

Value of Demand-Side Resources in Maryland

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March 13, 2025

I. Summary

Maryland and the PJM region are currently expected to face a resource shortage in the near future unless new resources are able to come on-line quickly.¹ The combination of the retirement of fossil-fuel power plants and projected rapid growth in electric demand has created a need for additional resources to meet demand. In its development of policies to meet this demand, Maryland should fully exploit and utilize demand-side resources² in the state prior to investing heavily in new generation.

This white paper reviews demand-side resources, their potential to obviate the need for new generation, and recommends demand response policies for Maryland.

II. Maryland Resource Need

In the next decade or so, electric power demand is projected to increase significantly in Maryland and new resources will be needed to meet this demand. This resource need is driven by the combination of projected electrification of buildings, electric vehicles, and new commercial and industrial loads (especially data centers), expected retirement of existing fossil fuel power plants like Brandon Shores, and the reduction of expected natural gas power plant availability (measured as expected load carrying capacity or ELCC) due to recent poor winter performance of these power plants

Many proposals are being offered to meet this new demand. Proposals in the Maryland legislature run the gamut from new gas-fired power plants to new transmission lines to new clean sources of power, such as offshore wind. While the proposals vary, there seems to be a shared goal amongst legislators to source these new resources within Maryland. Missing from these conversations are proposals to increase the use of demand-side resources. Demand-side resources are readily available, are local, can be deployed quickly, and are typically less costly than supply-side resources.

¹ As used in this white paper, “resource” refers to the power generation capacity and energy supplies needed to meet electricity demand, including both traditional generation, distributed resources, and demand-response resources.

² A demand-side resource is any action or technology adopted by electricity end-users that can potentially reduce, adjust, or shift electricity demand, thereby contributing to grid reliability and resource adequacy.

III. Demand-Side Resources Can be Important Solutions

Demand-side resources include a variety of technologies and operations that can adjust customer demand to reduce peak demand or optimize electric system operations. Demand-side resources include demand response, demand flexibility, and the strategic use of storage technologies. When properly supported and maintained, demand-side resources can be used to reduce load and thereby reduce the need for new generating capacity and infrastructure (both transmission and distribution).

As shown in Figure 1, the three main ways that demand-side resources can adjust load are by shedding load, shaping load, or shifting load to other periods. Demand-side resources can also help keep the electric system in balance by adjusting their consumption quickly in response to electric system conditions (shown as “shimmy” in Figure 1).

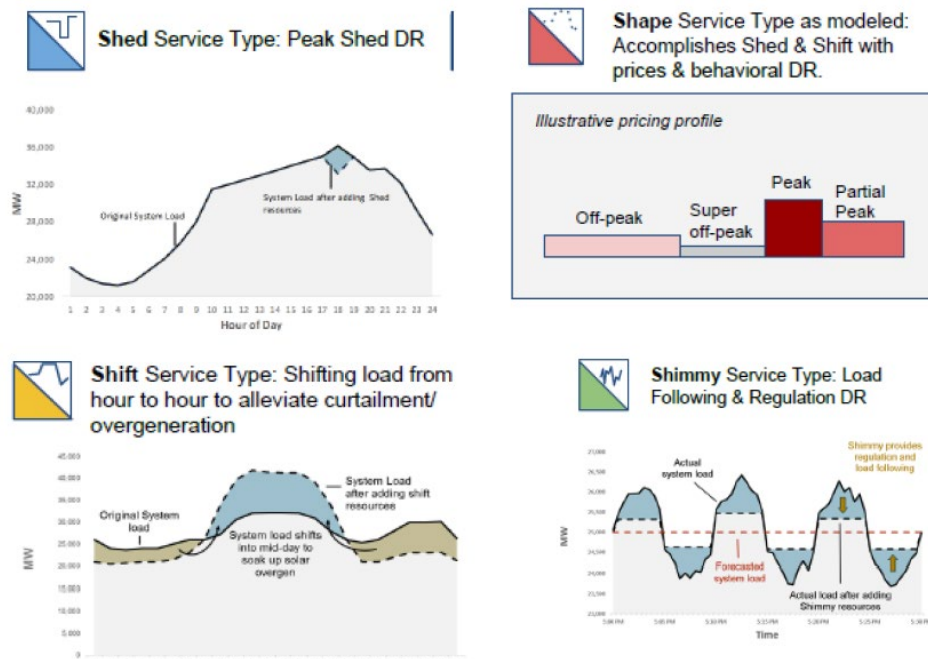


Figure 1. Ways Demand-Side Resources Can Adjust Load

To support demand-side resources, customer end-uses and buildings can be designed to be flexible, so that their operation can be adjusted to match supply or to respond to demand response events. Indeed, multiple end-uses and facilities are capable of providing demand flexibility by adjusting or shifting their demand to assist in electric system planning and operation. A good example is energy efficient buildings coupled with smart technologies that actively optimize their energy use to provide grid services, while meeting occupant needs and preferences. On-site storage (either from batteries or thermal storage) can also be deployed to reduce demand at crucial times.

As shown in Figure 2, key demand-side resources include:

- **Direct Load Control** – Remote curtailment or cycling of a customer’s equipment (e.g., air conditioners, water heater) on short notice.
- **Smart Thermostats** – Wi-Fi thermostats that can be used with home automation or set to respond to remote signals or direction, and are responsible for controlling a home's heating, ventilation, and air conditioning.
- **Manual and Automated Demand Response (DR)** – Manual demand response refers to specific actions taken by owners or operators of premises or facilities to reduce load. Automated demand response refers to automated curtailment of load or operations in response to price signals or directions from operators.
- **Zonal and Luminaire Lighting Control** – Control of lighting either on zones of a premise or facility or by directly adjusting a single light fixture (luminaire) to reduce consumption.
- **Managed Charging** – Strategic control of when and how vehicles are charged without compromising the fleets' operational needs. Managed charging balances energy needs among electric vehicles, buildings, and grids through sophisticated communication and defined control objectives.
- **Vehicle to Grid** – Technology that allows electric vehicles to not only draw power from the grid but also to push electricity back into the grid, acting as a mobile energy storage system.

Sector	End-Use	Enabling Technology	Shed	Shift	Shimmy
Residential	Air Conditioning	Direct Load Control, Smart Thermostats	●	●	
	Electric Water Heating	Direct Load Control, Automated DR	●	●	●
	Pool Pumps	Direct Load Control	●	●	
Commercial	HVAC	Manual and Automated DR	●	●	●
	Lighting	Zonal and Luminaire Control	●		●
	Refrigeration (including warehouses)	Automated DR	●	●	●
Industrial	Data Centers	Manual and Automated DR	●	●	
	Wastewater treatment and pumping		●	●	●
	Processes and Large Facilities		●	●	
Agricultural	Pumping and Irrigation	Direct Load Control, Automated DR	●	●	
All	Electric Vehicles	Managed Charging, Vehicle to Grid	●	●	●
	Behind-the-Meter Batteries	Automated DR	●	●	●

Figure 2. Demand-Side Resource Types and Applications

Demand response is a mature technology that has been around for many decades and has the potential to reduce significant amounts of consumption in both retail and wholesale markets. Interruptible rates, which provide large customers discounted rates in exchange for being obligated to reduce demand when directed (either through manual or

automated demand response), have been in existence since the 1950s. Direct load control of appliances has been existence since the late 1960s. The Federal Energy Regulatory Commission estimates that by the end of 2022 retail demand response programs have the potential to reduce demand by 30 GW, and in 2023 wholesale demand response programs could potentially reduce demand when directed by about 33 GW.³ The 2009 FERC National Assessment of Demand Response Potential estimated that 180 GW of demand reduction could be possible under aggressive policies – Maryland’s portion of this demand response potential was estimated to be as much as 5 GW, largely through time-varying rates coupled with automated responses.⁴

Demand response has proven valuable in multiple system events over the years. In the PJM region, demand response was deployed for multiple hours on December 23 and 24, 2022 during Winter Storm Elliott – PJM’s emergency demand response programs were called for 3 hours on December 23 and 14 hours on December 24. Along with other heroic efforts, the deployment of these emergency demand response resources kept the PJM grid from failing.

The electric system is becoming increasingly “smart,” which increases demand response potential. Recent technological developments, significant drops in the cost of technologies like storage and solar rooftops, and the increased smartness and controllability of end-uses has created new capabilities for demand-side resource types to provide demand flexibility and to participate in virtual power plants. Moreover, electric vehicles can serve as important sources of demand response through managed charging programs like those operated by WeaveGrid, or by injecting power into premises or the grid with bidirectional electric vehicle systems. Maryland should be commended for passing the DRIVE Act, which promotes the development of nation-leading virtual power plant and bi-directional electric vehicle programs.

Maryland’s experience with demand response goes back many years. For years, Pepco operated the Kilowatchers program which used direct load control to cycle air conditioners. Currently, Pepco, BG&E, and SMECO all operate demand response programs. For example, Pepco operates the Energy Wise Rewards program that remotely cycles (i.e., turns off and then on) central air conditioner and heat pump units. All four Maryland utilities operate residential cycling programs that operate primarily in the summer cooling season. These programs totaled about 577 MW in 2023 and are funded through Maryland’s EmPower program. In addition, BG&E and PHI operate dynamic pricing programs, which added another 125 MW in 2023. The programs operated by the Maryland

³ FERC, *2024 Assessment of Demand Response and Advanced Metering*, Staff Report, December 2024.

⁴ FERC, *A National Assessment of Demand Response Potential*, Staff Report, June 2009

utilities are overwhelmingly residential.⁵ Third party demand response aggregators operate additional commercial and industrial demand response resources and bid these resources into PJM's demand response programs, but data on these resources is unavailable at the state level.

However, support for demand response in Maryland has lagged in recent years, and Maryland is no longer a leader on demand response. Funding through EmPower has decreased over time (reported costs were \$64 million in 2024 versus \$99 million in 2010). Changes in how PJM counts resources for resource adequacy and capacity market participation has also contributed to lower deployment over time. The amount of demand response bid into PJM's capacity market provides an indicator of this decline -- demand response bids in the 2023/2024 delivery year were 267 MW,⁶ which is down from 952 MW bid in 2009.⁷ The switch from requiring capacity resources to be available all year, as opposed to being only available seasonally (such as air conditioner or smart thermostat cycling programs), is a major driver of this decline in PJM bids. Contributing to this decline is the reduced value of demand response for utilities who only operate distribution grids in Maryland's electric industry structure. Since Maryland electric utilities do not own generation or directly procure electric supply to serve customers, they do not have an incentive to operate demand response to meet their resource adequacy needs.

Maryland's experience with demand response contrasts unfavorably with the demand response activity and plans in other states, who are deploying modern technologies to create new programs, such as virtual power plants (VPP). Portland General Electric plans to grow its VPP program to 25 percent of its peak demand by 2030. NRG Energy and Renew Home recently announced plans to launch a 1 GW VPP in Texas by 2035 by leveraging flexible demand from smart thermostats. Within four months, National Grid implemented the Connected Solutions program in Massachusetts and New York, and the program is now able to provide 250 MW of peak shaving benefits. These examples demonstrate that with support and commitment from states and utilities, demand response can be deployed quickly and provide real value.

IV. Demand-Side Resources Can Assist in Resource Planning and Distributed System Planning

Demand-side resources can play important roles in both resource planning and distribution system planning. The key set of resource planning values of demand-side resources is the avoidance of the need to build or procure generation resources. By either

⁵ Maryland PSC, *The EmPower Maryland Energy Efficiency Act Report of 2024*, May 2024, p. 15.

⁶ *Ibid*, p. 17.

⁷ Maryland PSC, *The EmPower Maryland Energy Efficiency Act Standard Report of 2011*, March 2011, p. 19.

shedding load during peak periods or shifting this load to off-peak periods, demand response can obviate the need for new resources and for new transmission infrastructure to bring the power from these resources to load. Demand response can also be deployed strategically by new large loads to reduce the amount of infrastructure required to serve their peak demands – also known as flexible interconnection. The value of reducing peak demand is core to the economics of demand response and generally produces positive benefits that exceed the costs of any programs or incentives.

The value provided by demand-side resources in resource planning can extend to distribution system planning. At the distribution level, general utility practice is to build distribution networks to meet projected customer load largely through capital expenditures. Demand-side resources can provide a cost-effective, non-wires alternative to these potentially large expenditures.

Similar to the cost avoidance nature of demand-side resources at the resource planning level, demand-side resources at the distribution level can be used to avoid or defer infrastructure. The incorporation of demand-side resources at the distribution level requires a more targeted focus. Given the conservative nature of distribution system planning, reductions in load or injections of power to address distribution issues need to be dispatchable and reliable. An excellent use case for the application and deployment of demand-side resources is in hosting capacity analysis. Hosting capacity refers to the capability of a distribution feeder or circuit to “host” more generation or injecting resources. By strategically reducing load on a feeder, hosting capacity can be increased, which will allow more resources to interconnect.

V. Maryland Needs to Take Action

To meet expected increases in customer demand, while also meeting Maryland’s carbon reduction goals, Maryland will need to take a comprehensive approach to planning and operation. A core part of this approach will be to develop policies in support of demand-side resources.

Sierra Club recommends multiple policies to increase demand-side resources and their role in Maryland’s electric system.

- Maryland should study and report on the potential for demand response and demand flexibility to offset forecasted new resource requirements.
- Maryland’s electric utilities should be directed to expand and develop new demand-side resource programs both at the retail and wholesale levels. These can be traditional demand-response programs or new virtual power plant programs. If needed, The Maryland legislature and the Maryland PSC should

fully fund expanded EmPower demand response programs. To meet the expected electric demand growth, Maryland's policy should be to exploit demand-side resources first before Maryland invests in or focuses on new generation sources.

- Maryland and the Maryland PSC, in particular, should fully support FERC Order 2222 DER aggregation. FERC Order 2222 removed barriers to the participation of DER aggregations in wholesale markets. Participation in DER aggregations, which can include demand response resources, provides additional revenue sources to incent and fund demand resource development and deployment.
- The Maryland PSC should explicitly include demand-side resources in distributed system planning, as a non-wires solution, or as support for flexible interconnection. As of March 2025, the draft regulations under development by the Distribution System Planning Workgroup do not address the capability of demand-side resources to affect hosting capacity and provide non-wires solutions.