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**Clean Coalition Comments on the June 13, 2017, IEPR Joint Agency Staff Workshop on the Review of the Actions and Status of State-level Energy Roadmaps.**

The Clean Coalition submits these comments on the June 13, 2017, IEPR Joint Agency Staff Workshop on the Review of the Actions and Status of State-level Energy Roadmaps. The Clean Coalition strongly supports the Roadmaps and complements the Joint Agencies on the progress to date. In these comments we summarize how a distribution system operator (DSO) model would contribute to the coordination and implementation of both local and State-level energy policy and roadmaps related to distributed energy resources (DER) in California and provide as Appendix A the Clean Coalition's *Preliminary Report on the Distribution System Operator (DSO) Model*, which outlines the DSO functions and advantages in meeting the goals of the several Roadmaps and related policy initiatives.

The Clean Coalition is a nonprofit organization whose mission is to accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise. The Clean Coalition drives policy innovation to remove barriers to procurement and interconnection of distributed energy resources (DER)—such as local renewables, advanced inverters, demand response, and energy storage. We establish market mechanisms that realize the potential of these solutions. The Clean Coalition also collaborates with utilities and municipalities to create near-term deployment opportunities that prove the technical and financial viability of local renewables and other DER.

## I. A Distribution Systems Operator model will advance the goals of the State-wide Roadmaps and the CPUC DER Action Plan while offering an evolved role for utilities in addressing emerging issues of coordination between transmission and distribution operation, resource optimization, and DER market access and participation.

As we look to the future we need to consider how to practically integrate DER technologies and markets, and we should consider drawing a bright line between transmission and distribution operations. Utilities are responsible for operations ensuring reliability, efficiency, and provision of service within the distribution system. It is increasingly recognized that the electricity industry is going through a systemic transformation from exclusive reliance upon a highly centralized system powered mainly by large remote generating plants to a more decentralized system, where the "grid edge" is witnessing technological advances and customer adoption of diverse DER systems.

The transmission and distribution grids are distinct systems, with inherently different structures, characteristics, functions, operating principles, jurisdictions and rules, interconnecting only through specific substations. The California Independent System Operator (CAISO) manages transmission system operations. A Distribution System Operator (DSO) is the appropriate entity to manage the interface between distribution and transmission resources. This can address the issues of conflicting CAISO and local dispatch calls and impacts, as well as managing multiple use cases for individual or aggregated DER, and their participation in multiple markets, while signaling to optimize application to the highest value of service at any time. Establishing a single coordinating DSO entity for DER and grid operations within each distribution service area can efficiently open up access between markets and these multiple DER resource roadmaps, rationalizing integration of value streams and appropriate grid modernization investment.

We recommend that the California Energy Commission (CEC) address the role of distribution operators in general, and dedicated DSOs specifically, in the Integrated Energy Policy Report (IEPR) with regard to coordinated implementation of the State-level energy Roadmaps, DER Action Plan, local community energy planning, and ratepayer investment in grid infrastructure and modernization. In particular, separating ownership of distribution and transmission infrastructure resources will encourage competition in maximizing utilization and ratepayer value from each resource.

The Clean Coalition proposes that the formation of Distribution Systems Operators (DSO) will be critical to manage operations of a high DER distribution grid as envisioned in the Roadmaps, to ensuring broad consumer choice and ratepayer value combined with a continuing and evolving utility role in the future electric system. By divesting from transmission assets, incumbent utilities would become the dedicated distribution operators and market facilitators that represent the future of the retail electricity system incorporating the role that consumer choice will play in achieving broad public policy goals.

As customers move away from IOUs as their energy providers and increase customer choice, California will need some actor to manage the development of the distribution system in relation to these services and interactions. Today, DER providers, Community choice aggregation (CCA) programs and direct access (DA) providers increasingly offer California customers more choice in meeting their own electric needs and associated procurement, whereas both municipal and investor-owned utilities (IOUs) remain responsible for building and maintaining delivery infrastructure, managing local operations, and managing the physical interactions between customers, producers, the California Independent Systems Operator (CAISO) and energy or service providers that use the grid. This situation has the clear potential for conflicts between optimization of value for each actor, resulting in conflicting operational and dispatch signals that stress distribution facilities and increase overall costs for distribution and transmission infrastructure. The cost of this infrastructure already exceeds the energy component of ratepayer bills. In order to stem these conflicts while ensuring broad retail choice and safe, cost-effective

grid infrastructure, the Clean Coalition suggests that the CEC and the CPUC consider the DSO model in the context of consumer and retail choice.

The DSO model could greatly contribute toward realizing the goals that California policymakers have carefully developed and are currently pursuing through the Roadmaps and DER Action Plan. Fully realizing these goals requires easily accessible, transparent markets for the full range of electricity services customers and grid operators need, a robust array of competing DER providers who can bring costs down for both energy and grid services by creating real competition in those retail and wholesale markets, and clearly demarcated operational responsibilities.

On the first element, developing sophisticated set of markets and managing an exploding variety of distributed energy resources will require a dedicated entity to both manage the distribution grid, its interface with the transmission grid, and to manage the full array of market services that California will want in addressing the range of needs of its customers and electricity services providers alike.

On the second, California needs to eliminate the systemic barriers that currently discourage investment and proliferation in DER and the provision of associated services to all parties. Realizing the opportunities created by DER providers' facilities and operation, and successfully leveraging these on behalf of both general ratepayers and individual customers will require both judicious planning and investment in the DER management systems (DERMS) at the distribution grid level as well as development of effective markets, tariffs and other compensation mechanisms to provide the appropriate signals and incentives to optimize operations and reduce costs, including the full range of functions in DER and other resource value stacks.

The DSO represents the best structure to manage the increasing complexity of emerging energy services markets and DER rich distribution grids. In our vision, a DSO would first manage each distribution area, balancing load, generation and services to present a single aggregated and planned profile at the T-D interface to provide CAISO with a more manageable transmission grid. The DSO would also facilitate distribution wholesale markets and bid aggregated services into transmission wholesale markets on behalf of DER providers within their distribution area. By creating a bright line between distribution grid operations and the transmission grid, DSOs will focus on developing ever more effective and efficient grid operations and markets.

The primary function of the DSO would be to operate the distribution grid to ensure reliability and power quality, as utility distribution companies (UDC) do now. This necessarily will entail maintenance of the existing grid, and also cost effective grid modernization investments to accommodate customer driven DER installation, to support the appropriate development of distributed resources that contribute to grid operations, and to facilitate the emerging markets to fully utilize this capacity. Since a DSO is likely to realize multiple revenue streams from market facilitation services and offering services

to the transmission grid, DSOs will have strong interests to foster the deployment of new DER in the most cost-effective manner possible, and maximize utilization of this capacity.

The second key function of the DSO would be to manage the presentation of all resources and load in aggregate to the transmission grid at the Transmission-Distribution Grid interface (T-D interface). Currently, the Independent System Operator does not have visibility to the Distribution Grid in general, which means that as DER proliferate, management of the impacts of ISO dispatch or market signaling to those DER will become increasingly unwieldy for the distribution system. DSOs can solve this problem by maintaining their own visibility of all DER on their distribution grids and then presenting only the aggregate load and available dispatchable supply to the transmission grid at the T-D interface, and managing ISO calls for these resources. Not only will this simplify the management of the transmission grid, but it also opens the possibility of the DSO actively managing the distribution grid resources to present particular profiles to the ISO. This will allow the transmission ISO, without the need for direct visibility into the distribution system, to receive forecasts, commitments, and offers associated with each transmission node from the DSOs, reflecting each DSO's value and reliability based optimization of within its territory.

The Clean Coalition offers additional detail on the DSO model in Appendix A, a preliminary report detailing potential functions and advantages of a DSO.

## II. Conclusion

The DSO model merits consideration in the context of advancing California's state-level energy Roadmaps and Integrated Energy Policy Report. The DSO model addresses critical coordination between transmission and distribution operation, resource optimization, and DER market access and participation necessary to most effectively implement the goals of the three Roadmaps and DER Action Plan. This approach offers a needed mechanism to ensure cost-effective and safe management of the distribution grid while also ensuring open access to infrastructure, accommodate multiple energy providers, enable market participation by DERs, signal value for all energy resources, coordinate compensation and charges, and optimize efficiency in order to reduce ratepayer costs. The Clean Coalition hopes that this model will be a focal point ongoing CPUC and CEC efforts to advance the discussion.

Sincerely,
Doug Karpa
Policy Director
Kenneth Sahm White
Economics & Policy Analysis Director
Clean Coalition

# APPENDIX A

# Preliminary Report on the Distribution System Operator (DSO) Model

Clean Coalition

# Preliminary Report on the Distribution System Operator (DSO) Model

## I. How a Distribution System Operator model would advance customer and retail choice

A full retail choice model will allow sophisticated customers to get a variety of services from a variety of providers. For example, an industrial or commercial customers might obtain their main generation from a local community choice aggregation (CCA) program, while obtaining demand charge services from a third party provider, and selling demand response services. On the provider side of this market, the CCA may obtain a mix of generation from centralized generation as well as cheaper distributed energy resources (DER) within the distribution grid. As resources that do not use transmission resources, energy from DER would ideally not be subject to transmission access charges. Similarly, a direct access (DA) provider could offer power to customers in competition with the utility and the CCA. Additionally, full retail choice could include a demand response (DR) aggregator's ability to alleviate congestion on the transmission grid or to alleviate local needs on the distribution grid. The availability of a sophisticated array of markets would open up a tremendous opportunity for innovation and reduced costs by finding the most cost-effective resources to meet the needs of the distribution grid.

Getting to that full-scale retail choice ecosystem requires two things: easily accessible, transparent markets for the full range of electricity services customers need, and a robust array of competing DER providers who can bring costs down for both energy and grid services by creating real competition in those retail and wholesale markets.

On the first element, a dedicated entity could manage the distribution grid, its interface with the transmission grid, and the full array of market services. The wide variety of distributed energy resources offer an array of services that can be dispatched through a transparent market. Both customers and electricity services providers have a range of needs for which resources exist but markets have not fully realized. This will require a dedicated entity to both manage the distribution grid, its interface with the transmission grid, and the full array of market services.

With respect to the second element, California needs to eliminate the systemic barriers that currently discourage investment and proliferation in DER and the provision of associated services to all parties. Realizing the opportunities created by DER providers' facilities and operation, and successfully leveraging these on behalf of both general ratepayers and individual

customers will require both judicious planning and investment in the DER management systems (DERMS) at the distribution grid level, as well as the development of effective markets, tariffs and other compensation mechanisms to provide the appropriate signals and incentives to optimize operations and reduce costs, including the full range of functions in DER and other resource value stacks.

A distribution system operator (DSO) could provide both of those necessary elements. The DSO would create a bright line between distribution grid operations and the transmission grid by serving as the core operations and market manager of the distribution grid. In addition, a DSO could ensure the optimal utilization of distributed energy resources and increase focus on developing more cost-effective and efficient distribution grid operations and markets. As separate DSOs develop different approaches and policies, there will be opportunity for comparison, and adoption of innovative best practices.Below is a partial list of the DSO core functions.

**A. DSO as Distribution Grid System Operator**

The primary function of the DSO would be to operate the distribution grid to ensure reliability and power quality, as utility distribution companies (UDC) do now. This necessarily will entail both maintenance of the existing grid, but also to direct grid modernization investments to support the development of distributed resources that contribute to grid operation, to accommodate customer driven DER installation, and to facilitate the emerging markets to fully utilize this capacity. Since a DSO is likely to earn multiple revenue streams from market facilitation services and offering services to the transmission grid, DSOs will have strong interests to foster the deployment of new DER in the most cost-effective manner possible, and maximize utilization of this capacity. This would limit the potential conflict of interests that investor-owned utilities currently have between procuring the most cost-effective energy while also making a profit on capital investments.

**B. DSO as Transmission-Distribution Interface Manager**

The second key function of the DSO would be to manage the presentation of all resources and load in aggregate to the transmission grid at the Transmission-Distribution Grid interface (T-D interface). Currently, the California Independent System Operator (CAISO) does not have visibility to the distribution grid, which means that as DER proliferate, management of ISO dispatch or market signaling to those DER will become increasingly unwieldy for the distribution system, potentially line overload or congestion problems on the distribution grid but

invisible to the ISO. DSOs can solve this problem by maintaining their own visibility of all DER on their distribution grids and then managing ISO calls for resources by presenting only the aggregate load and available dispatchable supply to the transmission grid at the T-D interface. Not only will this simplify the management of the transmission grid, but it also opens the possibility of the DSO actively managing the distribution grid resources to present particular profiles to the ISO.

This kind of coordination and oversight of the distribution grid would avoid the potential for a "two-master problem" of individual distributed resources receiving instructions from the ISO that either create issues for the distribution grid or, worse, conflict with instructions meant to address distribution level needs. By operating as a distribution management entity, the DSO can coordinate both transmission and distribution grid needs in a planned fashion to enable more efficient operation.

### C. DSO as Distribution Wholesale Market Manager

These two functions are critical for the facilitation of full-scale retail choice, because viable markets for distribution services requires an entity to manage both the distribution grid operations and have the visibility into all resources to facilitate markets for a full range of services. These markets in turn would allow DER owners to realize a greater range of revenue streams to add to their value stack, which in turn provides consumers with both a wide array of competing, more cost-effective DER, as well as a transparent market in which to procure those services. An open market for energy services could replace a series of complex, bilateral contracts and also avoid restrictive contractual commitments that prevent optimization of value for DER capacity and services. Thus, a DSO with visibility and effective resource management within its distribution grid, resulting from cost effective investment and planning, would also greatly facilitate matching DER with customers interests.

## II. Barriers to DSO implementation and the deployment of a full range of retail markets

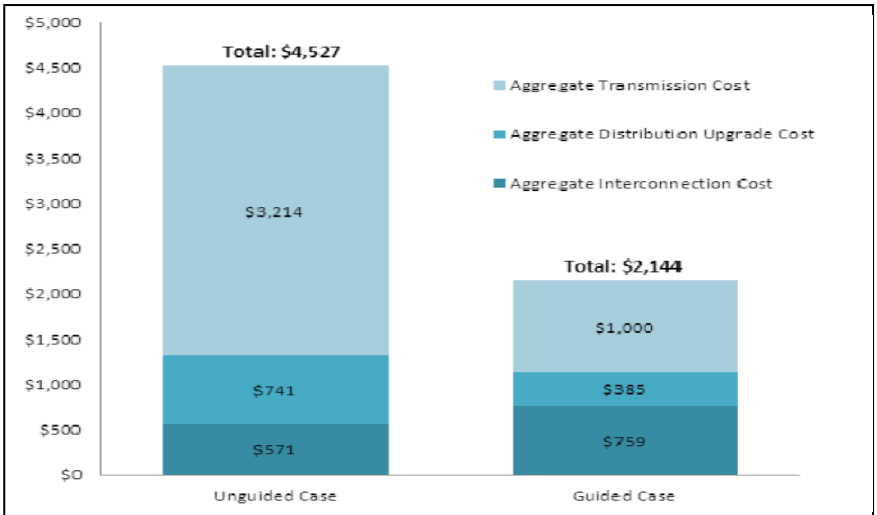
Currently, there are four systemic barriers to vigorous implementation of the kinds of distribution level support and investments that would facilitate full retail services markets. All of these systemic barriers are intimately related to the inherent conflict of interest that investor-owned utilities (IOUs) face due to their partial ownership of the transmission grid.

First, IOUs have little incentive to develop a wider range of retail services markets, because they have little incentive to foster greater DER penetration. Currently, IOUs can pay

themselves for delivery of energy from central generation, which uses the transmission grid that the IOUs mostly own. Since a significant portion of IOU revenue comes from the use of the transmission grid, this disincentivizes IOUs from focusing squarely on DER and facilitating retail markets to connect third party DER to customers. In other words, IOUs have a conflict of interest between finding the most cost-effective energy resource while also making a profit from capital expenditures—all posing a disadvantage to distributed energy resources.

Second, in addition to the direct payments they receive for the use of the transmission grid, IOUs also justify increased investment in transmission grids as more centralized generation is used. Increased penetration of DER and connecting customers with DER within their own distribution grids would avoid transmission investments, saving ratepayers millions of dollars in capital expenditures every year. In addition, the IOUs receive a guaranteed rate of return on transmission investments, providing them a disincentive from investing in DERs. Since IOUs can rate-base transmission investments and generate returns from those investments, the proliferation of DER providing service to local customers would cannibalize their potential for new transmission investments. Thus, IOUs have an incentive to obstruct policies or regulatory models that would allow DER to proliferate.

Third, current rate structures distort the procurement market against DER by requiring IOUs (as Participating Transmission Owners) to pay transmission access charges (TAC) for transmission delivery they do not actually use when energy is delivered to customers solely through the distribution system. This means that transmission grid investments are being socialized to subsidize transmission-dependent generators while significantly disadvantaging DER, which provide a valuable social service by not contributing to transmission capacity. IOUs are paying on the order of 3 cents per kWh extra compared to their native price from DER providers to support a transmission grid that is predominantly needed by their centralized generating competitors. As a result of this market distortion, DER artificially appear to be more expensive than they are. Fixing this distortion could greatly facilitate providing additional DER service providers for retail customers.



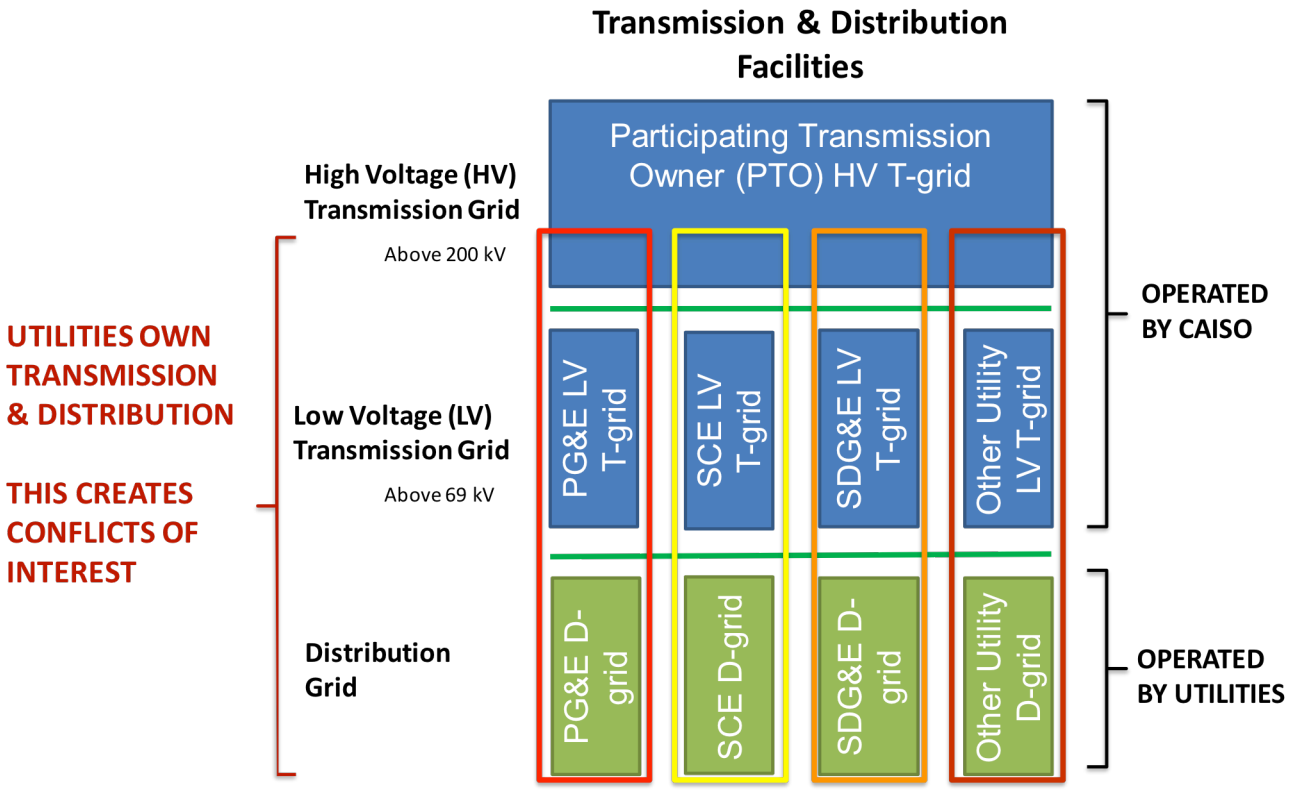

*The unguided deployment of DER could lead to an increased ratebase of more than $2 billion in additional investment.*

*Source: Southern California Edison (2012)*

The chart above estimates the ratepayer savings from planning new distributed generation within the distribution system close to load, greatly reducing transmission investment needs in comparison to the unguided location of new generation. While this study identified the impact of poorly sited distributed resources, comparable levels of large scale centralized generation connecting directly to the transmission system would have even greater impact as 100% of the energy would require transmission capacity to reach loads.

Fourth, planning the deployment of DER in a data-driven, planned manner would dramatically reduce the need for transmission grid investments. For example, a 2012 SCE study demonstrated that within its service territory unplanned DER proliferation would result in some $4 billion of extra investment to accommodate compared to a planned DER strategy. Thus, again IOUs have no particular incentive to ensure a robust and intelligent focus on DER or distribution grid planning.

**Today's Market Structure is a barrier to innovation**




The current market structure creates conflicts that undermine a vigorous pursuit of DER deployment and the development of new market structures.

Taken together, the development of the full suite of electricity services markets suffers from the lack of a market participant whose interests are squarely aligned with the development of robust markets and the DER that ultimately are needed to provide customers with a wide variety of retail choice.

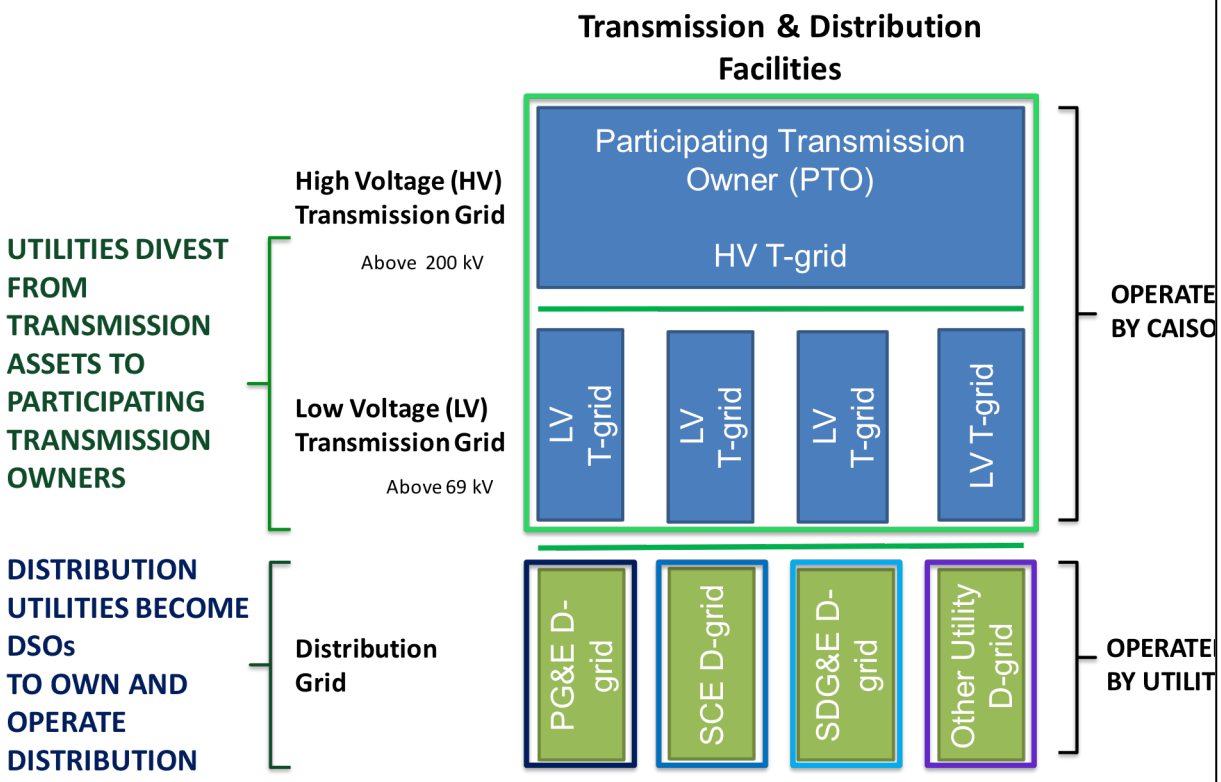
## III. The benefits of a DSO future

### A. A bright line between transmission and distribution management

The most straightforward path to create entities with the authority and the incentive to be a fierce competitor to create a full range of distribution services is to divest the existing IOUs from their transmission assets. By splitting transmission assets off from existing incumbent utilities, the resulting distribution focused companies would be natural DSOs, with every

incentive aligned to promote the development of new markets and DER deployment. Whether the IOUs split into a distribution company and a transmission owning and maintaining company or the assets are sold, shareholders would retain the full value of the grid though the management of the companies and assets may change.

The DSO Market Restructuring would foster a distribution-focused businesses.




Divesting transmission assets will create distribution grid focused businesses with an incentive to innovate and bring new DER and new markets online quickly.

### B. The DSO market structure would facilitate more robust grid operations

This structure would create the DSOs that could assume the full function of DSO as a manager of the distribution grid and the T-D interface. Since each DSO would be responsible for maintaining the reliability and the presentation of the distribution grid area to the transmission grid at the T-D interface, the problems of grid management and a lack of visibility into the distribution grid would be greatly simplified for CAISO, while distribution grid challenges would decrease. When each distribution area is independently managed by a dedicated DSO,

local balancing of load with distributed as a first priority would leave the DSO in a position to predict the net profile of load and generation at the T-D interface.

**C. The DSO market structure would provide a natural proponent of new markets for energy services**

Since DSO companies would be seeking profit opportunities within the distribution grid, these companies would be strongly incentivized to develop market mechanisms for distribution-level markets for energy services, including generation, demand response, demand charge management, voltage management, reliability services, and resiliency services, among others. As an additional layer, the DSO could also bid services from participating DER providers up into the transmission wholesale markets. This could also signal value for DER, coordinate compensation and charges for both distributed and centralized resources, and also optimize the efficiency of the distribution grid—all leading to lower costs for customers.

**D. The DSO market structure would provide a critical platform to support a wide variety of customer choice.**

As DER become a larger proportion of the distribution grid and (some) customers become more sophisticated in their energy use, markets will develop to provide value for prosumers to both take advantage of a wide range of services as consumers as well as opportunities as producers of electricity services. By having a single entity manage an otherwise complex and haphazard system of idiosyncratic bilateral contracts, these markets could simplify transactions and markedly lower costs.

## IV. Conclusion: moving toward a sophisticated distribution grid

As the California Energy Commission and the California Public Utilities Commission seek to develop the state's energy system, it will be critical to consider a market structure that can most efficiently deliver the services and market ecosystem that will both meet the needs of a diverse customer population and also facilitate California's moves to a 100% renewable energy future. DER are clearly a major component of such a future, but facilitating a rapid transition will require the creation of new entities dedicated to delivering the full potential value of the distribution grid.