CADER

"California Alliance for Distributed Energy Resources"—An Industry-Government Partnership

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The technical advantages and benefits of Distributed Energy Resources (DERs) make them suitable complements to the existing backbone of central station powerplants and the T&D grid. Their potential for challenging every facet of the provision of electrical services in competitive energy markets is considered revolutionary. Enabling competitive markets to value DER requires a change in the regulatory paradigm. The drive to electricity restructuring focused on transmission and generation. Transmission remains a regulated function, one in which the electron highway is now non-discriminatory to all users. Generation, now deregulated, is where competition occurs. The last battleground for competition, at the distribution level, is now occurring with many openly proclaiming that "DER is the wave of the future. "

The roles of regulated distribution utilities in this evolving market will be pivotal to the success of DER. Long responsible for system, transmission and distribution planning, they are the repository of the data and knowledge of the power system, and therefore are in a position of market power and potential market abuse. Achieving their participation and cooperative behavior are critical to the development of the DER market and the infrastructure for a reliable grid.

In California, these issues are now being considered by the regulatory community. The controversial nature of these issues portend a tumultuous time for their resolution. This paper reports on the efforts in California to ensure the barriers to DER are removed before the first wave of new advanced DER tech-

nologies are commercial in late 1999 or early 2000. At stake is the successful deployment of DER in the state's evolving competitive energy market, and the enhanced environmental, efficiency, and grid benefits which they offer.

The terms "distributed energy resources" and its variant, "distributed power" have become common vernaculars in the electricity industry. Outside of that industry, the understanding of small power sources located where people live and work is minimal, but is growing rapidly as organizations dedicated to promoting these resources, either as single prime movers or in combined heat and power modes, have arisen. One of the earliest groups[1] to form, the California Alliance for Distributed Energy Resources (CADER), seeks the removal of regulatory and market barriers that would hinder the successful deployment of these advanced technologies.

Figure 1. Representative DER Technologies
Combined heat and power efficiencies for fossil technologies will range between 65-80%. Photovoltaics efficiency represents solar to electric energy conversion.

Technology	Size Range (kW)	Year Commercial	Electric Efficiency (HHV)	Installed Cost ($/kW)
Reciprocating Engine	50-6,000	Avail	29-37%	200-800
Industrial Gas Turbine	500-20,000	Avail-1999	21-41%	300-870
Micro-turbine	25-250	1999	21-33%	250-1,250
Fuel Cells	3-3,000	Avail-2003	35-63%	815-4,000
Photovoltaic	10-10,000	Avail	15%	5,000-10,000

Source of data: *Final Report,* California Alliance for Distributed Energy Resources.

CADER's beginnings are found in the Distributed Generation Roundtable of April 1996. Co-sponsored by the California Energy Commission, Solar Turbines, Edison International, Southern California Gas Company, Sacramento Municipal Utility District, and OnsiteEnergy, the roundtable brought together representatives of technology manufactur-

ers, government policy and permit agencies, national research institutions, power marketers and other energy service providers, ratepayer and environmental groups, and public and private utilities. Fifty individuals brainstormed the barriers to distributed generation and also devised recommendations to overcome these barriers.

The efforts of this group resulted in the "kick-off," of the California Alliance for Distributed Energy Resources (CADER) in October 1996. The initial members took a unique approach to organization. CADER would be a voluntary collaborative with no dues, an open membership and a process which gave all viewpoints equal weight.

The collaborative focused its attention on four areas: (1) Regulatory, Institutional and Legislative issues; (2) Planning and Modeling issues; (3) Siting and Environmental issues; and (4) Technology Characterization. Committees meet over a span of ten months, culminating its efforts in a National Conference on distributed resources in September 1997. Showcasing its work products and featuring nationally known speakers, the members held a very successful conference. The Final Report published in April 1998, is the first ever documentation of its kind and is considered a "must-read" for industry and government participants in competitive electricity markets.[2]

CADER began implementation of its Action Plan in 1998. CADER met with the chief executives of four California regulatory agencies - the California Environmental Protection Agency, the Air Resources Board (CARB), the Public Utilities Commission (CPUC) and the Energy Commission (CEC). These agencies are in the pivotal position of being able to affect the outcome of distributed resources - the option of its use for on-site power needs; as a competitor to new merchant powerplants or the repowering of existing powerplants; or as a means to defer or replace transmission and distribution system upgrades. DER's availability to the residential market under California's adopted principle of 'consumer choice' will also be determined by these agencies.

The CARB, an agency within Cal-EPA, and the 35 air quality management districts are responsible for the attainment of air quality goals in California. The current air quality regulatory paradigm was established in the 1970s when powerplants were large and utilities were vertically integrated. DER requires revolutionary thinking and a re-evaluation of the air quality regulatory paradigm. Air quality regulators are now confronted by the potential of a multitude of small technologies connected to the distribution system and being installed by the new

breed of non-utility market participants.

Emission reduction credits and permits to operate (within approved emission levels) are held by utilities. With electric industry restructuring, utilities have divested generation, with the credits and permits being included in the sale. Power marketers and unregulated utility affiliates have replaced the investor-owned utilities in proposing merchant powerplants. Merchant powerplant builders, as well as proponents of repowering of existing facilities, are securing the remaining emission credits under the "first-in-time, first to acquire" market. This "buy-up" could well be detrimental to the nascent DER industry.

Without emission credits available to the advanced, highly efficient and cost-competitive DER fossil-fired technologies, the introduction of these technologies is jeopardized. This factor alone is a "show-stopper." CARB, in late 1998, initiated a study on the air quality implications of distributed generation. This exemplary leadership will enable the state to anticipate any needed changes to the air quality regulatory paradigm.

The CPUC is the state's ratemaking authority over investor-owned utilities and has jurisdiction over the functioning of the distribution system. In December 1998, the Commission took the bold step of ordering a rulemaking proceeding that would identify and frame the issues of a subsequent investigation. Many parties came forth to support such a proceeding.

Some of these parties want the potential anticompetitive aspects of regulated distribution utility planning, ownership or control of DER to be examined. These parties are concerned that regulated distribution companies may proceed to install DER before the CPUC enacts the rules of competition.

Other parties are concerned about distribution pricing policies, lack of interconnection standards and the lack of compensation of the benefits of DER to the grid. Local governments who advocate the use of DER in community and industrial development are concerned that, without market rules being established, the benefits of an efficient DER infrastructure and DER technologies cannot be realized.

The CEC is responsible for balancing state wide energy needs and developing state energy policy. As overseer of thermal powerplants 50 megawatts and greater, the CEC is empowered to conduct a "one stop" process by which all required permits are coordinated by the CEC permit process. DER, generally under 10 megawatts in size, unless aggregated, will not fall under the jurisdiction of the CEC but to local

permit agencies.

With over **50 local planning jurisdictions**, developers are afraid that disparate regulatory treatment will occur and that the costs of permitting may render their project uneconomic. Standardized or template permitting is being sought by CADER so that the costs of permits will be minimized. Permit agencies also need models and planning tools that are verified by a credible agency. CADER has asked the CEC to not only develop models but also to undertake the model validation function.

Lastly, because DER is relatively new, CADER believes the CEC can be the "objective information broker," bringing to the market unbiased information about the economic, operating, emission, and size characteristics and commercial availability of DER.

CONCLUSIONS

The revolution that DER promises—distributed energy facilities augmenting the existing power and T&D grid—can result in significant cost savings, improved reliability, increased productivity, and attainment of air quality goals.

The achievement of a competitive market for DER in California is dependent on its regulatory community acting proactively to remove the barriers to DER. California's regulators have indeed stepped forward, again showing their leadership in energy policy. Industry members will also work closely with the regulators in order to remove the barriers so that a competitive energy market can be achieved.

ABOUT THE AUTHOR

Eric Wong is a product consultant to Caterpillar's Lafayette, Indiana, Gas Engine Division, and stationed in Sacramento, California. He organized the Distributed Generation Roundtable which led to the formation of the California Alliance for Distributed Energy Resources. He served as its first chair from October 1996 to October 1998, and now represents Caterpillar or CADER's steering committee. Eric worked as an assistant executive director at the California Energy Commission, serving also as a senior policy advisor to the chairman and, previously, to the vice chair. He has 25 years of experience in the electric utility industry. He has presented papers on distributed generation in Thai-

land, Malaysia, Singapore and California, and studied electricity industry restructuring in Sweden, Norway, and the United Kingdom. Mr. Wong spent 10 years with the Federal Power Marketing Agency, the Western Area Power Administration (US DOE), as Director, Division of Power Contracts and Resource Planning. He has also worked in the governors' offices of both California and Hawaii on various environmental, energy, and land use issues.

References

1. The three other independent efforts are being led by the Electric Power Research Institute (EPRI); Gas Research Institute (GRI); and the Distributed Power Coalition of America (DPCA). Recently, the Combined Heat and Power Association formed (December 1998).
2. The 400-page Final Report is available. It can be ordered by searching the CADER website: www.energy.ca.gov/CADER, or by calling Ms. Vanessa Sapino at 916-329-9180. It is available for $10 USD, book rate mail cost included; priority or other mailing is additional.

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