Xcel Energy DSM Proposal for Energy Efficiency Market Incentives **11/27/2018**

In response to specific requests for proposals, Hunter Douglas, with the assistance of the window Attachments Energy Rating Council (AERC), respectfully submits the following initial draft for consideration:

Background: The U.S. Department of Energy has prioritized window attachments as an energy-saving measure, a lower-cost alternative to replacement windows, a solution to drafty and poorly insulated windows, and a way to prevent excessive heat in the summer since windows make up 30% of a typical home's heating and cooling energy. Because of this energy and cost-saving potential, utilities across the country (Efficiency Vermont, Baltimore Gas & Electric, and Silicon Valley Power) are currently considering automated cellular shades as a program measure.

Eighty-percent of the existing interior window covering installed base is largely inefficient vinyl mini-blinds. Encouraging consumers in Colorado to upgrade their window attachments could achieve large energy savings. Cellular shades are designed to minimize heat from escaping the home via cells that create pockets of air providing extra insulation. Cellular shades also help reduce solar gain or unwanted heat keeping a home cooler in summer. Additionally, adding motorization with automation to the cellular shade can increase energy savings. This proposed rebate offer of energy efficient cellular shades can be introduced quickly; they have a demonstrated history and an existing distribution network

Program Type: Consumer mail-in rebate and instant rebate at big-box retail locations. Suggest $25 - $45 off installed cost per unit. A cellular shade incentive could fall under Xcel Energy's Heating and Cooling category or a Smart Home incentives program. **Eligibility**: Residential customers. Limit 10 units per customer.

Product Cost: Using the standard window covering size of 3' x 5' energy efficient cellular shades, price per installed unit excluding upgrades can average $70 to $140 (industry average). 80% market is DIY. Additional motorization averages $200 per unit. **Measure Life:** 10 years on average.

Savings Potential: There are numerous modeled and field studies of cellular shades saving potential. See https://aercnet.org/resources/reports/. The Table below shows field study results from PNNL side-by-side model homes in Richland, WA. Study also covers demand response savings during peak periods. Double-cell (cell-in-cell) cellular shades out-performed standard vinyl blinds in all seasons under all use scenarios.

Window Covering Comparison (under different settings and use scenarios)	Season (HVAC Mode)	HVAC Savings % (+/- 95% conf.)	Average W-hr/day savings
Cellular shades compared to vinyl blinds (both always down)	Heating	9.3 (±1.9)	7,011
Cellular shades compared to vinyl blinds (both always down)	Cooling	13.3 (±1.3)	2,650
Cellular shades compared to vinyl blinds (both typical use)	Heating	2.0 (±1.3)	1,505
Cellular shades compared to vinyl blinds (both typical use)	Cooling	5.8 (±0.5)	1,487
Cellular shades (automated "Best Practices") compared to vinyl blinds (typical use)	Heating	8.7 (±1.2)	5,445
Cellular shades (automated HD Green mode) compared to vinyl blinds (typical use)	Cooling	15.1 (±2.0)	3,287

*See Cort, K.A. et al. *Testing the Performance and Dynamic Control of Energy-Efficient Cellular Shades in the PNNL Lab Homes.* Pacific Northwest National Laboratory. August 2018.

Table shows HVAC savings based on PNNL modeling of Denver, CO.

Table 27. Modeled HVAC Energy Use and Savings in Climate Zone 5B

	Window-to-Wall Area (%)	HVAC Energy Use (kWh/yr) Based on Cellular Shade Performance Level			Percent Savings Compared to No Shades	
Prototype		No Shades	Double Cell	Triple Cell	% Savings of Double-Cell Shades	% Savings of Triple-Cell Shades
Prototype # 1 (U=0.32)	15%	13656.9	12438.1	12282.7	9%	10%
	18%	13589.1	12103.6	11916.7	11%	12%
Prototype #2 (U=0.68)	15%	20213.4	17333.9	17181.7	14%	15%
	18%	20602.0	17084.1	16873.5	17%	18%
Prototype #3 (U=0.68)	15%	7751.6	6200.9	6182.4	20%	20%
	18%	7964.6	6057.5	6015.9	24%	24%

*See Metzger, C.E. et al. Modeling Cellular Shades in EnergyPlus. Pacific Northwest National Laboratory. December 2017.