Clean Coalition
Making Clean Local Energy Accessible Now

California Independent System Operator

Comments on

Demand Response & Energy Efficiency Roadmap Workshop

May 13, 2013

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I. Introduction

The Clean Coalition and the California Consumers Alliance appreciate the opportunity to offer the following joint comments on issues addressed in the May 13, 2013 CAISO workshop on the proposed Demand Response & Energy Efficiency Roadmap.

The Clean Coalition is a California-based nonprofit organization whose mission is to accelerate the transition to local energy systems through innovative policies and programs that deliver cost-effective renewable energy, strengthen local economies, foster environmental sustainability, and enhance energy security. To achieve this mission, the Clean Coalition promotes proven best practices, including the vigorous expansion of Wholesale Distributed Generation (WDG) connected to the distribution grid and serving local load. The Clean Coalition drives policy innovation to remove major barriers to the procurement, interconnection, and financing of WDG projects and supports complementary Intelligent Grid (IG) solutions such as demand response, energy storage, forecasting, and communications.

The California Consumers Alliance (CCA) is an organization established for the purpose of providing consumers with access to the technical and analytical expertise and tools needed to fully and effectively participate in transmission planning processes. CCA supporters are electricity consumers who reside and work in the service territories of the State's Investor Owned Utilities (IOUs): PG&E, SCE, and SDG&E. The IOU's transmission facilities comprise a major portion of California's integrated high voltage electrical grid. CCA advocates for efficient, cost effective and environmentally sensitive solutions to the identified needs of the State's electrical grid.

We are grateful for the CAISO initiative to develop a roadmap for incorporating Demand Response and Energy Efficiency into its infrastructure planning process and market operations, and its vision of a collaborative effort with agencies and

stakeholders. We are confident that DR & EE offer effective and efficient means to reduce the need for fossil fueled generation and transmission additions. DR will play an indispensable role in the integration of renewables and enabling tomorrow's smarter grid. The CCA joins the Clean Coalition in promoting these priority resources.

Energy Efficiency and Demand Side Management, including a variety of Demand Response (DR) opportunities, represent major and most preferred methods of managing energy use. Energy Efficiency has prevented household energy use in California from increasing over the past 30 years and reducing total use and capacity needs by a third, with great additional potential remaining. Demand Response may not reduce total usage, but can be implemented quickly and relatively inexpensively to manage usage, both addressing peak demand capacity at the lowest cost, and matching demand with supply to most cost effectively support much fuller use of the State's abundant clean renewable resources.

Our comments focus on the potential marriage of DR, in all its forms, with variable generation at both the transmission and distribution level, as we see this as the greatest opportunity (beyond use reduction) for progress in achieving a sustainable, cost effective, and reliable energy supply. We encourage full attention to this potential in the proposed Roadmap and look forward to exploring the opportunities presented by demand response in greater detail.

II. General Comments

DR is and remains important in meeting the Renewable Portfolio Standard and other clean energy goals, including greenhouse gas emissions reduction and increased penetration levels of distributed generation. We agree with many other organizations that California should be should be looking to transmission operators such as PJM and New England to examine their substantial experience in market structure and tailor the DR applications and markets to specific California needs including local and regional

generation and transmission capacity, flexibility, and maximum use of preferred resources.

Exploration of successful DR programs in California and among other transmission operators should be the next step in developing the DR market in California, while also looking to leverage the State's investment in Advanced Metering Infrastructure ("Smart Meters") and recent technical capabilities for locally targeted fast acting automated DR. The ISO roadmap should also ensure that various forms of demand response are fully recognized as a resource alternative to new fossil-fired generation, defer investment in transmission and distribution assets, and be used to routinely favorably modify the system load shape or temporarily adjust load as needed to maintain grid reliability as California progresses towards 2020 and future renewable energy goals. Recognizing that both customer load and local generation involve distribution level interaction the ISO should recognize that additional activities outside its own efforts are essential to developing the full capabilities of demand response and that the ISO should continue to coordinate with both utilities and state agencies to expand this effort to a cross-agency roadmap.

As illustrated in the following table[1], DR can play a valuable role in multiple services across a range of timescales, in conjunction with Distributed Generation (DG), and potentially Distributed Energy Storage (DS). The vision for the integration of DER is a smart-grid platform that would link a web of diverse generation sources, including a variety of fossil fuels and renewable and distributed sources, across the grid to a large set of consumers with possibilities for improved energy efficiency, local generation, controllable loads or storage devices. The grid, along with analytics, communication technologies and distributed intelligence, is used to coordinate and balance sources, storage and loads to produce a reliable power system for more moderate costs than a traditional and centralized approach. It is expected that the costs of a system with a

[1] *Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages,* International Energy Agency Demand Side Management Programme (in conjunction with the US Department of Energy and NREL), Seppo Kärkkäinen (author), 2009

better DER integration would be reduced compared to the present situation, because of the inclusion of more energy efficiency and renewables, but also of a lesser use of expensive peaking power and a better use of the transmission and distribution assets.

	< One minute	15 minutes	30 minutes	Hour ahead	Day ahead	Year ahead
Frequency control (primary, secondary, tertiary)	Local automated DG, Local automated DR, Load shedding	Centralized signals to DG and DR	Direct load control DR Manual DR	DG DR		
Voltage control	Power electronics	Power factor corrections, DS	Power factor corrections DS, DR			
Meet system peak load				DR	DR	EE DR
Portfolio balancing		DR, DG, DS	DR,DG, DS	DR,DG, DS		
Relief of HV network congestion		DR	DR	DR		
Network restoration		DR, DG, (DS)	DR, DG, (DS)	DR, DG, (DS)		
deferring network investments						Energy efficiency, DR, DS

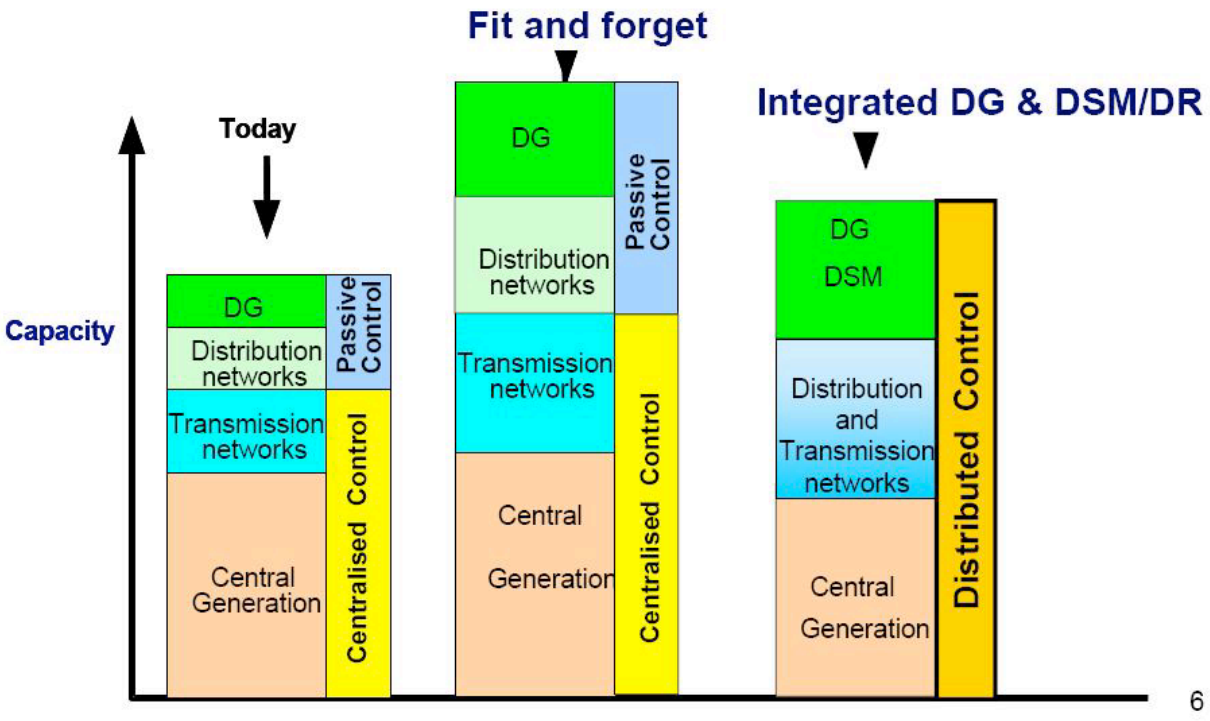
As we proceed to higher RPS standards, a proportion of the electricity generated by large conventional plants will instead be provided by a combination of distributed

generation, renewable energy sources, demand response, demand side management and energy storage. Efficient integration of distributed generation is unlikely to occur without changes to the transmission and distribution network structure, planning and operating procedures. Indeed, it is envisaged that there will be less of a distinction between these network types, as distribution networks become more active and share many of the responsibilities of transmission.

It is important to recognize, and for the Roadmap to address, that in the future electricity system with increased levels of distributed generation and active demand-side penetration, the distribution network can no longer act as a passive appendage to the transmission network. The entire system has to be designed and operated as an integrated unit. In addition, this more complex operation must be undertaken by a system where ownership, decision-making and operation are also dispersed.

Based on the characteristics of smart grids, it is possible to have energy infrastructures and systems with lower total capacity and emissions compared with the structures based on the existing technology and approach. In the following illustration, the "Fit and forget" approach means that networks and central generation are built on the basis of present technologies where centralized control is applied to central generation and transmission and passive control to distribution systems. The "Integrated DG & DSM/DR" approach is based on distributed control and efficient integration of Distributed Energy Resources. This means that the same load needs less generation and network capacity than the "Fit and Forget" alternative. Such integration will result in substantial savings from reductions in total capacity requirements.

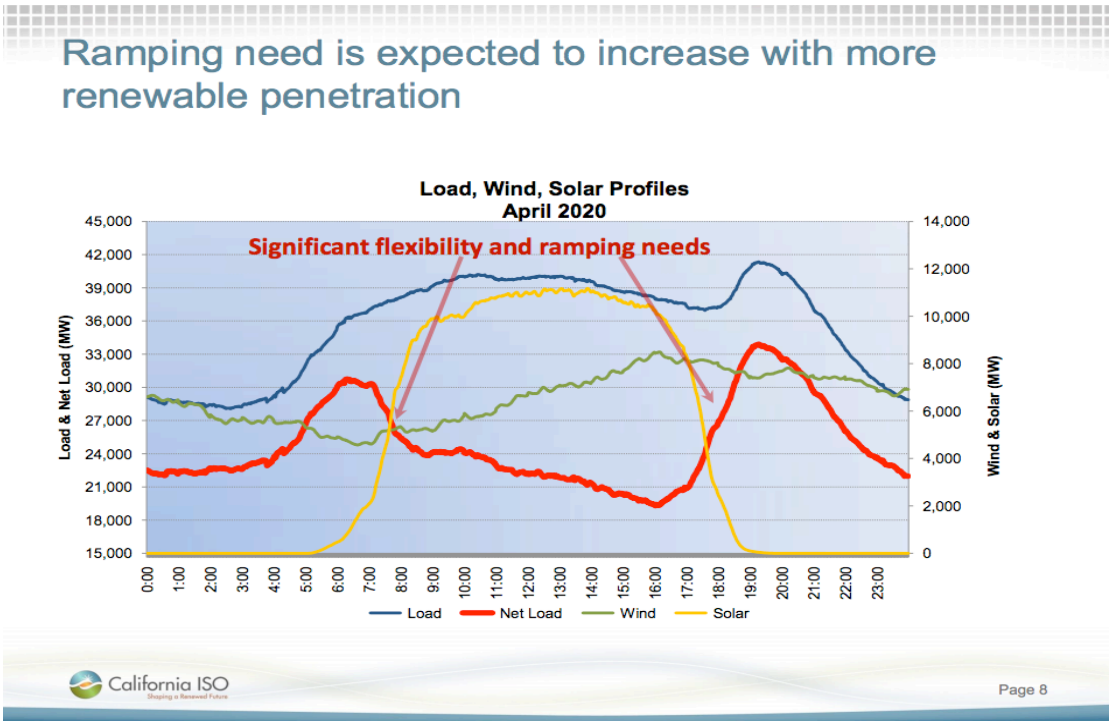
FIGURE 1



On matters more specific to current operational planning, the issue of possible SONGS replacement is currently being explored in great detail in the CPUC SONGS OII as well as the forthcoming Track 4 of the Long Term Procurement Planning proceeding. As CAISO CEO Steve Berberich stated at the workshop, a developed DR program can be instrumental in the event that SONGS remains offline, which should be of utmost priority moving forward. The Flex Alerts events of last year illustrated the potential; conservation measures on the part of consumers helped to reduce loads at critical times thereby reducing the risk of load shedding due to local capacity constraints with SONGS out of service.

Lastly, we'd like to take the opportunity to illustrate the potential for DR to address the particular concerns recently raised related to increased seasonal diurnal ramping as larger levels of renewables enter service in the near future.

FIGURE 2



This chart was created in exploration increasing ramping with the expected addition of projected 2020 intermittent solar and wind generation paired with conventional base load resources (nuclear and less flexible natural gas). This may also result in over-generation during the day as base load resources are unable to further limit their output.

The Clean Coalition replicated the net load and ramping from publicly available data provided CAISO for a similar spring day in order to explore the value of various mitigation measures, as shown below in Figure 3.

FIGURE 3

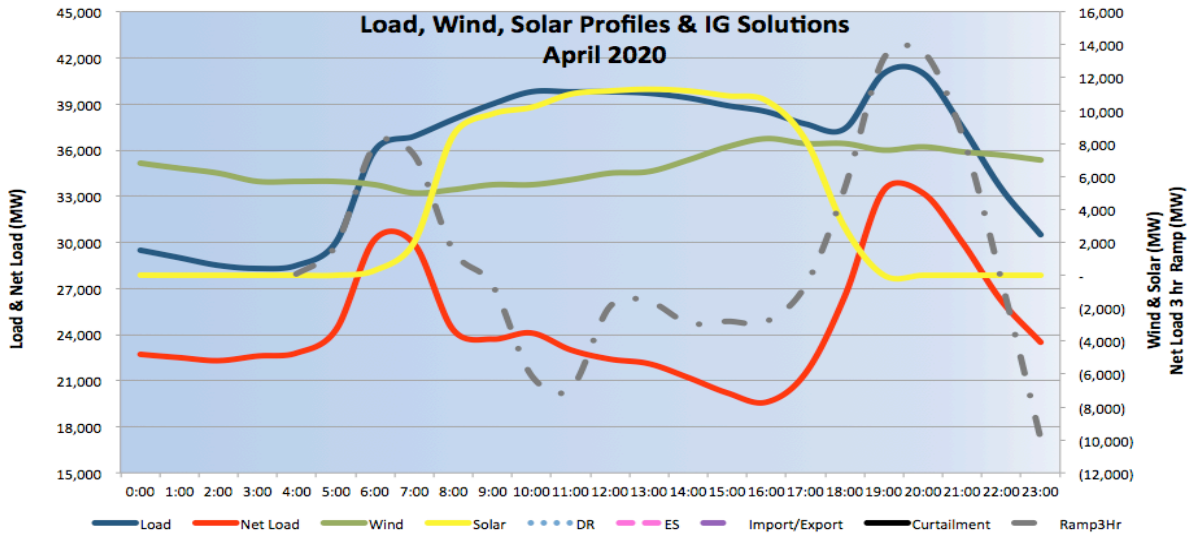
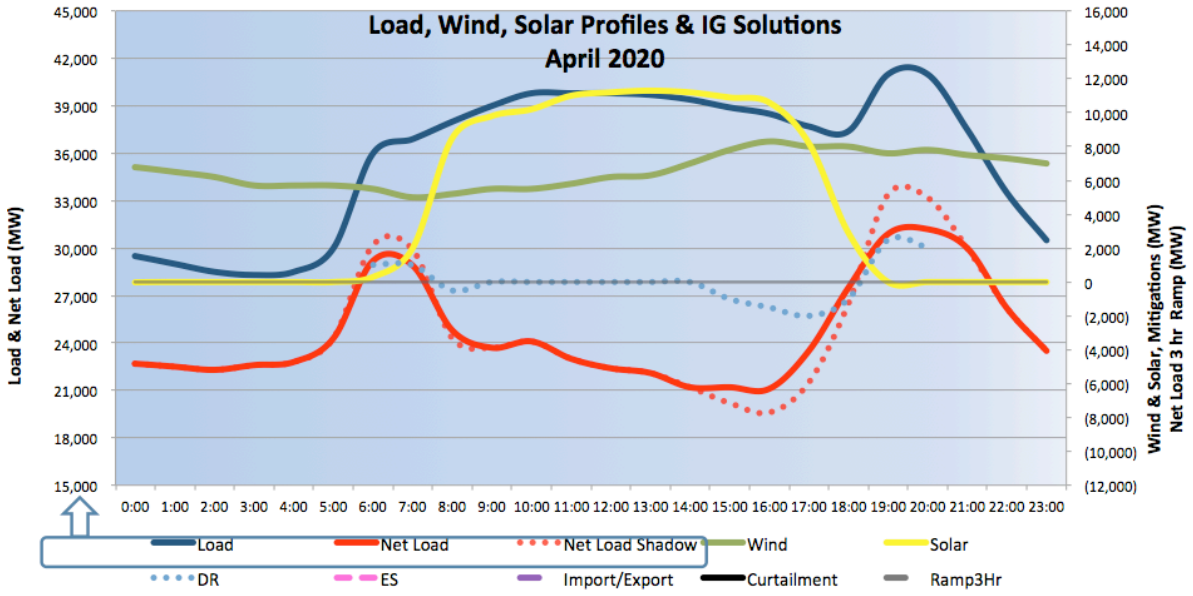


Figure 4 illustrates the changes observed when up to 2 GW of load shifting or Demand Response is incorporated, profoundly reducing both the over-generation and ramping factors:

FIGURE 4



We understand that the CAISO is currently developing models of solutions provided by load shifting and other Intelligent Grid capabilities including Demand Response and WDG generation control capabilities of Advanced Inverters, and we include this example to indicate the scale of likely results related to DR. We believe that export and import to other balancing authorities in the WECC has even greater additional potential to support higher levels of variable renewables without additional transmission or fossil generation facilities.

II. Specific Comments on Proposed Roadmap objectives & Workshop Topics

a. Automated DR Value in Flexibility, Stability and Ancillary Services

With specific regard to automated DR, its value lies with its flexibility contribution, grid support and ancillary services. Automated DR can act as an extremely flexible resource with real-time responsiveness to rapid or unexpected shifts in demand or intermittent generation, resulting in increased grid reliability. Its capabilities extend to supporting

distributed energy resources and to complementing traditional ancillary services. [2] The ability for automated DR to provide a wide range of services demonstrates that this is a program that should be developed quickly and effectively for California in the interest of grid reliability as we progress towards higher penetrations of renewable resources.

b. DR Market Structure in California

The DR market structure in California should be designed to provide access for broad participation and to enable integration of high levels of renewable energy. While the Clean Coalition is a strong supporter of the extensive use of automated DR, we also recognize the value that dispatchable DR can have in certain areas in achieving this objective, such as mitigating forecasted over-generation and ramping issues discussed in Section (a) above. DR is one of the most cost-effective and sustainable tools for balancing energy supply and demand as California progresses towards the 2020 Renewable Portfolio Standard, the 12,000 MW distributed generation goal, and future renewable energy and emissions goals.

c. Connecting wholesale and retail signals to respond to grid conditions

We strongly support the approach of sending dynamic pricing signals to customers and DR aggregators to influence load shape. To maximize the effectiveness of this approach, the Clean Coalition recommends investing in automated DR, as described above, and improving forecasting tools. Greater demand and supply forecasting capabilities will allow the ISO to better plan ahead for potential imbalances of supply and demand. This will allow the ISO to rely more heavily and cost-effectively on renewable supplies reduce reserve requirements. The ISO has taken very positive steps in this direction and much can be achieved with continued attention and systems development or adoption. Energy needs can be met by dividing a multi-hour need among separate 1 hour resources in addition to forecasting allowing day ahead DR/load shifting planning, which creates much expanded capability and very different

[2] *AUTO-DR: SMART INTEGRATION OF SUPPLY AND DEMAND FOR RAPID GRID RESPONSE: A White Paper,* Global Energy Partners Project Manager G. Wikler. March 2010, pg. 20.

market and communications requirements than conventional critical peak load reduction, especially for commercial HVAC participation.

The Roadmap should also focus on the ability of automated DR, including residential AC, water heating, and EV charging to provide controllable increases and decreases in demand every day to address ramping and over-generation mitigation. Other major loads, including statewide water transport and treatment, should be explored for additional DR/load shifting potential.

d. Non-transmission alternatives

We strongly support enabling DR and EE to be included as alternatives for transmission and local capacity, as the Clean Coalition has requested in prior TPP comments proposing the pursuit of non-transmission alternatives (NTAs).

We agree with the importance of reliable performance of NTA resources, at both the local resource and system level. However, we caution against attempts to achieve reliable aggregate performance by applying standards appropriate for large facilities to small facilities. As we have noted previously, the critical measure of small facilities is how they perform in aggregate, not individually, and statistical forecasting can ensure extremely high reliability. The performance of 10,000 or more individual facilities is dramatically more consistent, predictable, and reliable than the performance of a single large facility, where communication and control create similar critical infrastructure points, distributed communication pathways and automatic autonomous back-up operation of facilities should be planned. Such efforts will also support grid resilience, recovery, and emergency local operation during critical grid events.

e. Creating opportunities to support demand response and energy efficiency investments

DR market development opportunities should support demand response and energy efficiency investments, including long-term valuation accessible to both distribution operators and third party aggregators. It is vital to create conditions that further incent

investments in demand response and energy efficiency resources that align with the evolving needs of the grid, and we urge CAISO to note that while EE is broadly much more cost effective than increasing total supply, DR is even more cost effective in managing resources and addressing peak requirements. Very little investment is required to just temporarily reduce demand or shift it by some hours, and DR is applicable to facilities that are already highly efficient.

Since DR capabilities can be installed at the point of consumption more quickly and at lower cost than EE, separate and distinct deployment strategies and timelines should be employed with regard to each to optimally reduce suck cost investment in excess generation and transmission capacity, while maintaining full commitment to all cost effective efficiency standards and support for investment in upgrades. In addition, capacity payments can contribute significantly toward DR investments at the utility, aggregator, and customer level.

With this discussion in mind, the Clean Coalition advocates for DR to be integrated with DG, in accordance with our DG+IG future. In looking to 'best' or 'other' practices around the country and around the world, the integration of DR and DG has proven to be successful where integration of DR and DG can be seen as an integrated distributed energy resource (DER). Combining the different characteristics of these resources is essential in increasing the value of DG in the energy market.[3] DG has proven to be a useful integration resource that complements the extensive use of demand side resources in addition to increased flexibility capacity and grid stability. In addition, the locational value of DR combined with DG assists in meeting local capacity requirements, which is of particular concern for the Southern California region.

f. Coordination between regulatory agencies

[3] *Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages,* International Energy Agency Demand Side Management Programme (in conjunction with the US Department of Energy and NREL), Seppo Kärkkäinen (author), 2009.

We wholeheartedly support CAISO in recognizing the need for coordination between regulatory agencies for development of DR technology and regulatory frameworks and consistent planning assumptions, in support of the roadmap objectives and removing barriers to participation. This will ensure that all information is consistent between the ISO and the CPUC for proceeding and planning purposes as well as continuing robust discussions as DR is developed to ensure that all needs are met. Full consideration and accounting of all reasonably expected resources should be incorporated in all planning, including risk adjusted availability contingencies. Lastly, planning should incorporate interconnected balancing authorities beyond CAISO and associated resources.

Respectfully Submitted, May 21, 2013

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