

# Berkeley County Schools Case Study

**18 month project spanning 35 buildings**

- ✓ 7 Schools with New Geothermal HVAC Systems
- ✓ 5 Schools with New Boilers and Chillers
- ✓ 23,400 LED Light Fixtures Across 35 Buildings
- ✓ 1,741 Plumbing Fixtures Replaced or Retrofitted
- ✓ All New Direct Digital Controls Systems
- ✓ Envelope Improvements
- ✓ M&V and Energy Management Services



*Project Cost = \$28.3 million*

*Annual Savings = \$1.7 million*

*Utility Incentives = \$305,000*

*"We always want to be a leader..., but when you're looking at that, 'how do you get there?' You have to go out and find a **leader nationally**, and I felt that's what we did."*

Manny Arvon, Superintendent,  
Berkeley County Schools, WV

# HVAC systems in need of replacement

Building	Age of Systems (Years)	End of Life Now
Back Creek Valley Elementary	11, 26	Half
Bedington Elementary	5, 23	Half
Berkeley County Bus Garage	<1, 25	Half
Berkeley Heights Elementary	18	Yes
Board of Education	1 to 10	No
Bunker Hill Elementary	9, 17	Half
Burke St Elementary	27	Yes
Eagle Intermediate	14	No
Gerrardstown Elementary	6, 12, 23	Half
Hedgesville Elementary	11	No
Hedgesville High	Most 11, Few 20+	No
Hedgesville Middle	19	Half
Inwood Primary	12	No
Marlowe Elementary	43	Yes
Martinsburg High	10, 23	Half
Martinsburg North Middle	Mostly new, some 4	No
Martinsburg South Middle	8	No
Millcreek Intermediate	28	Yes
Mountain Ridge Intermediate	10	No
Mountain Ridge Middle	2	No
Musselman High	17	Half
Musselman Middle	16	Half
Opequon Elementary	18	Yes
Orchard View Intermediate	13	No
Pikeside Learning Center	>25	Yes
Potomack Intermediate	17	Yes
Ramer Center	6 to 10	Some
Rosemont Elementary	8, 20+	No
Spring Mills High	4	No
Spring Mills Middle	12	No
Spring Mills Primary	2	No
Tomahawk Intermediate	6, 16	Half
Tuscarora Elementary	18	Yes
Valley View Elementary	18	Yes
Winchester Avenue Elementary	~15	No

# HVAC systems in need of replacement

Building	Age of Systems (Years)	End of Life Now	End of Life < 5 yrs
Back Creek Valley Elementary	11, 26	Half	Yes
Bedington Elementary	5, 23	Half	Half
Berkeley County Bus Garage	<1, 25	Half	Half
Berkeley Heights Elementary	18	Yes	Yes
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Eagle Intermediate	14	No	Yes
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# Berkeley Summer Renovations

## 1<sup>st</sup> Summer (2016) - 9 weeks on site

- ✓ 25 miles of pipe installed in the ground
- ✓ 300 tons of geothermal heating and cooling installed
- ✓ 150,000 SF of old HVAC removed and replaced with geothermal
  - ✓ 110,000 SF of new ceilings installed
  - ✓ 3 schools with complete MEP renovations
- ✓ 10,000 LED light fixtures installed (includes additional bldgs.)

## 2<sup>nd</sup> Summer (2017) – 8 weeks on site

- ✓ First day of school was Monday last week, completed project on time
- ✓ 26 miles, 310 tons, 145,000 SF, 4 schools completely renovated

# Berkeley Before and After - Lighting



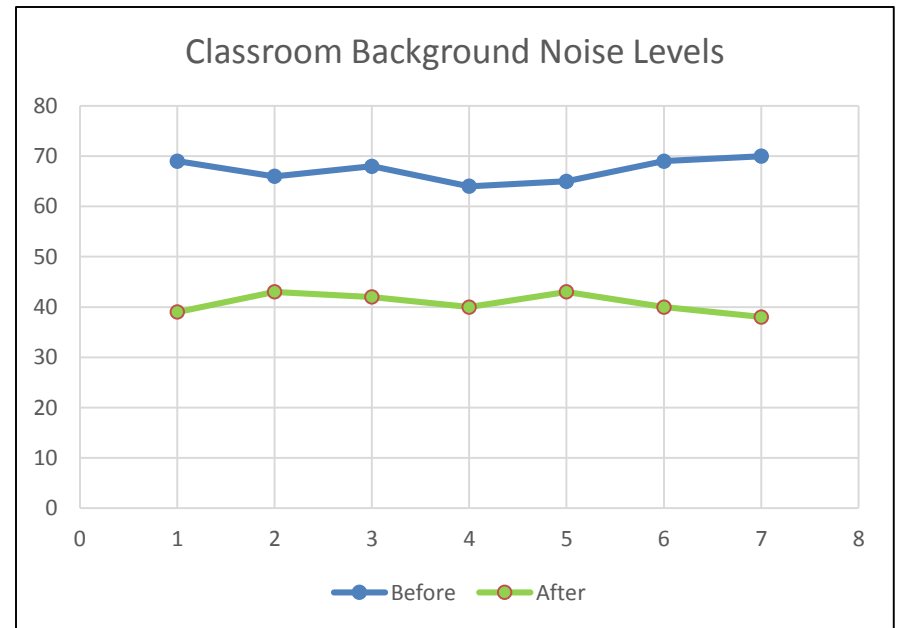
# Berkeley Before and After – Sound Levels

## Opequon Elementary School, Classroom Sound (dB)

Before	After
69	39
66	43
68	42
64	40
65	43
69	40
70	38

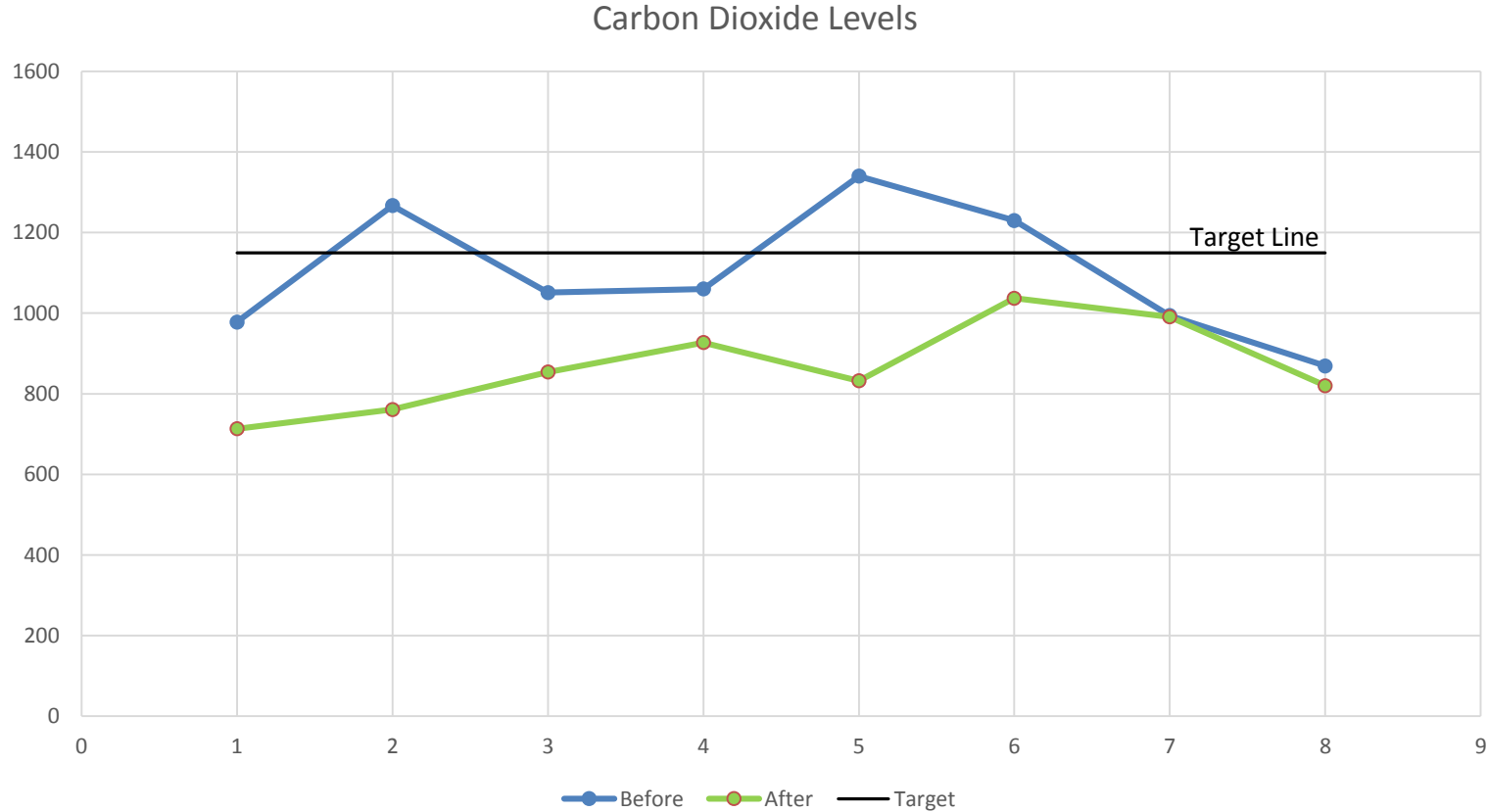
## Reference Levels (dB)

40	Quiet Library
40	Whisper
50	Quiet Office
55	Box Fan
60-65	Regular Conversation
70	Vacuum Cleaner, 3 feet away
75	City Traffic
75	Alarm Clock





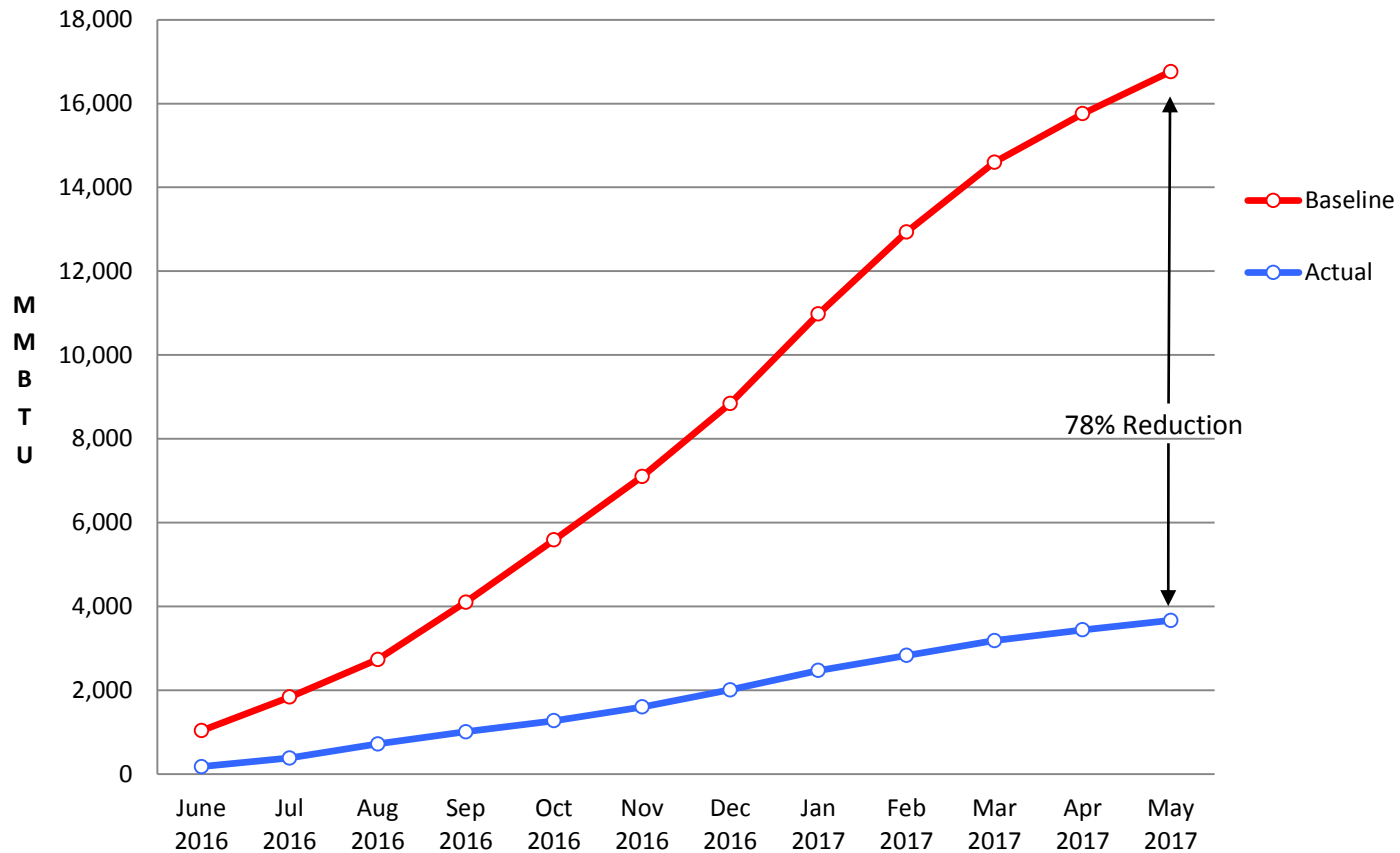
# Berkeley Before and After - Indoor Air Quality





# Energy Savings - Renovations

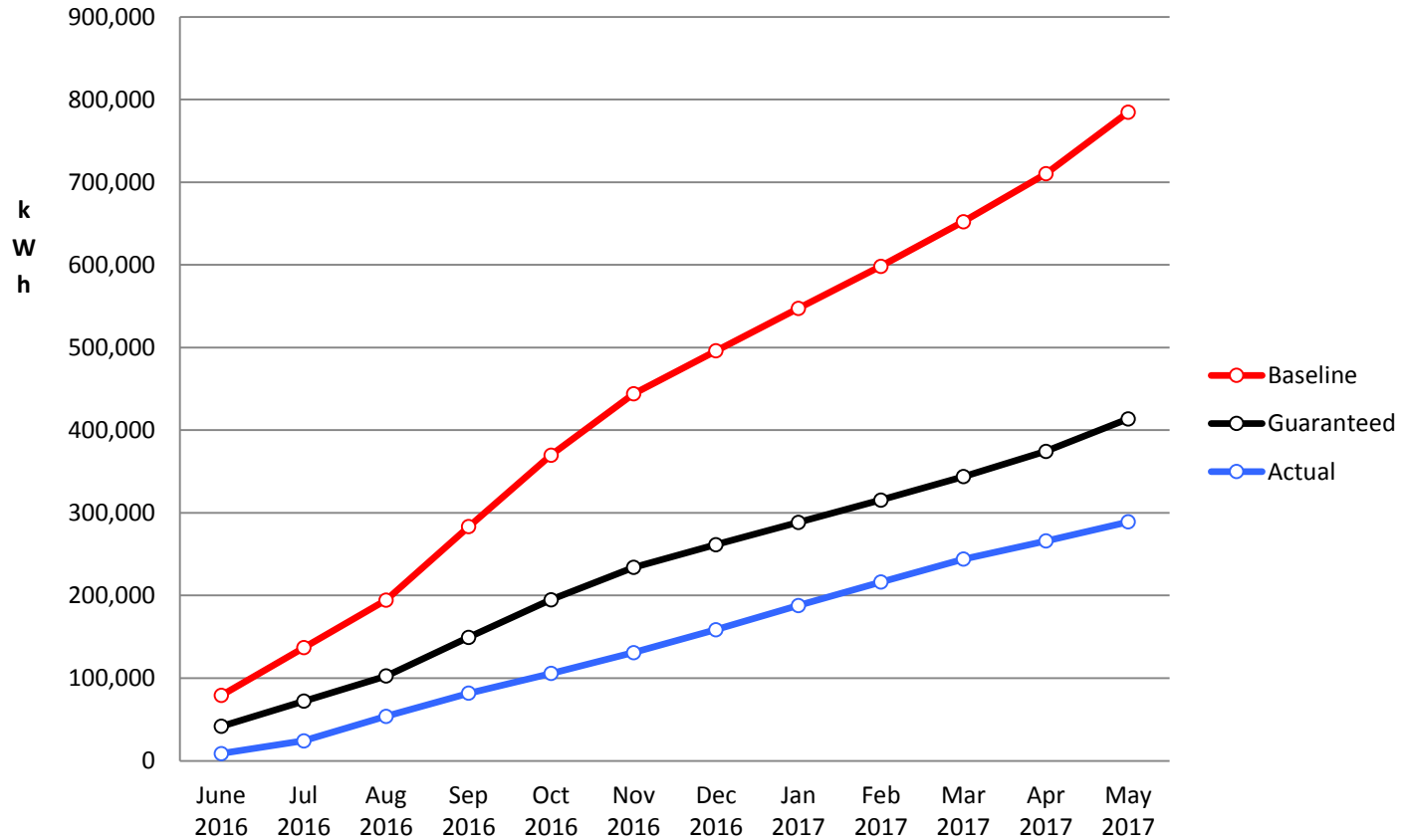
## Combined Performance



Total savings from 3 schools = \$187,894

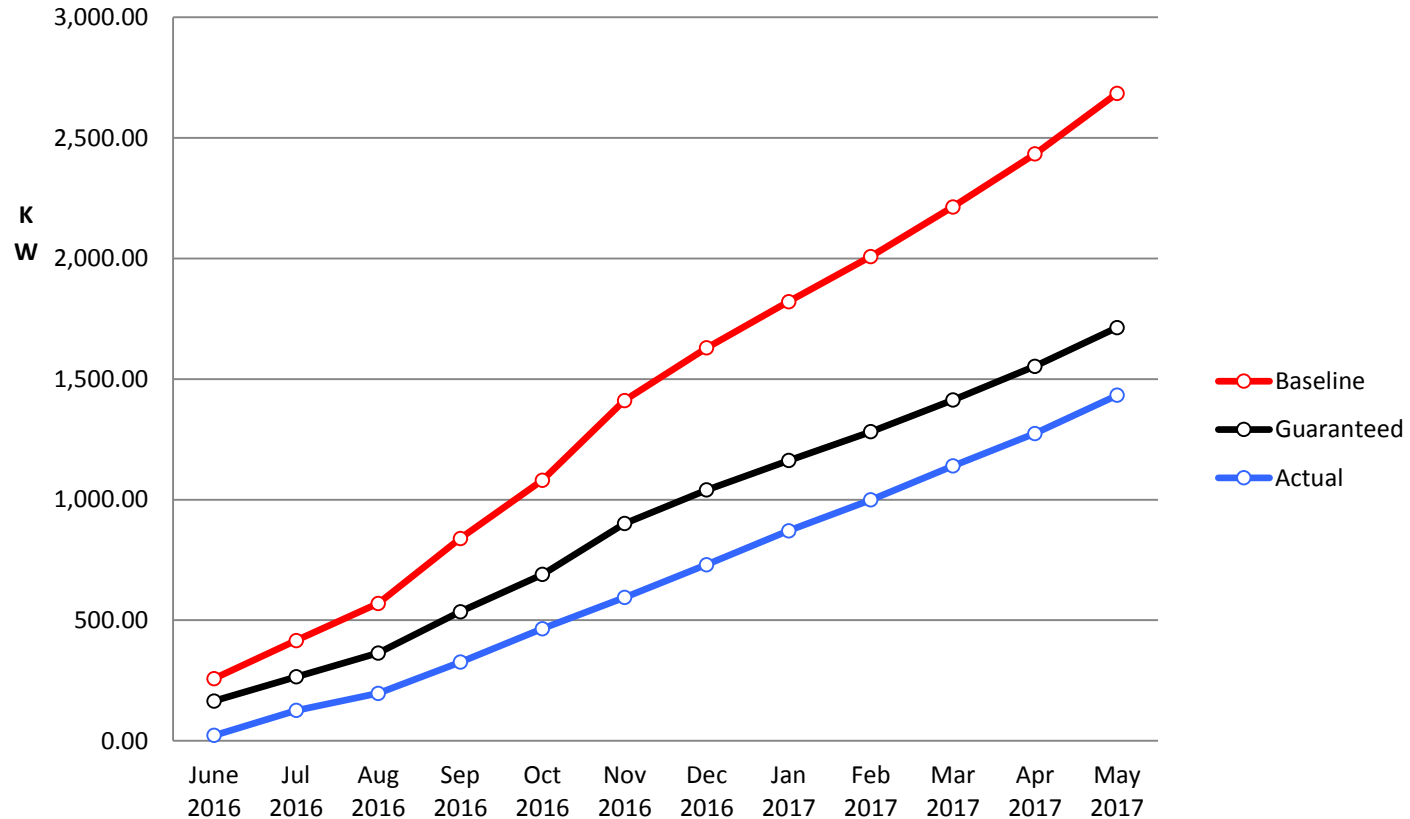
# Energy Savings - Renovations

## Opequon Elementary School - Electrical Consumption - kWh Tracker



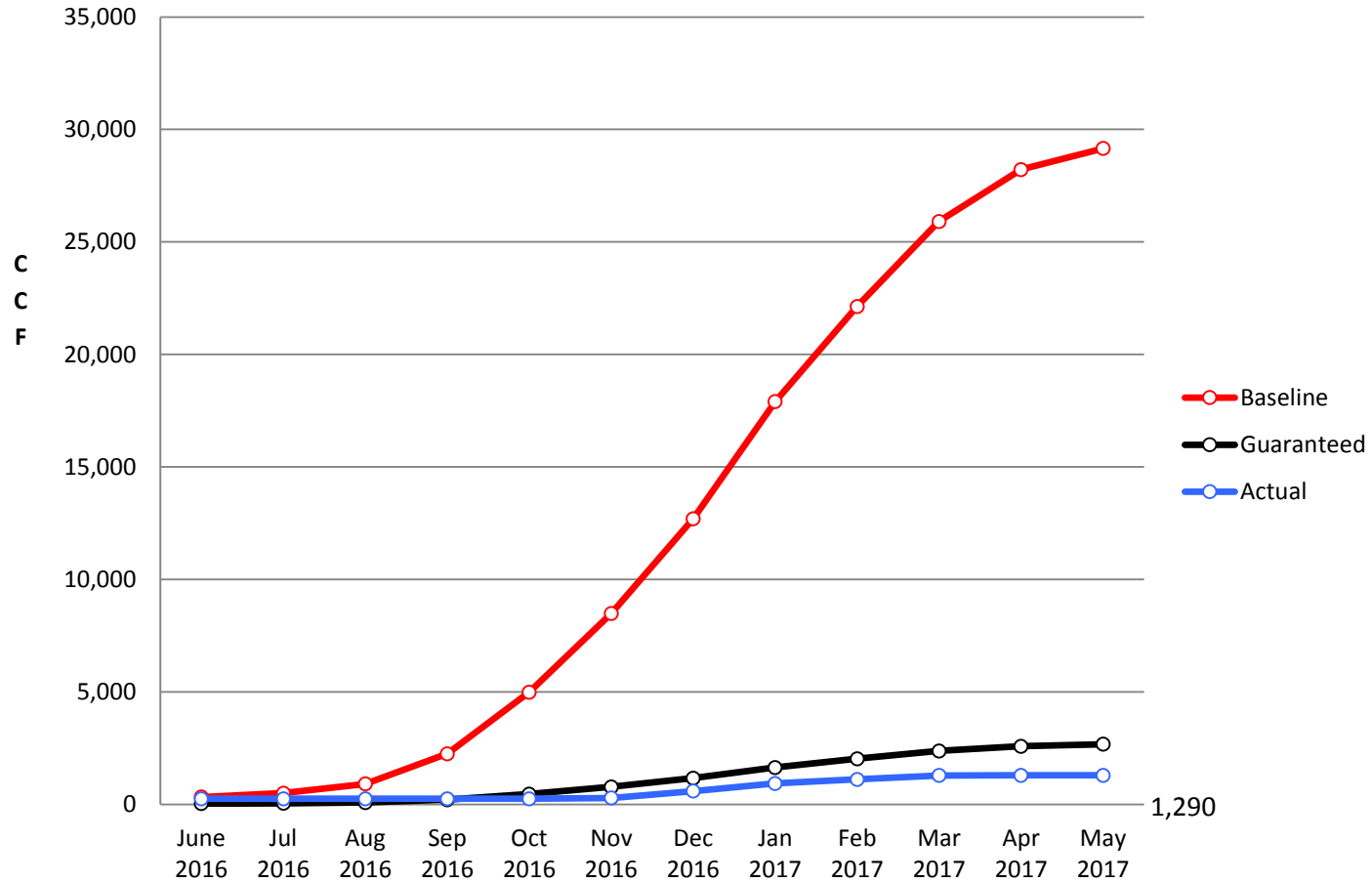
# Energy Savings - Renovations

## Opequon Elementary School - Electrical Demand - kW Tracker



# Energy Savings - Renovations

## Opequon Elementary School - CCF Tracker



# The First Perfect 100 Energy Star Schools in the State of West Virginia



Mill Creek Intermediate  
Valley View Elementary  
Opequon Elementary



# District Wide Savings to Date

Energy =	\$2,842,643 (24 months)
<u>Rebates Received =</u>	<u>\$315,500</u>
Total Savings =	<b>\$3,158,143</b>
<u>Guaranteed Savings =</u>	<u>\$1,766,820 (24 months)</u>
<b>Excess Savings =</b>	<b>\$1,391,323</b>