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STATE OF SOUTH CAROLINA

BEFORE THE PUBLIC SERVICE COMMISSION

DOCKET NO. 2019-239-E

In the Matter of:	)	
	)	
Dominion Energy South Carolina,	)	
Incorporated's Request for Approval	)	
of an Expanded Portfolio of	)	
Demand Side Management	)	Late Filed Hearing Exhibit
Programs, and a Modified Demand	)	
Side Management Rate Rider	)	
	)	
	)	

The South Carolina State Conference of the NAACP, the South Carolina Coastal Conservation League, and Southern Alliance for Clean Energy (collectively, "Efficiency Intervenors") respond as follows to the request for a late-filed exhibit discussing programs targeted at winter peak and a sliding scale incentive to reward Dominion Energy South Carolina, Inc. ("DESC") for accomplishing certain savings targets.

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1. Introduction and Recommendations

This document provides information in response to a request from Commissioner Ervin at the Evidentiary Hearing for Docket No. 2019-239-E on November 13, 2019,[1] for a recommendation regarding measures and strategies that can reduce winter peak. Where possible, specific program examples from other utilities or efficiency program administrators have been provided. More jurisdictions are focused on reducing summer peak than winter peak, so direct comparisons are sometimes difficult.

This document also responds to the Commission's request for additional information regarding the use of a sliding scale in DSM incentive structures (incentives for the utility, not the consumer). Because of the Commission's interest in winter-peak reduction, the sliding scale recommendation has been augmented to include an additional incentive for winter peak demand reduction.

It is recommended that the Commission:

1. Direct Dominion Energy South Carolina ("DESC") to develop programs that are specifically targeted to reduce winter peak, taking into consideration the information and examples presented in this exhibit;
2. Direct DESC to consult with its stakeholder advisory group to develop such winter-peak reducing programs;
3. Direct DESC to file a proposal with the Commission seeking approval of such program(s) by May 31, 2020, with implementation to begin no later than September 1, 2020;
4. Direct DESC to report on winter peak reduction program results at least annually, concurrent with submission of annual rate rider adjustment;
5. Adopt a sliding-scale shared savings incentive structure that
    a. is based on annual incremental savings as a percent of total sales;
    b. provides DESC with a shared savings incentive when annual incremental savings are at or above 0.5 percent of total annual sales;
    c. provides additional credit for savings from low-income programs; and,
    d. provides additional credit for savings from measures that reduce the use of electric resistance heat (though not duplicative of additional credit provided for low-income savings); and,
6. Direct DESC to submit a revised program plan if DESC cannot achieve a shared savings incentive of 5 percent in 2020 and increasing by 1 percent per year in subsequent years.

[1] Docket 2019-239-E, *Dominion Energy South Carolina, Inc.'s Request for Approval of an Expanded Demand Side Management Plan, and a Modified Demand Side Management Rate Rider*.

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2. Programs to Reduce Winter Peak

In this section are descriptions of measures and strategies that utilities use to reduce peak demand. Listed first are energy efficiency measures that can have the largest impact on winter peak; then demand response / demand management measures are described. Some measures provide both efficiency and demand response benefits; those are categorized based on the primary focus. The final subsection provides program strategies that can help reduce winter peak.

The following provide an array of measures and strategies that can be combined into winter-peak reduction programs for different sectors.

2.1 Efficiency Measures to Prioritize

With the obvious exception of more efficient air conditioners, nearly all efficiency measures will have some effect on winter peak. Even as baseload measures like lighting, refrigeration, or ventilation are made more widely efficient, system peaks will diminish. Those measures are not included here. Rather, the focus here is efficiency measures with the highest effects on winter peak, which are generally those that directly address the heating system or the building envelope.

2.1.1 Building Envelope

- **Air-seal and insulate**: For residential or commercial buildings with electric heat, comprehensive weatherization (air-sealing and insulation) provide savings that have beneficial impacts on winter peak demand.[2] Mobile and manufactured homes provide a particularly compelling target as they are often heated with electric resistance heat and on average they have higher use, on a per square foot basis, than site-built homes. Additionally, the demographics of mobile home residents will align well with DESC's stated intent to provide additional targeted services to low- and moderate-income South Carolinians.

2.1.2 Heating, Ventilation, and Air Conditioning (Plant, Distribution, Control)

- **Replace electric resistance heat with air source heat pump:** Replacing electric resistance space heat with an air source heat pump can provide dramatic savings and will reduce winter peak.[3] Heat pumps can be as much as four times more efficient at producing heat than electric resistance heat. While heat pumps are not at maximum efficiency when temperatures are coldest, there will still be a significant reduction in peak demand from this measure.

[2] There can be winter peak reductions even in buildings heated with natural gas, propane, or oil (*see* measure in section 2.2.1 on peak savings available from variable speed drives in commercial HVAC fans and pumps).

[3] http://www.swenergy.org/data/sites/1/media/documents/publications/documents/Heat%20pump%20study%20FINAL%202018-06-18.pdf, p 11.

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- **Install smart thermostat:** Utilities in many states are providing incentives for smart thermostats to reduce energy consumption. In doing so, these thermostats can reduce winter peak. A 2019 compendium of utilities that provide smart thermostat incentives includes Duke Energy in South Carolina as well as utilities in North Carolina, Virginia, Louisiana, and Texas.[4]

- **Seal and insulate ductwork**: When electric heating systems include ductwork (for example, a ducted air source heat pump), making sure ducts are properly sealed and that they are insulated wherever they go outside of the conditioned space can reduce winter peak.

- **Combined heat and power:** Combined heat and power (CHP) involves the simultaneous production of electricity and useful thermal energy. By recapturing some of the exhaust heat from gas-fired generators, commercial buildings can utilize that otherwise wasted energy for domestic hot water or space heating purposes. CHP reduces the consumption of grid-sourced electricity, therefore – reducing winter peak electric demand.[5] CHP systems used for heating purposes sometimes sit idle during the summer months, but are rarely inactive during winter months. Because they are already running in winter, they reduce overall energy demand, but are typically unavailable as a dispatchable winter resource.

2.1.3 Summary of Efficiency Measures

The table below shows which markets may be targeted for each measure suggested above. **Res.** is residential; **LMI** is low and moderate income; **Comm.** is commercial; and, **Ind.** Is industrial.

Measure	Res.	LMI	Comm.	Ind.
Air-seal and insulate	√	√	√	
Replace electric resistance heat with air source heat pump	√	√	√	
Install smart thermostat	√	√	√	
Seal and insulate ductwork	√	√	√	
Combined heat and power			√	√

2.2 Demand Response or Management Measures that do not Require AMI

2.2.1 HVAC

- **Provide smart Wi-Fi-controlled thermostat with contracted ability for DESC to adjust settings in advance of or during winter peak events.** DESC has identified early morning hours on cold mornings as a time when savings will have the highest impact on winter peak. The provision of a smart Wi-Fi-controlled thermostat with customer consent for DESC to make brief, limited adjustments to settings during peak periods will directly reduce peaks. Those adjustments may include "preheating" in advance of peak morning

[4] https://www.vaultelectricity.com/electricity-providers-are-offering-free-smart-thermostats-and-rebates/.
[5] https://www.epa.gov/chp/chp-benefits.

call for heat or a small reduction in temperature during the peak hours. Existing examples include Portland General Electric and Con Edison, the latter of which is doing this specifically to reduce winter peak gas demand.[6]

- **Setback temperature in commercial HVAC systems with variable speed drive motors**: Many commercial HVAC systems rely on electric motors embedded in pumps and fans to circulate hot water or air throughout a building. Electric motors capable of varying their speed / output can dramatically reduce electric consumption. Buildings that burn fossil fuel for heating can still reduce their electric use during peak times using temperature setbacks, which, in turn, reduce motor speeds and lower electric demand.[7]

2.2.2 Lighting

- **Commercial lighting controls**: With fewer hours of daylight during winter months, there is a higher level of coincidence of lighting load with peak demand. Along with the reduced electric consumption from LED lights, this technology presents the opportunity to dim – which further reduces electric use without completely turning off lights.[8]

2.2.3 Industrial Process

- **Interruptible loads**: Industrial processes consume hundreds or thousands of times more electricity than any single home. Some industrial processes (e.g., manufacturing, wastewater treatment) can afford to be temporarily interrupted for a short number of hours, thus significantly reducing demands on the electric grid. During these hours, plant managers can perform routine maintenance, quality control inspections, or other tasks that can only be done when major industrial processes are inactive.[9]

2.2.4 Generators

- **Emergency generators:** Demand response programs have long relied on customer-sited oil or natural gas-fired generators to reduce peak demand. These assets can potentially be called upon for winter demand response events but can be limited by annual emissions permitting rules. Generators used for demand response at lower than their total rated load often experience poor fuel efficiency, increased maintenance, and decreased system lifetime.[10]

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[6] https://www.portlandgeneral.com/residential/energy-savings/thermostats/smart-thermostat-programs and https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-residential-customers/bring-your-thermostat-and-get-$85.

[7] https://www.facilitiesnet.com/powercommunication/article/VFDs-Expand-Load-Capability-for-Demand-Response-Programs--15318.

[8] https://www.ecmag.com/section/lighting/dimming-demand-lighting-control-demand-response.

[9] http://eta-publications.lbl.gov/sites/default/files/lbnl-1335e.pdf.

[10] https://www.distributedenergy.com/storage/article/13034167/energy-storage-for-demand-response.

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2.2.5 Energy Storage

- **Battery energy storage systems**: Lithium ion and other battery energy storage system prices have declined 85 percent since 2010 and could decline another 67 percent by 2030.[11] Two Massachusetts utilities, for example, gives customers the option of participating in summer or winter demand response programs using batteries.[12]

2.2.6 Summary of Demand Response / Management Measures

The table below shows which markets may be targeted for each measure suggested above.

Measure	Res.	LMI	Comm.	Ind.
Provide smart Wi-Fi-controlled thermostat with control	√	√	√	
Setback temp using variable speed drive motors			√	
Commercial lighting controls			√	√
Interruptible loads				√
Emergency generators				√
Battery energy storage systems			√	√

2.3 Program Strategies to Reduce Winter Peak

2.3.1 Outreach Strategies

- Identify and target residential and commercial customers with high winter use or other evidence of electric resistance heat.

- Mobile and manufactured homes have significantly higher energy use (on a per square foot basis) and more frequent use of electric resistance space heat than other types of residential homes, and provide a good target. If DESC maintains data on building type, these homes can be targeted whether they are in a designated park or not. If building type is not tracked, this market can be targeted through direct outreach to residents of mobile and manufactured home parks.

2.3.2 Measure-Mix Strategies

- Use contractor referral strategy to increase measure mix. Use incentives to encourage HVAC contractors to make referrals to weatherization contractors and vice versa.

- Encourage weatherization (air-sealing and insulation) prior to installation of a new heating system. Weatherization can result in the need for a smaller heating system and

[11] https://about.bnef.com/blog/behind-scenes-take-lithium-ion-battery-prices/; https://www.nrel.gov/docs/fy19osti/73222.pdf.
[12] https://www.masssave.com/en/saving/business-rebates/demand-response-and-storage/.

can therefore reduce heating system replacement costs for the utility program or the customer.

2.3.3 Program Strategies to Reduce Winter Peak

- **Provide targeted customer incentives**
  - For low-income customers: Provide all cost-effective measures on a direct-installation basis, fully funded and managed by utility.
  - For moderate-income customers: Provide a high level (50-75 percent) of direct funding for cost-effective measures for moderate-income customers. Provide option of project management by utility.
  - For market-rate customers: Provide a moderate incentive (30-50 percent) for all cost-effective measures. Provide option of project management by utility.
  - Provide on-bill financing over a term that provides positive cashflow for customer.

- **Provide contractor incentives**
  - Provide incentive for contractors to participate in programs to encourage them to promote more efficient products. Incentives can and should be augmented with regular contractor training.
  - Encourage multiple-measure projects by increasing contractor incentives as more measures or savings are added.

- **Customer-initiated load curtailment**: Larger commercial and industrial electric customers can self-curtail their electric load when given notice by a demand response aggregator or utility, either by manually turning back equipment or through pre-programmed building automation systems control protocols.[13] National Grid – ConnectedSolutions in Massachusetts offers a variety of ways to participate in its Winter ConnectedSolutions demand response program for commercial customers. Customers can either manually or automatically reduce their electric load during peak winter times, and have the choice of enrolling in the program themselves or through a demand-response aggregator.[14]

- **Direct load control**: In some cases, utilities or third-party curtailment service providers can directly control customer-sited equipment like thermostats and electric hot water heaters, sending signals to reduce temperature setpoints or allow broader fluctuation in temperature.[15]

- **Third-party aggregation:** Demand response is not new, and there is a mature market for third-party service providers that can market demand response programs to customers, install relatively inexpensive submetering at a customer's site, and aggregate many

[13] https://aceee.org/files/proceedings/2006/data/papers/SS06_Panel3_Paper25.pdf.
[14] https://www.nationalgridus.com/media/pdfs/bus-ways-to-save/connectedsolutions-mawinterdispatchflyer.pdf.
[15] https://www.bpa.gov/EE/Technology/demand-response/Pages/residential_demand_response.aspx

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megawatts of electric load for demand response. These aggregators coordinate pre-determined load reduction strategies across many customer facilities at once to deliver demand reductions on behalf of grid operators and utility companies. The aggregator and the customer split the demand response revenues.[16] National Grid – ConnectedSolutions in Massachusetts offers a variety of ways to participate in its Winter ConnectedSolutions demand response program for commercial customers. Customers can either manually or automatically reduce their electric load during peak winter times, and have the choice of enrolling in the program themselves or through a demand response aggregator.[17]

3. Sliding-Scale Shared Savings Incentive Structure

3.1 Rationale

As identified and described in Efficiency Intervenors' witness Chant Direct Testimony, a sliding-scale incentive can provide a superior structure of incentives for DSM program administrators by maintaining motivation for continued performance enhancement. By increasing the rate or level of incentive as results increase, program administrators can be motivated to improve performance. When used, the metric must be clearly measurable and verifiable (e.g., annual or lifetime MWh savings, or MW reduction). Third-party administrators and utility program administrators alike are encouraged through this strategy.

The structure can be highly complex or very simple. A very simple structure is used in Illinois to provide incentives to utility program administrators. ComEd, one of the state's major utilities, receives an incentive if it reaches its goal at the 100 percent level. If it then exceeds the goal, it can earn additional pro-rated incentives, to a maximum of 125 percent of goal.

Arkansas provides an example the focuses on only one metric, but involves a shared savings that is capped at increasing budget levels. The Arkansas Public Service Commission requires that utilities achieve at least 80 percent of goal to earn an incentive, which is 10 percent of net benefits, capped at 4 to 8 percent of budget. The level of the cap is what is used to provide incentive, with an increased cap allowed at higher levels of earnings.[18]

On the more complex end of the spectrum is the DC Sustainable Energy Utility in Washington, DC, which receives incentives (or incurs penalties), for meeting (or not meeting) goals related to a much wider array of metrics:

- Energy savings (electric and natural gas)
- Renewable energy generation installed
- Summer peak demand reduction
- Low-income energy savings
- Low-income program spending

[16] https://energy.mit.edu/wp-content/uploads/2016/01/CEEPR_WP_2016-001.pdf.
[17] https://www.nationalgridus.com/media/pdfs/bus-ways-to-save/connectedsolutions-mawinterdispatchflyer.pdf.
[18] Ark. Pub. Serv. Comm., Docket No. 13-002-U, Order No. 7, p. 29.

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- Green jobs created[19]

3.2 Incentive Structure for Consideration in Docket No. 2019-239-E

In Direct testimony, witness Chant recommended a simple structure that would reward DESC with additional incentives for increasing its total annual savings rate beyond a threshold level.[20] Witness Chant now recommends a lower threshold for earning incentives at 0.5 percent instead of 0.8 percent, in order to provide an incentive to DESC even as programs are in the initial state of expansion.

Annual incremental savings (as a percent of total annual sales)	Percent of NPV-Benefit to DESC
0.50%	5%
0.60%	6%
0.70%	7%
0.8%	8%
0.9%	9%
1.0%	10%
1.1%	11%
1.15% and greater	11.5%

Under this scenario, the higher the savings, as a percent of total annual sales, generated by DESC, the higher the multiplier used. It might help to extend the chart to include (assumed) NPV levels and DESC incentive levels. In the table below, NPV of benefits is assumed to be a straight-line function.

Annual incremental savings (% of total annual sales)	Percent of NPV-benefit to DESC	NPV of benefits ($ millions) (assumed)	Earned incentive to DESC ($ millions)
0.50%	5%	$21.0	$1.050
0.60%	6%	$25.2	$1.512
0.70%	7%	$29.4	$2.058
0.80%	8%	$33.6	$2.688
0.90%	9%	$37.8	$3.402
1.00%	10%	$42.0	$4.200
1.10%	11%	$46.2	$5.082
1.15% and greater	11.5%	$48.3	$5.555

This structure provides savings earned at a specific interval level, and also the multiplier that would be used for additional NPV benefits above a given step level, but below the next step. So that, if, for example, savings were assumed at 1.1 percent and NPV of benefits were at $48 million, then the additional $1.8 million in NPV benefits over what is shown in chart ($46.2

[19] https://www.dcseu.com/media/default/docs/about-us/dcseu-annualreport-final.pdf, page 35.
[20] Chant Direct Testimony, p 29.

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million) would also be multiplied by 11 percent to provide an additional $198,000 of earned incentive, for a total earned incentive of $5.28 million.

Witness Chant also suggested that savings earned in low-income programs be provided a 50 percent extra credit for the purpose of calculating the shared savings incentive. Using the example provided in Direct Testimony, if total annual incremental savings were at 1.0 percent of annual sales and 20 percent (0.20) of the savings were from low-income programs, then an additional 0.10 percent (1/2 of 0.20) would be added to the annual incremental savings figure, which would increase the multiplier. In that example, using the above table, DESC would earn an incentive of $5.082 million instead of $4.2 million because 20 percent of savings are from low-income programs.

The same logic could also be used to structure an incentive to address winter peak. As discussed earlier, measures that directly address electric resistance heat provide the highest level of winter peak savings and could also be provided with the additional extra credit of 50 percent in the calculation of DESC shared savings incentive. So, for example, if 20 percent of the savings came from measures that directly address electric resistance heating, it would have the same effect as outlined in the above example of low-income programs.

3.3 Sliding-Scale Incentive

Efficiency Intervenors recommend that the Commission approve the sliding-scale incentive structure outlined above, provided that for the purpose of calculating savings for incentives (a) savings from low-income programs be weighted at 150 percent (or, 50 percent more than actual); and (b) measures reducing or eliminating use of electric resistance heat be weighted at 150 percent to the degree those savings do not duplicate the low-income program savings.

Finally, the Efficiency Intervenors recommend that if DESC determines that it cannot achieve savings sufficient to earn a performance incentive of 5 percent in 2020 and an additional 1 percent in each succeeding year of the five-year plan, then, concurrent with annual review of its DSM rider, it shall submit a cost-effective plan for review and consideration by the Commission that enables achievement of that goal.

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