or employment benefits from a DSM/EE transfer between California and other states that would benefit the Hopi Tribe and Navajo Nation; and (3) the DSM/EE analysis does not address the source of energy acquired through a DSM/EE transaction, which would likely be conventional coal fired power generation, and the issue of whether such an acquisition would be consistent with California policy.	Institutional constraints may be comparatively quick to resolve if the parties are in agreement. Re (2): Our labor impact analysis (to be completed shortly) will outline ideas for how possible employment benefits to the Tribes could come about, and the tax analysis identifies certain parallel revenues for the Navajo. No Hopi taxes are estimated, as no such taxes exist. Re (3): The source of energy is notionally the DSM savings itself; actual generated energy shipped to California is energy that would otherwise have been generated without the DSM, thus it is not incremental but, rather, decremental. Hence, it is not necessarily true that it would be treated as new coal fired generation under the proposed California policy.
		1d	At ES-21, for example, the MACS draft asserts that DSM/EE technologies have "a high potential to create future jobs for the tribes, both on and off reservation territories." This claim, however, is not supported by the study analysis. There is no basis presented in the study for the proposition that DSM/EE employment or economic benefits would benefit the tribes directly instead of the economy in general. Nor does the analysis evaluate the importance of creation of jobs on or near the Hopi tribal reservation.	Our labor impact analysis (to be completed shortly) will outline ideas for how possible employment benefits to the Tribes could come about.
		1d	While pursuit of the DSM/EE strategy identified in the MACS report deserves further consideration by the PUC, this option clearly does not satisfy the criteria of Decision 04-12-016 as an alternative or complement to Mohave.	The report provides an explanation of the mechanism by which the innovative DSM/EE strategy contained therein could be implemented. That strategy's legal standing in California is beyond our scope of work.
Hopi	ES	4	Levelized Cost Issues. At ES-33, the draft MACS reports claims to ignore the calculation of the levelized cost of energy, because the analysis of certain costs over the life time of the project "is beyond the scope of this study and is rightfully performed as part of the integrated resource planning process." The report further states, "[n]either the levelized cost of energy calculation nor the discounted cash flow analysis is within the scope of this study." Yet, at 1.3.2 (Solar Technology), the following statement appears: "Based on the review, potential power plant configurations were developed that are considered to be feasible based on the maturity of the technology, technical risks and expected reliability, capital costs, O&M costs, levelized energy costs, and dispatch constraints." See Draft MACS Report at 1.3.2, p. 1-3. These positions appear	We refer in section 1.3.2 to levelized energy costs that exist as public information estimated by others.
Hopi	ES	5	There appears to be a typographical error on page ES-5 in either Table ES-1 or ES-2, relating to Net Output under the No CO2 removal Scenario. Table ES-1 refers to 548.4, whereas ES-4 refers to 548.9	Table ES-1 has a typographical error: the value should be 548.9.
Hopi	2	1	IGCC. I recommend the report clearly state what IGCC technology is feasible for development today. (Compare the statement at 2-24: "... although it is technically possible to remove a high degree of CO2 from the syngas, it is not likely that such a plant will be technically viable under the 2020 time frame. This is due to the need to develop a hydrogen-fueled combustion turbine that can reliably generate power and be guaranteed by the turbine vendors.") The report acknowledges that certain technical issues remain regarding turbine component design that must be addressed before pure hydrogen syngas can be reliably burned in power turbines. It was suggested at the last meeting of the stakeholders that the MACS report identify what is technologically achievable at an IGCC plant that could be economically and realistically designed and built today, and to focus on the economics and technology relevant to that option. The report remains unclear in this area. In particular, ES.1.2 should expressly state which of the three cases identified is commercially achievable today. In this regard, it is my understanding that the 90% CO2 removal case is not realistically achievable today. If so, this conclusion should be stated clearly. At present, the discussion is potentially confusing.	The timetable for introduction technology making this option possible is subject to various factors, including federal and state subsidies, vendor research and development, and other financial and research issues. Vendors may have informed other stakeholders that they are confident that this option will be technically feasible. However, these vendors will all admit that the question of when is the salient question.  Sargent & Lundy cannot make any definitive comment regarding when the technology that makes this option possible, that is, the hydrogen-burning combustion turbine, will be commercially available. The US DOE has set a target date for completion of the demonstration unit of 2012. Providing time for testing and evaluation of this demonstration unit, we do not believe that commercial availability of the turbine will occur in less than, at least, the next ten to twelve years.

Hopi	2	2	The draft does not include the Dakota Gasification plant in Table 2-2. Why?	The Great Plains Synfuels Plant is the same as the Dakota Gasification plant (original name)
Hopi	2	3	Conceptual Project Construction Schedule. The discussion at Section 2.9, at page 2-40, appears to begin with a description of the amount of time required to complete an IGCC facility from the decision to begin. However, the time estimate provided appears to exclude any estimate of the time required to receive permitting and all approvals necessary to begin construction. This same problem appears to exist with respect to other technology options considered. To comply with the PUC's directive, the MACS Study should include an analysis of the time required to receive permitting and all approvals necessary to begin construction.	Sargent & Lundy's construction schedule estimates assume lengths of time for permitting that we have observed in other projects. We however, do not have the expertise or competence to address the numerous issues that may arise in the process of permitting a project in the specific localities that are the subject of this study. Given the uncertain nature of the objections to any plant's construction, we do not believe an analysis of the possible length of time required for permitting would provide any useful data. We understand that it is possible that the permitting process could last for several years.
Hopi	6	1	Carbon Sequestration Analysis. The study does not appear to address whether there is actual demand for CO2 in EOR activities in California. While the report concludes that, technically, the possibility exists to ship CO2 from a Mohave alternative or complement powerplant to California for use in EOR operations, the study consultants do not appear to have examined whether there is actual demand in the marketplace for such a product. Anecdotal information that I have received suggests that, at the present time, there is not a market for CO2 transported from Arizona for use in EOR operations in California.	It is true that there is no existing market for CO2 for EOR in California. The technical potential does exist for extensive CO2-EOR, but the lack of supply to the oilfields is at least part of the reason that CO2-EOR has not been undertaken to any large degree. Whether power plants outside of California can economically sell their CO2 in California will be largely determined by the potential for cheaper CO2 from California oil refineries. This dynamic will be clarified in the final report.