

Air Source Heat Pumps in Multi Family Buildings

Bruce Ledgerwood

Action for Boston Community Development (ABCD)

- ABCD is one of 25 agencies that deliver the energy efficiency and fuel assistance programs to Massachusetts low income households.
- CEC has provided ABCD funding to install ASHPs in low income homes 2013-2017.
- Used to install “cold climate” ASHPs in state funded public housing.
- Installed 760 ASHPs at 19 different sites - low rise, garden style buildings.
- Most were mini splits in one bedroom apartments, serving elderly.
- A few family units also served with larger, multi zone equipment.
- One Variable Refrigerant Flow (central system) 23 unit project in Cambridge.
- All electric baseboard or storage heat removed except in bathrooms and hallways.

























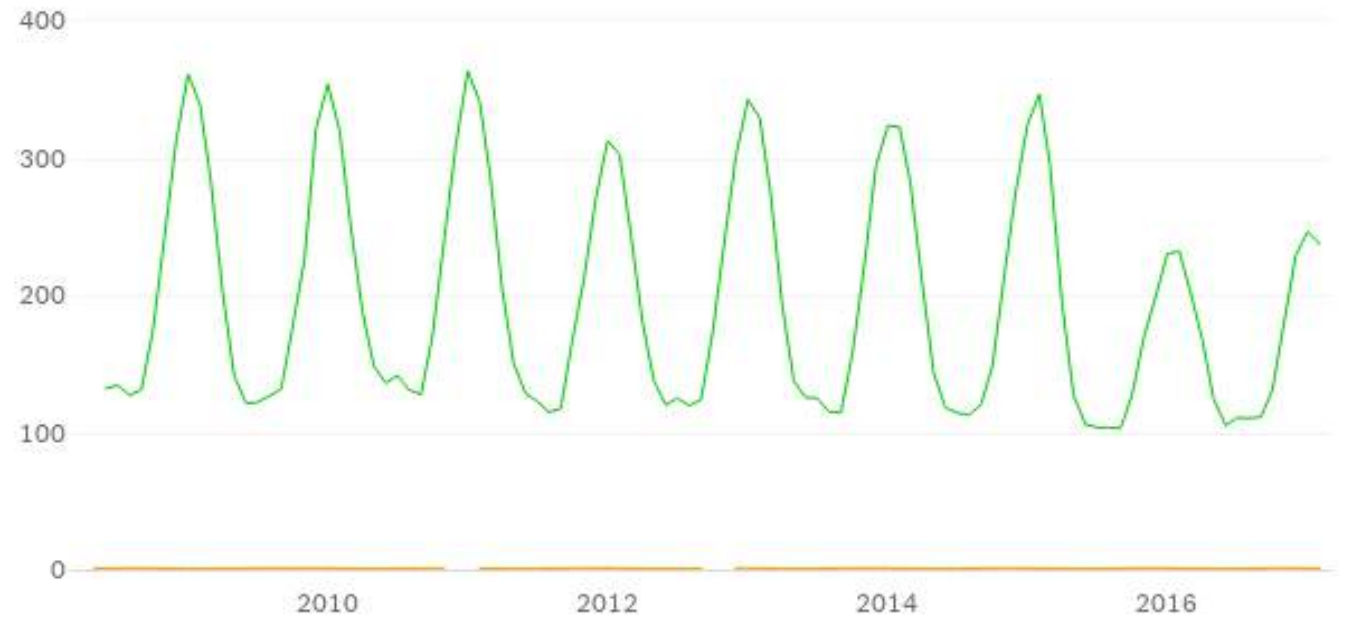
Savings?

Doggett Circle - 1 « DED - Doggett Circle

Total energy use in kWh

Name	Full-Year Sum	
Electric #261135010..	59.3k	<input checked="" type="checkbox"/>
Electric #261135110..	311	<input checked="" type="checkbox"/>

Detailed data per month



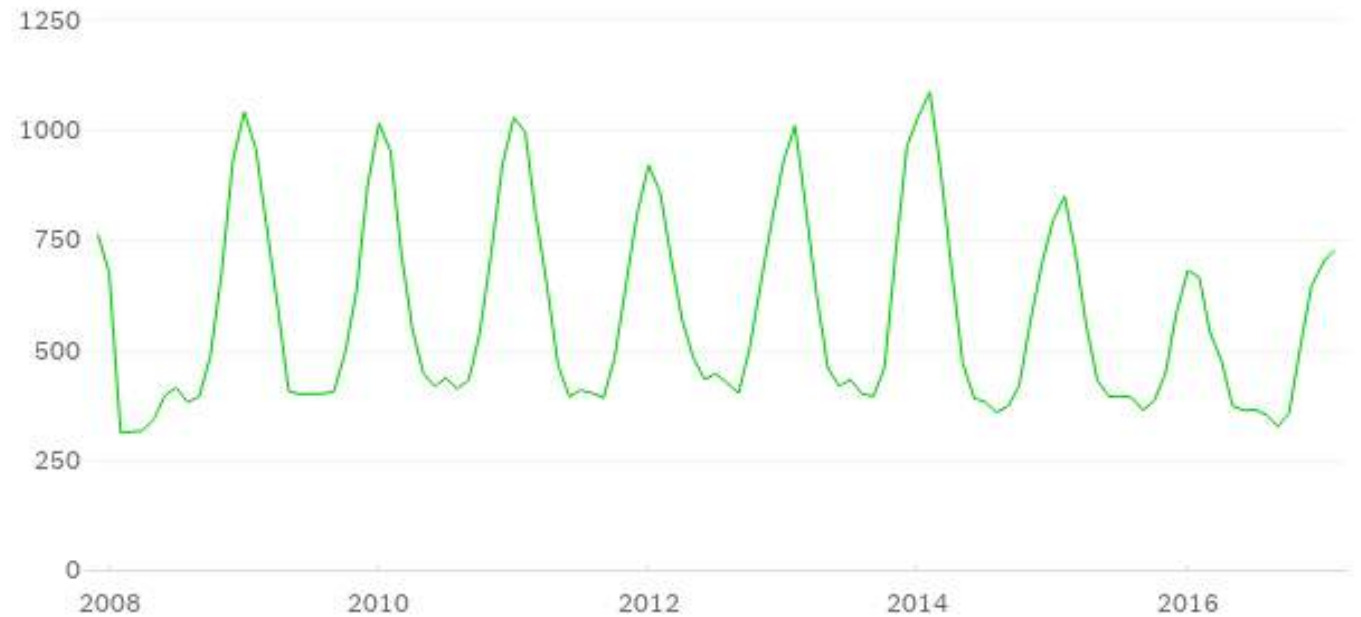
312 - R.C. Weaver Apartment

Total energy use in kWh showing all available data

Name	Full-Year Sum	<input checked="" type="checkbox"/>	Detailed data per month
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• 81 Clifton St	<div><div></div></div> 174k	<input checked="" type="checkbox"/>
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• Properties owned by other users



Total energy use ▼ in kWh ▼

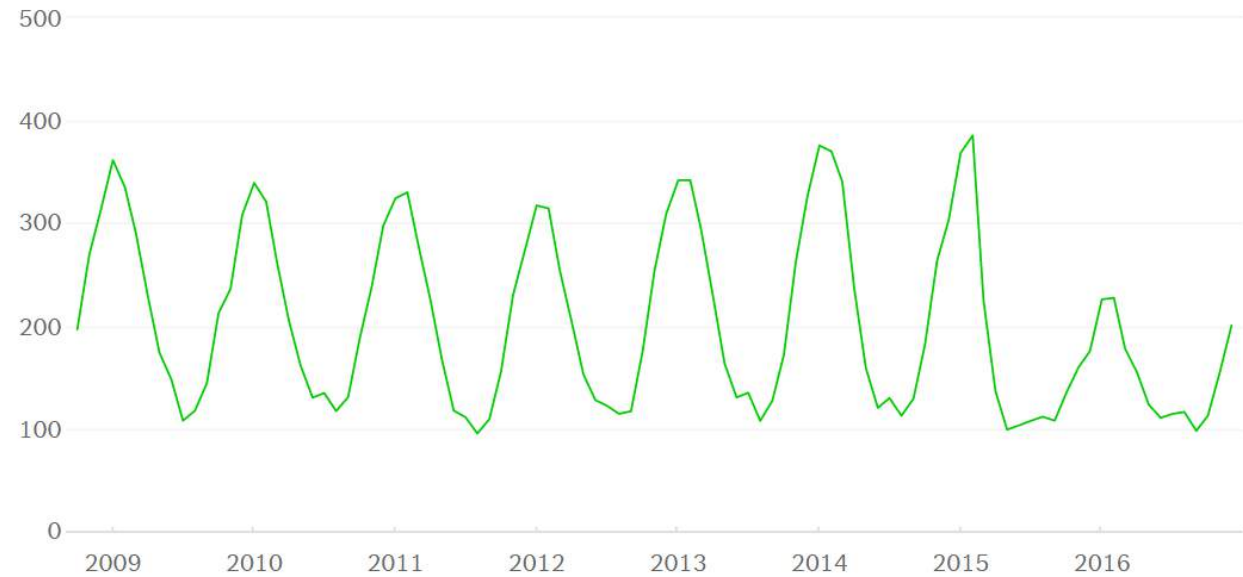
Graph ☒ Table



◆ Name	▼ Full-Year Sum	✓
Electric #2567964100...	<div><div></div></div> 55.2k	✓

Detailed data per month

Click & drag to zoom in



MRL - Bolton Hill Apartments

Electricity use in kWh showing all available data

Name	Full-Year Sum	<input checked="" type="checkbox"/>
• 397 Bolton St. #1	170k	<input checked="" type="checkbox"/>
• 397 Bolton St. #3	170k	<input checked="" type="checkbox"/>
• 397 Bolton St. #2	56.7k	<input checked="" type="checkbox"/>
• 397 Bolton St. #4	29.4k	<input checked="" type="checkbox"/>
• Community Building...	21.5k	<input checked="" type="checkbox"/>

• Properties owned by other users

Detailed data per month

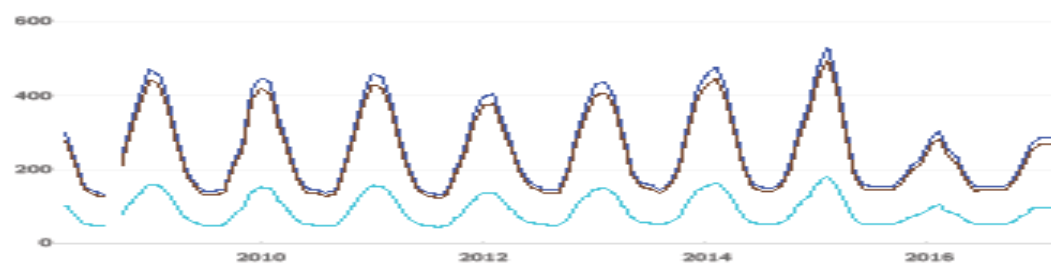


ORL - Tonset Woods

Electricity use in kWh showing all available data

Name	Full-Year Sum	<input checked="" type="checkbox"/>
Tonset Woods - Alde...	76.4k	<input checked="" type="checkbox"/>
Tonset Woods - Birc...	76.4k	<input checked="" type="checkbox"/>
Tonset Woods - Ced...	76.4k	<input checked="" type="checkbox"/>
Tonset Woods - Hem...	76.4k	<input checked="" type="checkbox"/>
Tonset Woods - Will...	76.4k	<input checked="" type="checkbox"/>
Tonset Woods - Elm...	71.4k	<input checked="" type="checkbox"/>
Tonset Woods - Map...	71.4k	<input checked="" type="checkbox"/>
Tonset Woods - Oak...	71.4k	<input checked="" type="checkbox"/>
Tonset Woods - Pine...	71.4k	<input checked="" type="checkbox"/>
Tonset Woods - Com...	26k	<input checked="" type="checkbox"/>

Detailed data per month



Project	one bed apts.	Overall Savings	HVAC Savings	Summer KW Impact	Winter KW Impact
Acton	68	24%	45%	1 (0%)	440 (-37%)
Orleans	100	24%	51%	75 (-16%)	2508 (-59%)
Marlborough	62	32%	52%	57 (-18%)	487 (-38%)
Pittsfield	13	31%	49%	88 (-59%)	351 (-60%)
Cambridge	23	23%	53%	3 (+3%)	99 (+61%)
Weighted Average		26%	50%	somewhat reduced	significantly reduced, except Cambridge

Costs?

Cost of Installs				
type	BTU size	heads	transfer fans	average
mini split	9000	1	0	\$ 3,875
mini split	12000	1	1	\$ 5,009
mini split	15000	1	1	\$ 6,027
multi zone	18000	2	0	\$ 6,697
multi zone	24000	3	0	\$ 8,500
multi zone	36000	4	0	\$ 18,125
VRF	92000	23	6	\$ 208,250

Benefits vs. Costs

Pittsfield Cost Effectiveness:		
KWHr saved annually		49,511
DD normalized	0.95	47,035
electric expense avoided	0.18	\$ 8,466
Lifetime years	18	\$ 152,394
cost ASHPs	\$ 79,500	
simple payback in years		9.4
npv	0.7	\$ 106,676
benefit cost ratio over lifetime with npv		1.3

Orleans Cost Effectiveness:		
KWHr saved annually		226,691
DD normalized	0.95	215,357
Electric expense avoided annually	0.18	\$ 38,764
lifetime years	18	\$ 697,755
cost ASHPs	\$ 465,500	
simple payback in years		12.0
npv	0.7	\$ 488,429
benefit cost ratio over lifetime with npv		1.05

Thank You.

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