Distributed Energy Costs and Benefits Perspectives Matrix

The following table summarizes major categories of costs and benefits, and other factors that may affect the evaluation of distributed energy (DE). These categories have been identified by various stakeholders during the 2013 Technical Conference on DE and net metering as factors that could affect the value of DE. The views of the stakeholders and APS regarding the use of each cost/benefit category in valuing DE are described in the respective columns.

Categories	Definition	Solar Parties Perspective	Solar DHW Perspective	Environmental Stakeholder Perspective	Large Commercial & Industrial Stakeholder Perspective	APS Perspective
Fuel & Purchased Power	Utility costs for fuel and purchased power to serve load.	DE should receive credit for avoiding fuel and purchased power costs according to APS' marginal cost of fuel and purchased power during each hour that DE is exported to the grid. As well, DE may permit APS to increase its off-system sales by reducing the total amount of generation needed to serve load. This and all other avoided costs should be calculated taking into consideration appropriate assumptions for timeframe, discount rate, future natural gas prices, future resource mix, de production categories, de production characteristics, and line losses.	SDHW should receive credit for avoiding fuel and purchased power costs.		AECC acknowledges DE avoids fuel and purchased power cost, but any analysis of DE cost/benefits should also recognize that the DE participant avoids purchasing retail energy (and perhaps capacity) from APS. Gas turbine cycling costs increase on a kWh operated basis because of load following solar production from both a turbine efficiency basis and from the need to purchase more EPNG hourly services for more varied natural gas dispatch.	DE permits APS to avoid current, actual fuel and purchased power costs for each kWh generated by the solar system.

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Variable Operations & Maintenance	Utility O&M costs that vary with the amount of energy produced.	DE permits APS to avoid certain variable O&M costs for each kWh generated by the solar system. DE should receive credit for these avoided costs according to APS' marginal cost of fuel and purchased power during each hour that DE is exported to the grid.	SDHW should receive credit for avoiding variable O&M costs.		AECC acknowledges DE avoids variable operations & maintenance cost, but any analysis of DE cost/benefits should be net of any *increases* to operations expense and also recognize that the DE participant avoids purchasing retail energy (and perhaps capacity) from APS. Load following solar generation results in higher O&M costs as more starts are required on cloudy days. The more solar installed the less combined cycle gas plants are required and the more simple cycle aero machines are required at higher heat rates	DE permits APS to avoid certain variable O&M costs for each kWh generated by the solar system.

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Water Consumption	Utility consumption of water to generate electricity.	Water costs embedded in APS O&M costs are based on long-term water rights, but that water could be sold for much more. The market value of the water should be used, rather than APS' avoided costs. Reducing water consumption may also provide additional societal benefits. DE benefits citizens of Arizona and the Southwest because it helps reduce water consumption in an arid state/region. The societal benefits of water conservation should be considered when evaluating DE, even if these benefits are not credited directly to DE providers through rates. This is especially true in AZ where the ACC is a fourth branch of government and serves a quasi-legislative function, taking into account not just utility costs but effects on the broader society as well.	SDHW DE should receive credit for avoiding water consumption and associated costs.	Water consumption is an issue when conventional plants are curtailed due to water shortages. Solar DE reduces the impact of these curtailment events, thus improving the efficiency of utility operations and reducing fuel and other utility operating costs.	AECC believes this category is captured above under variable operations & maintenance.	DE permits APS to avoid actual water costs associated with energy production and is included in O&M costs above.

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Cost of Environmental Compliance	Utility costs of state and federal environmental compliance.	DE should receive credit for avoiding costs of environmental compliance. Review is needed to assure that this is reflected in the O&M costs above. DE should also receive credit for its contribution to avoiding any future environmental compliance costs due to the early retirement of existing resources.	SDHW should receive credit for avoiding costs of environmental compliance.		AECC acknowledges DE has the potential to avoid utility environmental compliance cost, but any analysis of avoided cost of environmental compliance should be net of gas turbine operations and recognize only those cost reductions that are directly attributable to DE and whose savings will persist sufficiently into the future, regardless of changes in regulations/rules. Further, any analysis of DE cost/benefits should also recognize that the DE participant avoids purchasing retail energy (and perhaps capacity) from APS.	DE permits APS to avoid actual environmental compliance cost and is included in O&M costs above. These costs are already included in avoided generation costs.

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Fuel Hedging	Utility cost of hedging future fuel costs.	DE reduces APS' fuel consumption, and therefore reduces the quantity of fuel purchases that APS must hedge against. Associated cost reductions in APS' fuel hedging program should therefore be credited to DE. Furthermore, by reducing fuel purchases, DE also mitigates future volatility in fuel prices not fully accounted for by APS fuel hedging practices. Thus, DE should be credited for any additional hedging costs that customers are willing to pay beyond current utility hedging practices.	SDHW should receive credit for avoiding costs of environmental compliance.	DE also provides a hedge to DE participants against future utility rate increases.	AECC acknowledged above that DE avoids fuel & purchased power costs, a component of which is fuel hedging.	APS does not believe that DE would likely lower the cost of fuel hedging to other APS customers in any meaningful way. To the extent that increased DE production allows APS to avoid purchases of natural gas and wholesale power, these avoided costs are included in the avoided fuel and purchased power category, whether the expected costs are hedged or not. However, increased DE production has no impact on hedge costs or benefits related to the natural gas and wholesale power purchases APS must make to serve non-DE customers, so including an additional benefit for this item would be double-counting the fuel savings.

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DE Capacity Value (e.g., MW)	A component used in calculating DE costs and benefits. The amount of DE capacity (e.g., MW) that the utility can rely upon to meet peak load requirements and system reliability. May be calculated differently for generation, transmission and distribution.	Capacity value is not a cost or a benefit itself, but rather it is an intermediate component/input needed to calculate avoided generation capacity. Several issues affect capacity value of DE on the APS system, including coincidence with the system peak, and the penetration of DE relative to the system's peak demand. These factors are captured by an effective load carrying capability (ELCC) analysis, which would most appropriately be conducted by an independent third party rather than APS. Capacity value may change as DE penetration increases (assuming no change in load shape), however the timing and magnitude of this change are uncertain. Capacity Value should also reflect DE's impact on APS' Planning Reserve Margins. DE should be treated as a demand-side resource and should reduce planning reserve margins. Net metered DE is "behind the meter" and reduces peak demand; there is no need to apply a planning reserve margin to demand that does not actually occur. This approach is a common practice among resource planners. It is also consistent with the NERC definition of Net Internal Demand that is used to calculate Planning Reserve Margins.	SDHW should receive credit for avoiding costs of environmental compliance. SDHW incorporates storage and can insure benefits throughout the summer peak demand and also offers winter morning peak demand benefits.		AECC acknowledges that DE possesses a capacity value when DE solar reduces specific peak capacity requirements for APS.	Capacity value of DE on the APS system is affected by several issues, including coincidence with the system peak, and diminishing value with increased saturation of DE. These factors are captured by the effective load carrying capability (ELCC) APS analysis.

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Generation Capacity ($)	Utility costs of investments in new generating resources and associated facilities or incremental fixed costs of future capacity purchases.	DE should receive credit for avoiding future generating capacity or capacity purchases. DE credit for deferred capacity costs should be incremental and not based on exact timing or size of planned generating additions, since the exact timing and size of resource needs is uncertain and potentially subject to gaming. Reduced capacity needs can be translated into reductions in capacity purchases, ownership stakes in jointly owned plants, or the potential for capacity sales to other utilities and should be considered incrementally. Value should be incremental and not based on timing or size of planned generating additions. DE also provides value to customers by reducing the "lumpiness" of capacity investments thereby mitigating the rate impacts of potential over/underinvestment in supply-side generation resources.	SDHW should receive credit for avoiding future generating capacity or capacity purchases. Value should be incremental and not based on timing or size of planned generating additions.		AECC acknowledges DE avoids some capacity cost, but any analysis of DE cost/benefits should also recognize that the DE participant avoids purchasing capacity from APS.	DE potentially permits APS to defer generation capacity and associated costs.
Fixed Operations & Maintenance Costs	Utility fixed O&M costs and other fixed operating costs associated with an avoided or deferred generating resource (or capacity purchases) that do not vary with the amount of energy produced or sold.	DE should receive credit for avoiding fixed O&M costs of new generating resources. DE should receive credit for avoiding fixed O&M costs of new generating resources consistent with the avoided fuel determination.	SDHW should receive credit for avoiding fixed O&M costs of new generating resources.		AECC acknowledges that DE avoids some fixed operations & maintenance costs for those specific utility generation units whose construction is avoided by DE. Any analysis of DE cost/benefits should also recognize that the DE participant avoids purchasing energy (and capacity) from APS.	DE potentially permits APS to defer fixed O&M costs.

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Line Losses	Difference in the amount of electricity generated and the amount available for use by the end consumers. Energy and demand losses that occur on the transmission and distribution systems.	Line Losses is not a cost or a benefit itself, but rather it is an intermediate component/input needed to calculate avoided fuel and purchased power as well as avoided capacity. Line losses vary significantly across the utility system and the time of day. Input assumption for line losses should reflect the marginal system losses occurring during each hour of DE production (rather than the average line losses, which include low losses late at night).	SDHW avoids the use of electricity for water heating and should receive credit for avoiding fixed O&M costs of new generating resources.		AECC acknowledges DE avoids line losses for the power the DE participant would have purchased from APS had they not implemented DE solar.	DE potentially permits APS to avoid line losses. This should be based on measured system losses. The quantity of energy and capacity produced by DE at the customer site is adjusted upward for an amount of energy and capacity losses on the electric grid prior to computing the value of reduced energy costs and avoided capacity costs. This is already accounted for in the avoided energy and capacity costs.
Transmission System Investment	Electrical infrastructure used to transmit power from supply sources to the utility's local distribution grid. Investments in transmission infrastructure that are needed to meet future load growth, system expansion, or to assure system reliability.	DE should receive credit for avoiding incremental transmission system costs. This analysis should consider potential for targeted DE system placement with transparency into the need for future system upgrades	SDHW should receive credit for avoiding incremental transmission system costs.		AECC acknowledges DE has the potential to reduce some transmission system investment, but that any transmission investment required to satisfy standby/supplemental loads associated with DE customers must be fully integrated in the cost/benefit analysis. Any analysis of DE cost/benefits should also recognize that the DE participant may avoid purchasing some transmission service from APS.	DE at very high penetration levels may defer future transmission and interconnection costs. Many factors must be considered in this evaluation.

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Distribution System Investment	Electrical infrastructure used to distribute power from the transmission system to the consumer. Investments in distribution system infrastructure that are needed to meet future load growth system expansion, or to assure system reliability.	DE should receive credit for avoiding incremental distribution system costs. This analysis should consider potential for targeted DE system placement with transparency into the need for future system upgrades.	SDHWE should receive credit for avoiding incremental distribution system costs.		AECC acknowledges DE has the potential to reduce some distribution system investment to the extent peak system requirements are reduced, but that any distribution investment required to satisfy standby/supplemental loads associated with DE customers must be fully integrated in the cost/benefit analysis. Any analysis of DE cost/benefits should also recognize that the DE participant may avoid purchasing some distribution service from APS.	DE at very high penetration levels may defer future distribution costs. Distribution facilities that can be avoided are limited because facilities must still be sized to meet the peak electric load of the customer which is typically not reduced by DE.

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Ancillary Services	Electric power related services necessary to support the reliable operation of the electric system (scheduling & dispatch; reactive power & voltage control; loss compensation; load following; system protection; energy imbalance).	For clarity, we suggest that this category be combined with the Integration Cost category below. DE may increase requirements from some ancillary services such as regulating reserves, thus increasing utility operating costs. Black & Veatch recently completed a study for APS quantifying these costs. DE should also receive credit for reducing certain ancillary service costs. For example, modern PV inverters can provide VAR support. Upcoming IEEE 1547 revisions will allow DE to utilize its grid-stabilizing capabilities (reactive power & voltage control, etc.) Future integration costs should also be evaluated for a scenario in which APS has implemented low-cost variable energy integration practices such as those identified in a recent report by the Western Governors' Association.[i]	SDHW facilities may decrease costs for certain ancillary services.	The impact of DE on APS requirements for ancillary services should be empirically analyzed to determine costs or credits assigned to DE.	When DE produces a reduction in the amount of ancillary services required, AECC believes that benefit should be considered in the APS analysis. Any analysis of DE cost/benefits should also recognize that the DE participant may avoid purchasing some ancillary services from APS and that DE customers may increase the amount of ancillary services required	DE may increase requirements for some ancillary services such as regulating reserves, thus increasing utility operating costs. Black & Veatch recently completed a study for APS quantifying these costs.

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RES Avoided Costs	Costs for purchasing renewable energy to meet ACC RES requirements.	DE helps meet the APS RES requirements and should get credit for any above-market RES compliance costs.	SDHW helps meet the APS RES requirements and should get credit for avoided RES costs.		AECC believes that no additional credit should be awarded for "avoiding" above-market RES costs, particularly if DE is being subsidized as part of the same RES program.	Any benefit that may exist is limited to the following conditions: 1) if APS is below its RES compliance and 2) renewable power is more expensive than conventional generation. In addition, the value of this potential benefit would be capped at the rates that customers pay for RES programs.
Integration Costs	Utility costs to integrate and accommodate new facilities into the electric system. Can include costs for both new required facilities and incremental costs of operation.	For clarity, we suggest that this category be combined with Ancillary Services category above. DE may increase requirements from some ancillary services such as regulating reserves, thus increasing utility operating costs. Black & Veatch recently completed a study for APS quantifying these costs. DE should also receive credit for reducing certain ancillary service costs. For example, modern PV inverters can provide VAR support. Upcoming IEEE 1547a code will allow DE to utilize its grid-stabilizing capabilities (reactive power & voltage control, etc.) Future integration costs should also be evaluated for a scenario in which APS has implemented low-cost variable energy integration practices such as those identified in a recent report by the Western Governors' Association.		DE integration costs should be empirically determined and included in the evaluation of DE.	An empirical matter TBD.	Integrations costs, such as increased costs for ancillary services (see above) and increased costs for customer metering, relaying, and protection should be captured by the APS DE analysis. Including all integration costs will lower the net value of DE.

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Administration Costs	Utility costs to administer customer DE adoption including incremental costs for recordkeeping, billing, advertising, and general administration.	Any incremental DE administration costs relative to average customer administration costs are likely to be small, and should be based on reasonable estimates based on availability of smart meters and high penetrations, rather than historic costs with analog meters and fewer facilities.	Any incremental SDHW administration costs are small relative to other program impacts and are not significantly different from average administration costs for non-participating customers.		AECC believes that all administrative program costs associated with DE should be attributed to DG in any cost/benefit analysis	Administration costs and other program costs should be included in the analysis. This would include direct cash incentives as well as rate impacts to other customers. Including all administration costs would lower the net value of DE.
Market Price Mitigation	Reduction of wholesale market clearing prices for natural gas and electricity.	To the extent that DE reduces wholesale demand, it may reduce the market clearing prices by shifting the marginal resource to a lower heat-rate generating unit. DE should receive credit for costs avoided by these price reductions.			The capability of DE to reduce wholesale market clearing prices for natural gas and electricity is theoretically possible, but likely to be negligible. Further, so many other factors are in play at the wholesale/regional level that accurately assigning values specific to DE for reducing market wide prices would be highly speculative.	APS does not believe that market price mitigation is a clear benefit. No persuasive analysis has been provided to show that demand reductions related to DE are significant enough to have a measurable impact on wholesale power prices. Wholesale power prices are largely driven by natural gas prices in most hours of the year because natural gas resources are typically the generating units on the margin. Natural gas prices are determined primarily by national and even international factors. Incremental DE is too small to have a measurable effect on national natural gas prices.

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PV System Orientation	Changes in DE system value due to specific tilt and azimuth of a system.	PV System Orientation is not a cost or a benefit itself, but is one of several PV Production Characteristics affect the estimated output of PV systems on an hourly basis. These characteristics are inputs to calculating avoided energy and capacity. Southwest orientation may provide more capacity value (more generation when a utility needs it), thus increasing the value of avoided capacity-related costs. Size of system could affect how much energy is exported versus self-supply.			AECC acknowledges that PV system orientation can impact the value associated with a given system's installation type. The value of the orientation of a given DE system should be determined by its hourly output in comparison to utility cost in the same hour.	Orientation of DE systems may affect value. Further, if preferable orientations were provided higher-than-average compensation, then less preferable orientations must be provided lower than average compensation. PV system orientation has largely been determined by customer choice.
Grid Security	General reliability of the electric system to transmit power and serve customer loads, especially with respect to the ability to withstand natural or manmade disasters.	DE contributes to grid security by incrementally shifting the resource portfolio towards a large number of small generators. This incrementally reduces the grid's reliance on a small number of large generating units or transmission lines operating simultaneously during a contingency event.	SDHW improves grid security by avoiding the use of electricity during periods when the electricity grid is compromised. Benefits to grid security should be considered and included when computing benefits of DE.		AECC acknowledges DE may provide some benefits with respect to grid security in the event of natural or manmade disasters. DE installations even in high concentrations and at high levels of penetration may still only provide benefits for the installed DE customer and then only for those with defined on-site circuitry that allows them to use island from the utility. The assignment of any value due to "grid security" must be carefully weighed to determine if any benefit can realistically be shared beyond the installed customer.	DE production occurs only during the day, is transient, and is insufficient in scope to meet significant loads of the electric system. As such, DE does not significantly enhance grid security.

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Health Effects	DE impact on the use of traditional fossil-fueled generating resources, thus reducing potentially adverse health effects.	The societal benefits of avoided adverse health effects should be considered when evaluating the merits of pursuing more DE, even if these benefits are not credited directly to DE providers through rates. This is especially true in AZ where the ACC is a fourth branch of government and serves a quasi-legislative function, taking into account not just utility costs but effects on the broader society as well (applies to each of the so-called externalities). APS reports that 30% of avoided generation will be from coal plants; if that is assumed, the health benefits of reduced coal generation should be considered.	Benefits of avoided adverse health effects should be considered when computing benefits of SDHW.		AECC acknowledges that DE may avoid harmful emissions from traditional utility generation, which arguably could be counted as benefits in a cost-benefit analysis if the current RES requirement is eliminated; however, if the current RES requirement is retained, the benefits of externalities such as health effects are already implicitly taken into account in the mandated market penetration targets that force the procurement of above-market power. These benefits should not be double counted.	APS believes that the overall assessment of DE in the technical workshop should focus on costs and benefits that directly impact the utility's costs to serve its customers. The key issue that APS has surfaced for the workshops is the potential for a customer with DE to shift the utility's costs to serve them to other customers. Therefore, APS asserts that other "external" costs and benefits that are not recovered through (or have an impact on) retail electric rates, though potentially interesting from a policy standpoint, should not be included in this assessment. The EPA and ADEQ consider health effects when establishing emission control requirements. Avoided capacity costs already account for these environmental costs.

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Non-compliance Environmental Effects	Environmental effects that are not addressed by utility environmental compliance regulations.	The societal benefits of non-compliance environmental effects should be considered when evaluating the merits of pursuing more DE, even if these benefits are not credited directly to DE providers through rates. This is especially true in AZ where the ACC is a fourth branch of government and serves a quasi-legislative function, taking into account not just utility costs but effects on the broader society as well.	Societal benefits provided by SDHW, such as reduced water use and avoiding pollutants permitted under current regulations should be considered when computing benefits of SDHW.		AECC acknowledges that DE may avoid pollutants, which arguably could be counted in a cost-benefit analysis if the current RES requirement is eliminated; however, if the current RES requirement is retained, the benefits of externalities such as reduced pollution are already implicitly taken into account in the mandated market penetration targets that force the procurement of above-market power. These benefits should not be double counted.	APS believes that the overall assessment of DE in the technical workshop should focus on costs and benefits that directly impact the utility's costs to serve its customers. The key issue that APS has surfaced for the workshops is the potential for a customer with DE to shift the utility's costs to serve them to other customers. Therefore, APS asserts that other "external" costs and benefits that are not recovered through (or have an impact on) retail electric rates, though potentially interesting from a policy standpoint, should not be included in this assessment. The EPA and ADEQ consider environmental effects when establishing emission control requirements. Avoided capacity costs already account for these environmental costs.

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Economic Development & Jobs	Spurring of local businesses and jobs or industries that contribute to the local economy.	The societal benefits of economic development and jobs should still be considered when evaluating the merits of pursuing more DE, even if these benefits are not credited directly to DE providers through rates. This is especially true in AZ where the ACC is a fourth branch of government and serves a quasi-legislative function, taking into account not just utility costs but effects on the broader society as well.	Benefits of economic development should be considered when computing benefits of DE, including SDHW.	Should be considered as impacts and reported separately from net benefits of DE.	As a component of ratemaking for APS, AECC does not consider economic development & jobs that may result from DE (as compared, it must be assumed, to economic development & jobs from non-DE installation) as an applicable benefits category.	APS believes that the overall assessment of DE in the technical workshop should focus on costs and benefits that directly impact the utility's costs to serve its customers. The key issue that APS has surfaced for the workshops is the potential for a customer with DE to shift the utility's costs to serve them to other customers. Therefore, APS asserts that other "external" costs and benefits that are not recovered through (or have an impact on) retail electric rates, though potentially interesting from a policy standpoint, should not be included in this assessment. The net impact of DE and average electric rates versus other generation sources on local economic development and jobs are an external issue that should not be included in the overall assessment of DE's potential for shifting costs to other customers.

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Civic Engagement/Conservation Awareness	Utility programs may raise public awareness in energy conservation and increase the adoption of other, non-DE, energy conservation programs and measures.	DE should receive credit for any increase in public awareness of energy use that leads to conservation behaviors. This is similar to the approach used by APS in evaluating the spillover effect of its DSM programs. The 2009 California Solar Initiative impact report showed a 7% to 13% usage reduction after customers installed solar energy systems (see table ES-11 of the report).	SDHW DE should receive credit for increasing public awareness and engagement.		As a component of ratemaking for APS, AECC does not consider civic engagement/conservation awareness that may result from DE as an applicable benefits category.	APS does not believe that this is an appropriate benefit of DE for purposes of this evaluation. The costs and benefits of increased participation in other APS energy efficiency programs are already captured in the evaluation and implementation of those programs. In addition, DE programs may very likely reduce participation in DSM programs.
Energy Subsidies	Transfer payments, incentives, tax credits, R&D investments, loans, loan guarantees, and other subsidies.	This analysis should consider the costs and benefits of DE apart from any energy subsidies. Separately, there are strong policy justifications to provide incentives offered by electric utilities through programs like APS' DE program, to assure that solar DE receives comparable levels of subsidies as other industries, including accounting for subsidies that other industries have received since their inception.	Sufficient incentives should be provided to solar SDHW, including incentives offered by electric utilities through programs like APS' DE program, to assure that solar SDHW receives comparable levels of subsidies as other industries, including accounting for subsidies that other industries have received since their inception.		AECC opposes increasing solar incentives paid by ratepayers and supports reducing the subsidies paid.	APS does not believe that federal and state tax and spending energy subsidies should be included in this evaluation. These subsidies are federally mandated policies. These energy subsidies impact all rate payers alike and do not result in cost shifting from one customer to another.

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Technology Synergies	Applying multiple technologies in a coordinated fashion that yield benefits which are collectively greater than the sum of the benefits from the individual technologies.	Technology Synergies is not a cost or a benefit itself, but rather it is an intermediate component/input needed to calculate avoided capacity costs. DE evaluation should consider scenarios in which technologies and pricing practices can modify the APS load shape sufficiently to move the peak earlier in the day so that it better coincides with solar production. Future load shapes can be managed to minimize costs and requirements for new centralized generation through strategic storage, demand response, and other smart technologies as DE penetration increases. Since non-technology options (such as peak pricing) might accomplish the same effect, we suggest the category be renamed to "Future Load Shape."	SDHW should be evaluated and receives higher credit for capacity for its ability to provide peak demand benefits by avoiding the use of electricity for heating water, especially during the summer months.	Should also take into account technological, installation, siting, organizational, and marketing innovations that have occurred in AZ and, have lowered installed costs, shifted the supply curve for DE downward, shifted the demand curve for DE outward, and increased consumer surplus.	No comment at this time.	Customer programs such as energy efficiency and demand response are designed to reduce load during system peak periods which are typically summer afternoon, and shift it into the late evening or nighttime hours. It would be counter-productive to design customer programs that shift load to the summer afternoons.
Decommissioning Costs	Utility cost to decommission a generating facility at end-of-life.	Decommissioning costs for both DE and avoided new utility generating units should be included in the lifecycle valuation of both technologies. Decommissioning of DE units is largely a customer expense; the only utility costs to consider are removal costs related to any interconnection facilities (paid for by customers) that are no longer useful after the generator is removed.	SDHW should receive credit for avoiding fuel and purchased power costs.			At a future time, when an avoided CT plant is ready for decommissioning, several factors and market drivers will determine if the plant's salvage value will be less than, equal to, or greater than its cost of decommissioning. Any solar system decommissioning costs should be netted out as well.

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Ratepayer/Consumer Interest	The ACC is required to rule in the interest of ratepayers regarding utility rate structures.	DE provides a social benefit by contributing towards the general energy preferences of the Arizona public as expressed in opinion surveys. This should still be considered when evaluating the merits of pursuing more DE, even if these benefits are not credited directly to DE providers through rates. This is especially true in AZ where the ACC is a fourth branch of government and serves a quasi-legislative function, taking into account not just utility costs but effects on the broader society as well.	SDHW should receive credit for avoiding variable O&M costs.			The ACC must find that rates are just, reasonable, and in the interests of all customers.
Ratepayer Cross-Subsidization	Higher or lower retail rates experienced by customers that do not participate in a DE program caused by participating customers receiving credits and/or incentives that exceed or underprovide, respectively, the net benefits obtained by the electric utility.	Cross-subsidization is not a cost or benefit itself, but rather it is an aspect of how the costs and benefits are distributed. Cross-subsidization may occur either to or from DE providers depending on how the costs and benefits are calculated.	SDHW DE should receive credit for avoiding water consumption and associated costs.		Higher cost recovery requirements for non-participating customers caused by DE should be eliminated. Rate design updates should be made to remove any subsidies DE customers receive by not paying their actual APS system costs.	A fundamental concept underlying ratemaking is that all customers should pay for the services they receive and subsidization between customer classes should be removed to the extent practical.

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Utility Systems Costs	Procurement and operating costs for new systems and procedures necessary to manage utility operations in response to DE operations.	DE may add to utility system operation costs, however these costs are already captured above in either Variable O&M or Ancillary Services/Integration. And, newer inverters are likely to reduce utility system costs.	SDHW should receive credit for avoiding costs of environmental compliance.		Cost to the utility of additional and changing system protocols and operating routines due to changing demands as well as contingency handling efforts in the event of material swings in available solar DE.	A limited amount of costs to support the administration of APS's DE portfolio are collected annually through the Renewable Energy Standard (RES) budget. Additional facility integration and system operations costs should be captured by the Integration Cost category and will lower the net value of DE.

[i] http://www.westgov.org/component/docman/doc_download/1610-meeting-renewable-energy-targets-in-the-west-at-least-cost-the-integration-challenge-full-report?Itemid=