

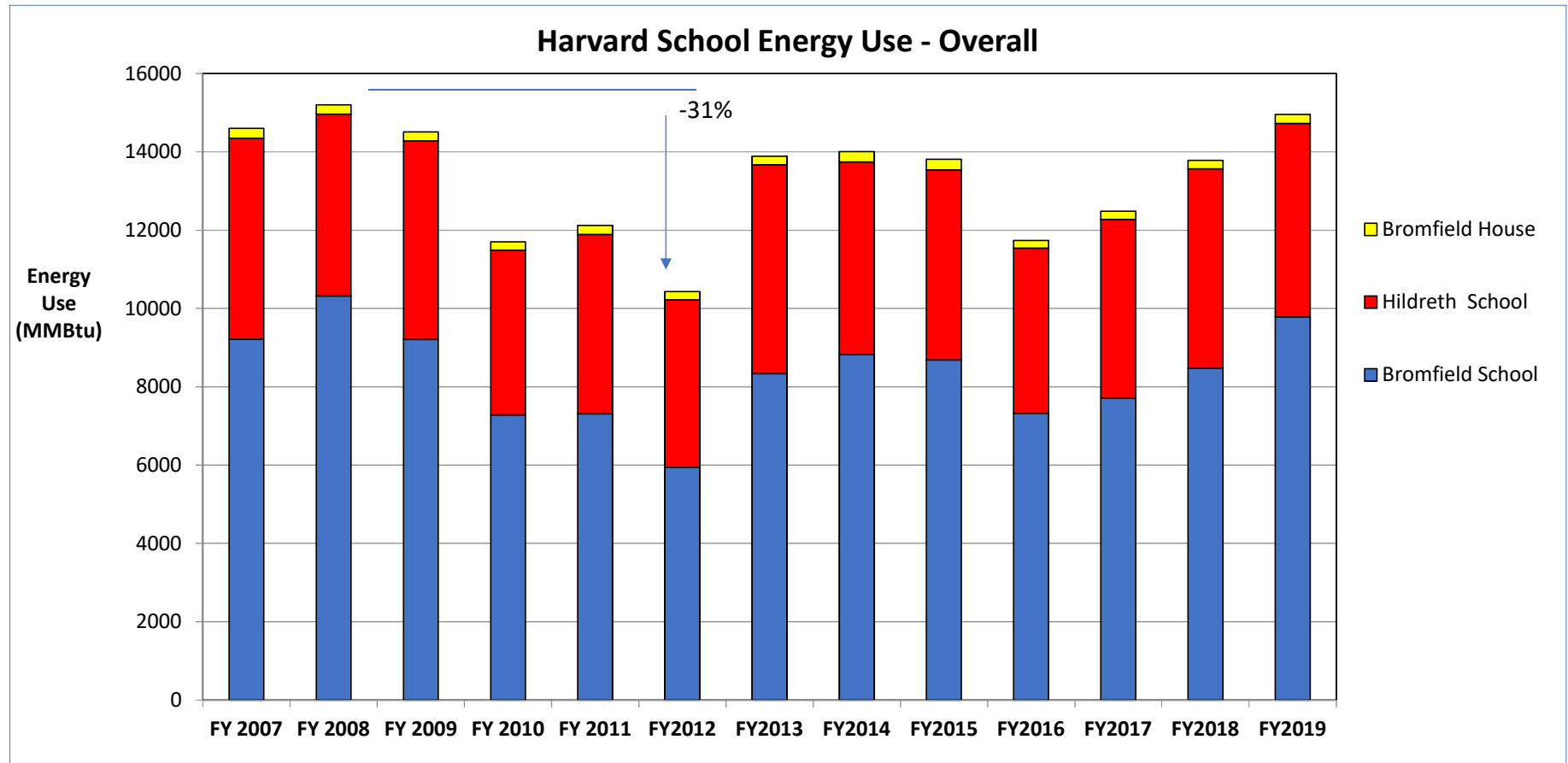
Town of Harvard Schools Energy Report



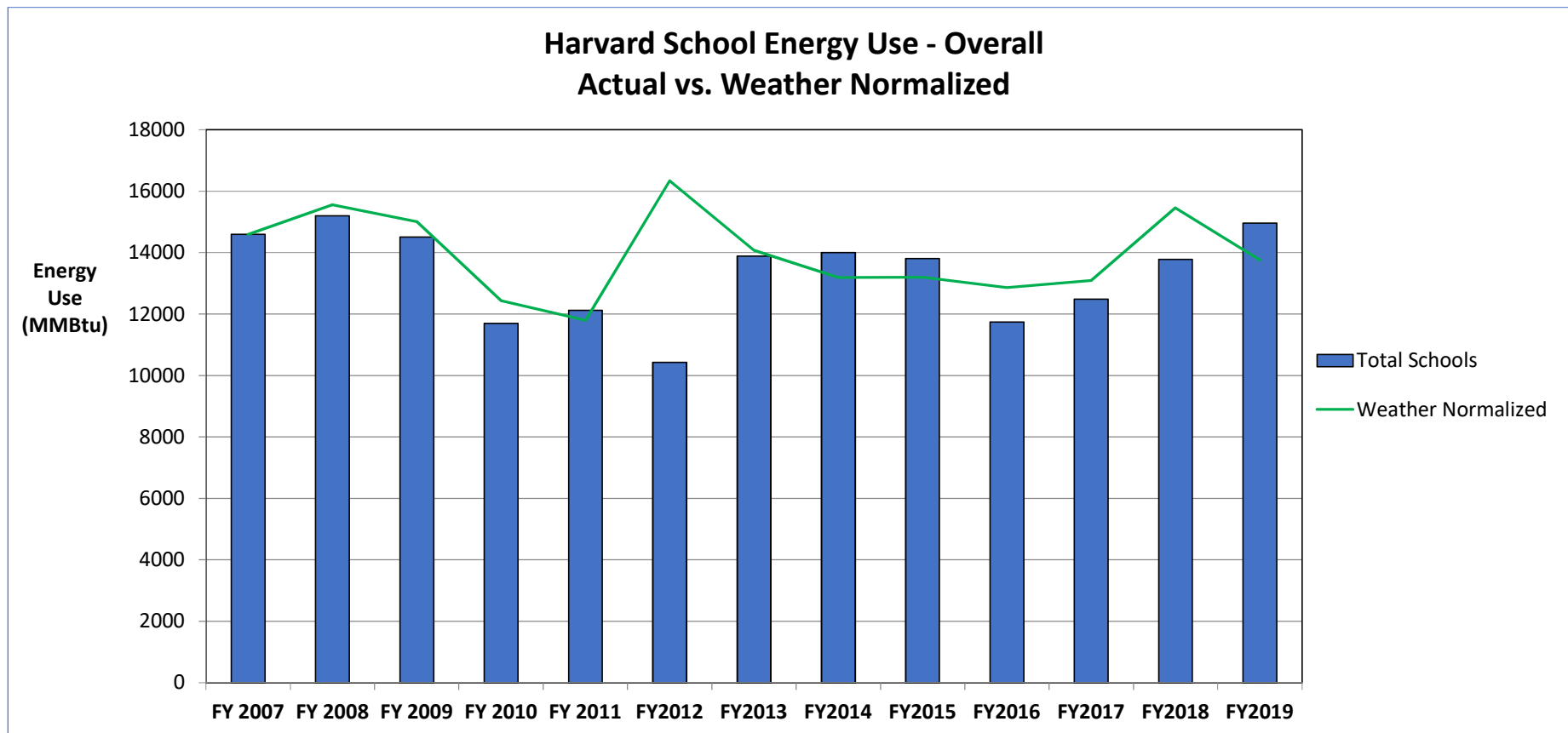
Agenda

- Energy Use FY07-FY19
- Energy Costs FY08-FY18
- Emissions FY07-FY19
- Energy Reduction Projects – History and Current
- Energy Reduction Projects - Future
- Energy Initiatives / Concerns

Energy Use

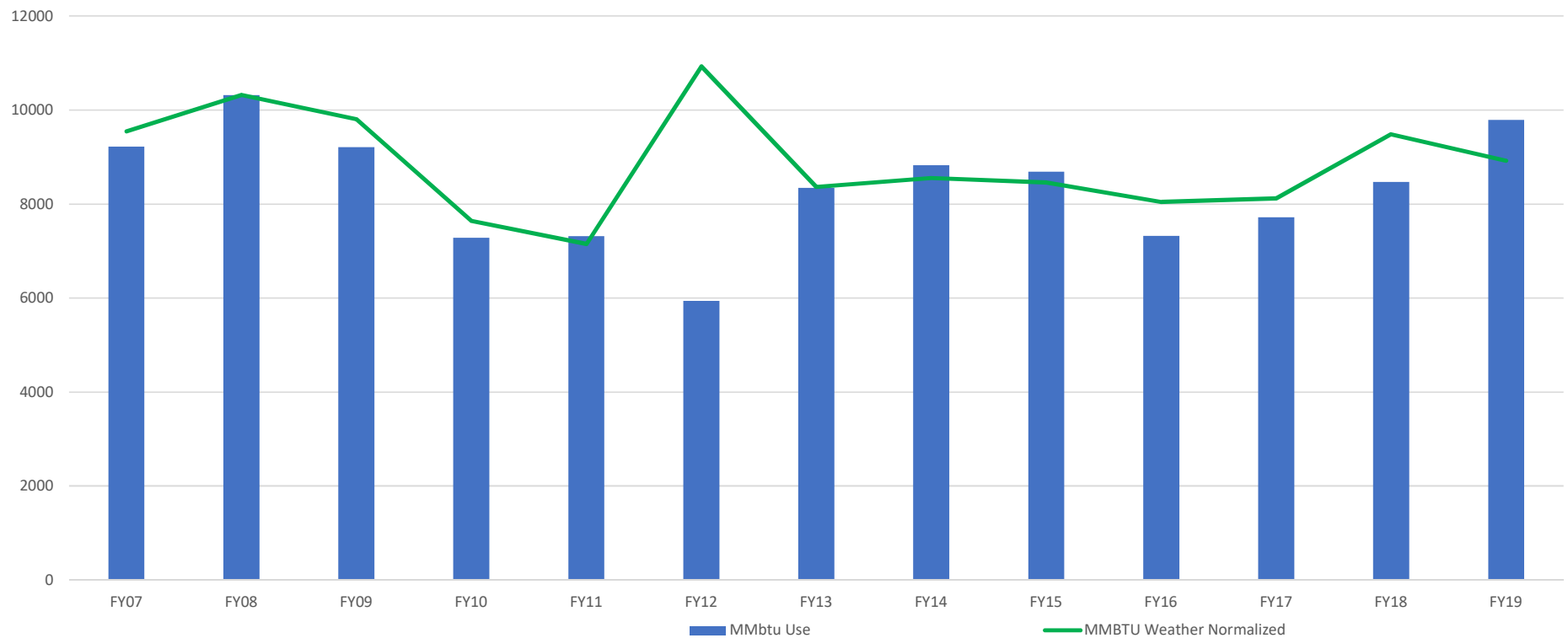


Energy Use

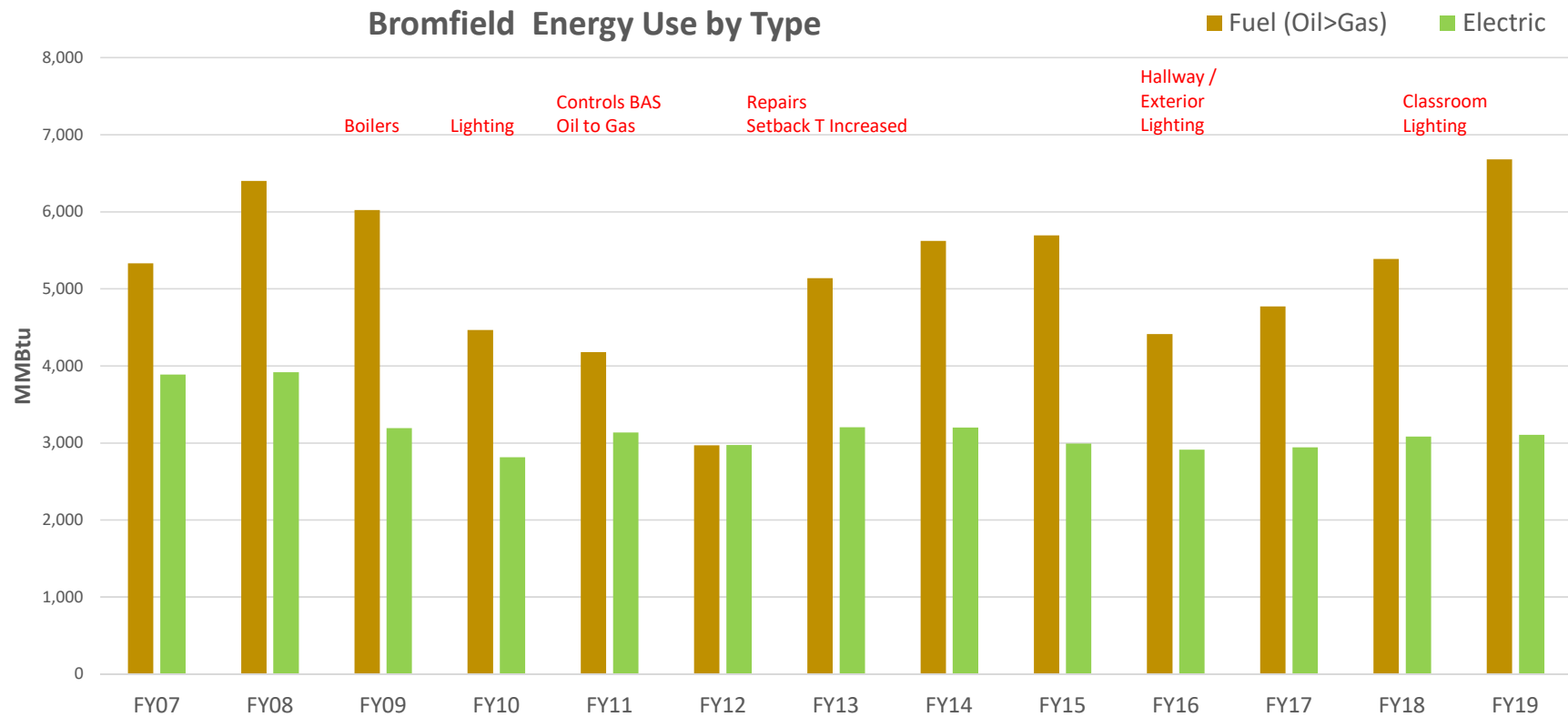


Energy Use – Bromfield School

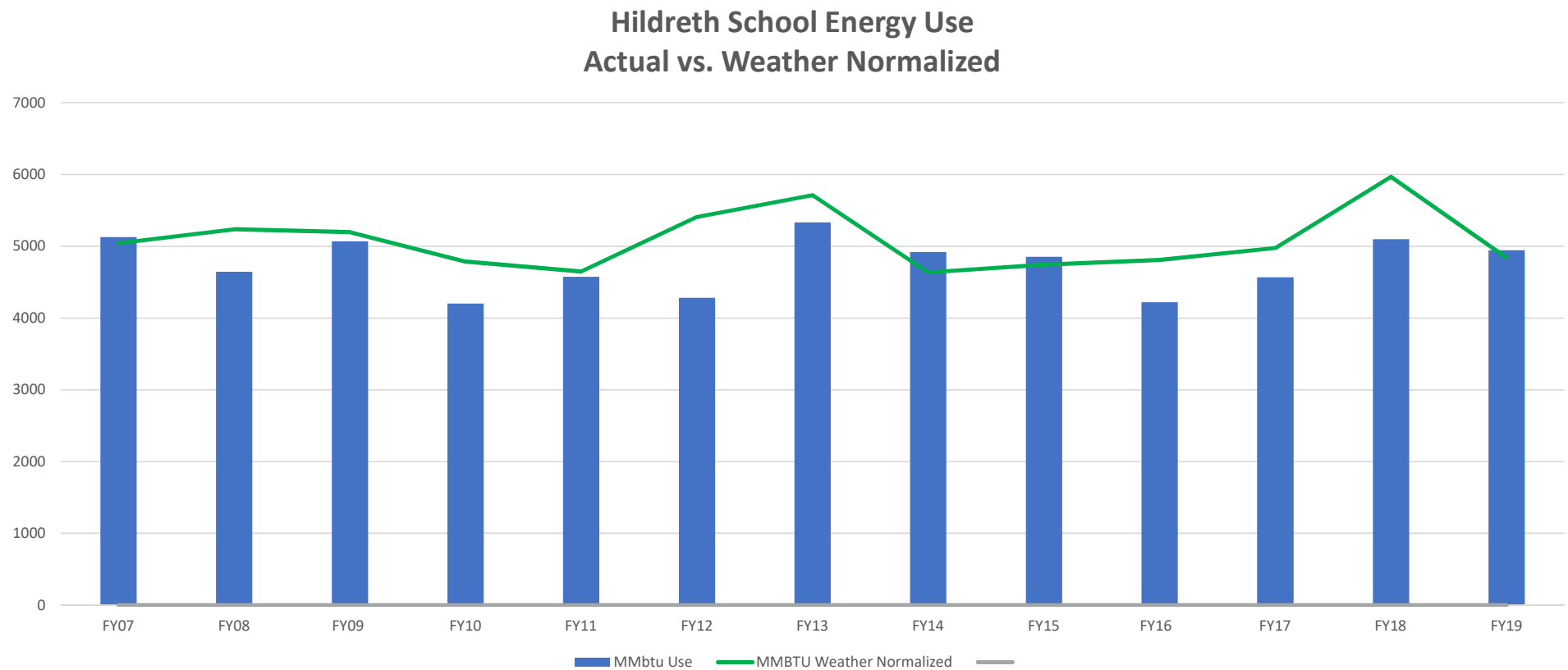
**Bromfield School Energy Use
Actual vs. Weather Normalized**



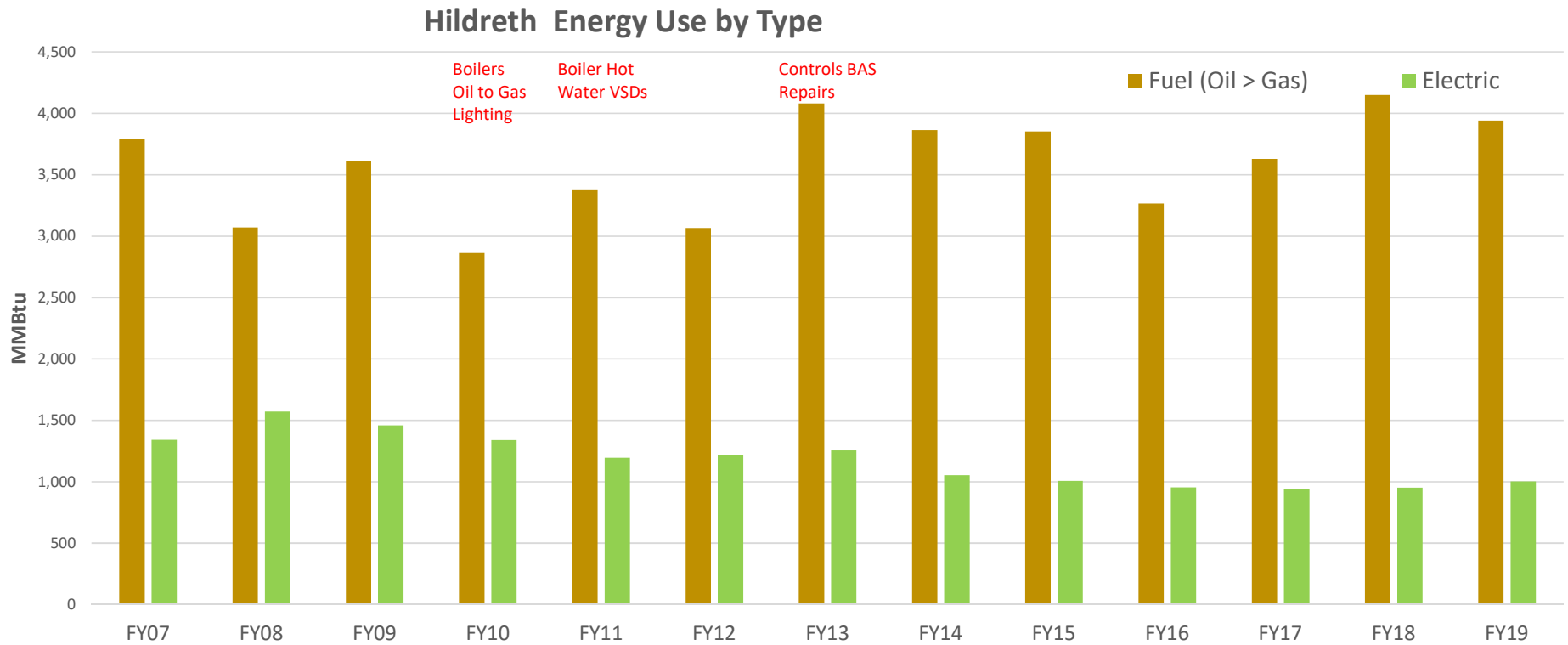
Energy Use – Bromfield School



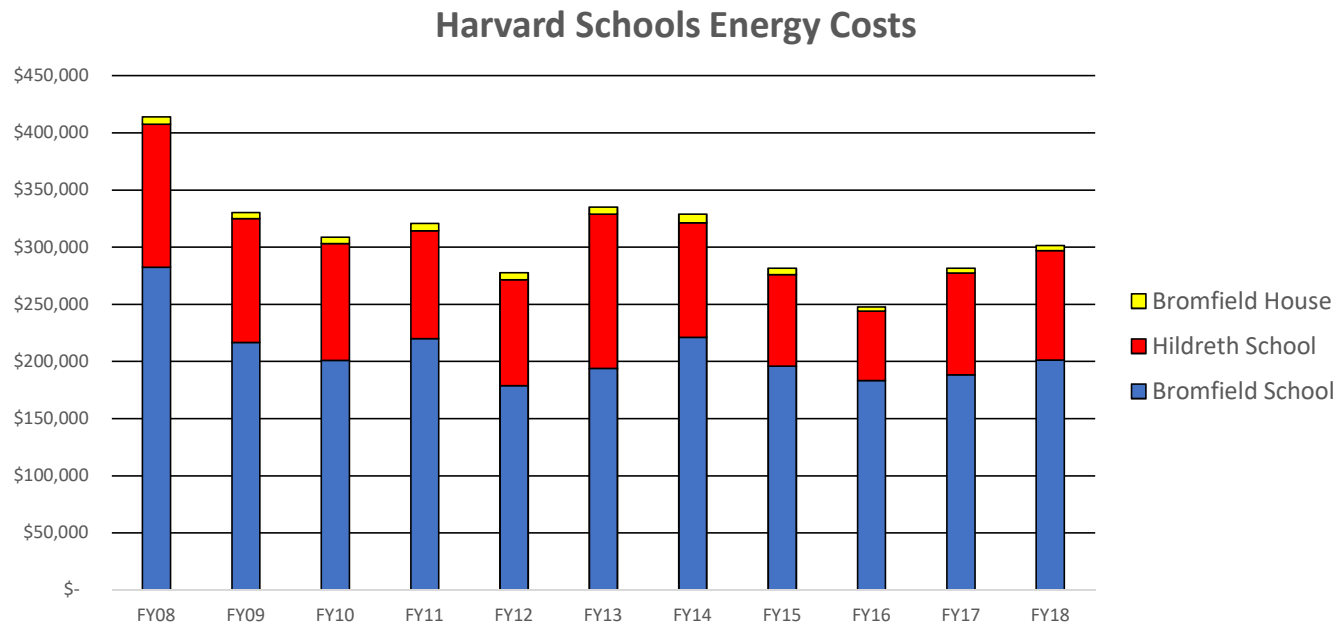
Energy Use – Hildreth School



Energy Use – Hildreth School

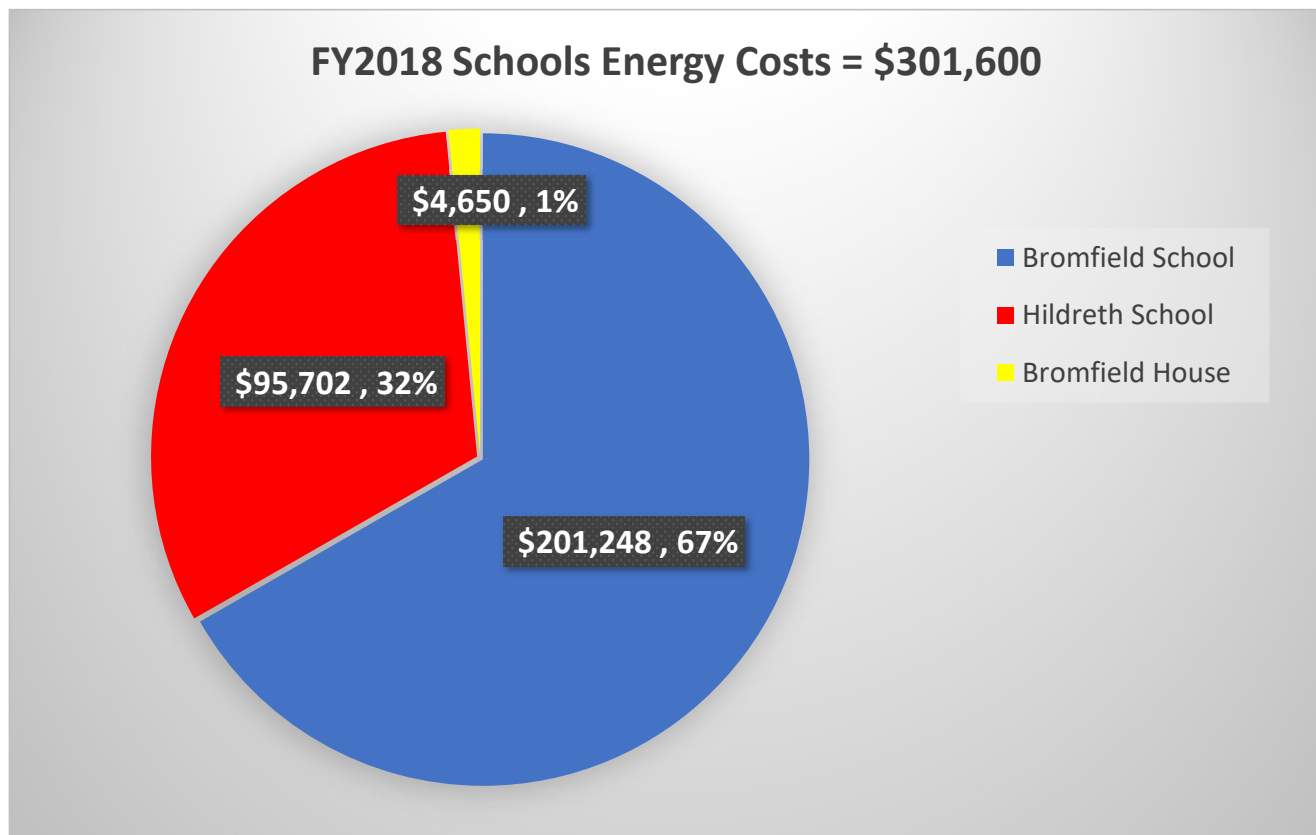


Energy Cost

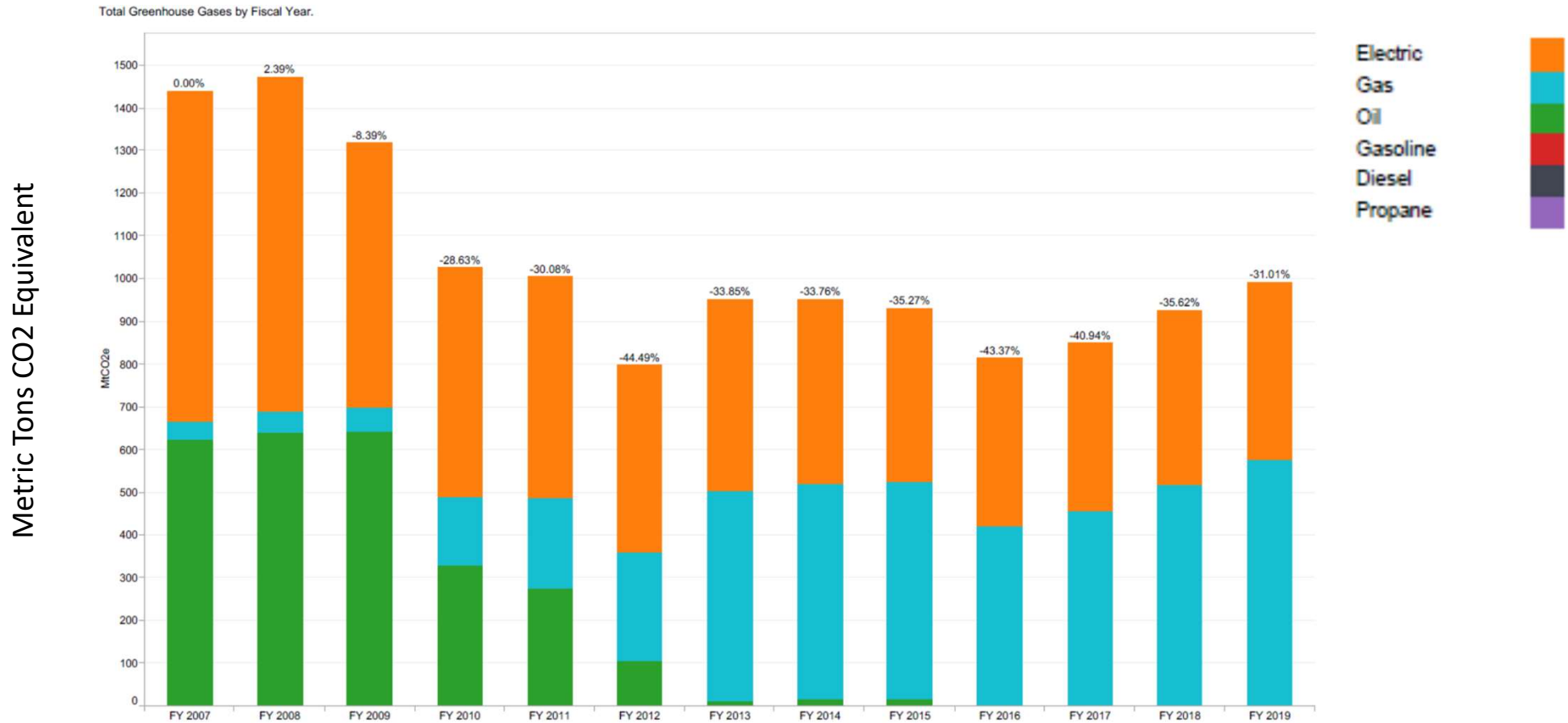


Total Energy Costs	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
Bromfield School	\$ 282,490	\$ 216,789	\$ 200,943	\$ 220,056	\$ 178,931	\$ 194,049	\$ 221,040	\$ 196,061	\$ 183,314	\$ 188,294	\$ 201,248
Hildreth School	\$ 124,996	\$ 108,189	\$ 102,241	\$ 94,381	\$ 92,665	\$ 134,958	\$ 100,356	\$ 79,801	\$ 60,858	\$ 89,016	\$ 95,702
Bromfield House	\$ 6,549	\$ 5,292	\$ 5,630	\$ 6,387	\$ 6,151	\$ 6,173	\$ 7,374	\$ 5,720	\$ 3,635	\$ 4,370	\$ 4,650
	\$ 414,035	\$ 330,270	\$308,814	\$320,824	\$277,747	\$335,180	\$328,770	\$281,582	\$247,807	\$ 281,680	\$ 301,600

Energy Cost



Emissions Down – Schools (TBS, HES, TBH)



Bromfield Projects - History

FY09 Aug 08	Boiler (2)/Burner (2)	Fuels	\$ 100,000
FY10 Aug 09	Lighting Upgrade - Interior	Electric	\$ 114,495
FY11 Dec 10	Building Automation System Upgrade / Retro-comm.	Fuels/Elect	
FY11 Dec 10	Demand Controlled Ventilation Gym	Fuels	
	Pneumatic Controls Conversion		
FY11 Dec 10	Demand Controlled Ventilation - Library, Auditorium, Café	Electric	
	Roof Top Unit fan & Boiler Hot Water Variable Speed Drives		\$ 140,223
FY11	Convert to Gas	Fuels	
FY13 Dec 12	Retro-commissioning Repairs – actuators, sensors, controllers, dampers valves	Fuels/Elect	\$ 45,466
FY13 Dec 12	Library Air Handler Unit Controller Replacement	Electric	
FY16 May 16	Lighting Upgrade - Exterior LED	Electric	\$ 42,285
FY17 Sep 16	Lighting Upgrade - Hallway / Occupancy Sensors	Electric	\$ 67,451
FY17 Dec 16	Monitoring Project – Retro-commissioning/BAS	Fuels/Elect	\$ 52,323

Bromfield Projects - History

FY19	Monitoring Project – Software	Fuels / Electric	\$6,151
FY19	BAS Control Programming	Fuels / Electric	\$6,279
FY19	Weatherization (Air Sealing)	Fuels	\$14,252
FY19 Sep 2018	Lighting Upgrade - Classrooms/Gym/ Auditorium	Electric	\$214,760
FY19	Retrocommissioning /Building Automation System (BAS)	Fuels / Electric	\$5,050
FY20 Dec 2019	Lighting Upgrade – Remaining - Fall 2019	Electric	\$78,847

Hildreth & Bromfield House Projects - History

HES

FY10	Dec 09	Boiler/Burner(2) Convert to Gas	Fuels	\$ 30,000
FY10	Dec 09	Lighting Upgrade	Electric	\$ 32,687
FY11	Apr 11	Boiler Hot Water Variable Speed Drives	Electric	\$ 53,199
FY13	Dec 12	Building Automation System	Electric/ Fuels	\$ 103,659
		Retro-commissioning & Repairs		
		Demand Controlled Ventilation Gym, Cafeteria		
FY13	Dec 12	Solar Array HES Roof 5 kW	Electric	\$ 40,000

Bromfield House

FY16	FY16 Replaced boiler and converted oil to gas.	Fuels
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Total Green Community, National Grid and Clean Energy Center Grants = \$1,047,000

Future Projects – Energy Reduction Opportunities

- Bromfield LED Lighting– remaining misc support areas
 - Green Community Grant Sep '19 - Subcontract Oct '19; Complete by Dec '19

Future

- Bromfield Focus – Work with Jon S - Variable boiler controls; repairs
- Bromfield Setback temperature – address root cause of frozen coils
- Monitoring Recommendations – Fraunhofer extended to all circuits pending final IT network modifications.
- Bromfield Hot Water Tank – consider Solar Electric or Solar Thermal?
- FY22-23 capital projects HVAC/AHU/AC – any eligible for grant funds?

Energy Initiatives / Concerns

- Energy Policy
- Energy Manager
- Car Charging Station
- Student Collaboration; Curriculum Integration
- Solar
 - Bromfield – Limited Rooftop
 - HES - Existing 5kW Solar Array – Re-use?
 - HES - New solar array – how to fund?
- HES - Building Automation System – integrate with Bromfield