Getting to Zero in City Vital Service Buildings for Cost and Carbon Savings and Climate Resilience

Energy Conservation Recommendations and Renewable Power Generation Analysis for 52 Pittsburgh Vital Service Buildings

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Notes:

1. The ECMs were aggregated from about 65 New Jersey energy audit reports of the same building types. Several professional consulting firms like Steven Winter Associates authored the energy audit reports.

2. All ECMs should be field-verified to confirm that the recommendations match the actual building system types

3. Building clusters can be utilized for power-buying new equipment

4. Savings is estimated

5. PV generation accounts for shading from adjacent buildings

6. Summaries are ordered by overall building EUI (highest to lowest)
7 gas utility ECMs will reduce gas costs by $1,340 annually and CO₂ emissions by 2%, with a potential payback of 9.1 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Install insul. on all exposed htg. and DHW piping
3. Add smart thermostat and control zones
4. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
5. Calibrate and fix: operation schedule, sensors, dampers and valves
6. Upgrade to high efficiency furnace (AFUE ≥ 95%)
7. Install demand control ventilation with CO₂ sensors

4 electric utility ECMs will reduce electric costs by $1,220 annually and CO₂ emissions by 33%, with a potential payback of 5.1 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces
4. Install variable frequency drives on HVAC fan motors

After ECMs, Paulson Recreation Center could support rooftop PV that would meet 93% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 72%.
Firehouse 22 Recommendations

9 gas utility ECMs will reduce gas costs by $2,750 annually and CO2 emissions by 7%, with a potential payback of 16.1 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Install min. R24 insulation at truck bay walls and attic ceiling
7. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)
8. Upgrade to high efficiency infrared unit heater
9. Replace single pane windows with double pane with low-e on glazing surface #3 (VLT > 50%, U ≤ 0.31)

3 electric utility ECMs will reduce electric costs by $835 annually and CO2 emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 22 could support rooftop PV that would meet 49% of the electric load to create a resilient vital service facility and reduce CO2 emissions by 40%.

32% Source Energy Savings
Medic 10 Recommendations

10 gas utility ECMs will reduce gas costs by $1,810 annually and CO₂ emissions by 2%, with a potential payback of 16.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Calibrate and fix: operation schedule, sensors, dampers and valves
7. Install min. R24 insul. at truck bay walls and attic clg.
8. Upgrade to high eff. condensing boiler (AFUE ≥ 95%)
9. Upgrade to high efficiency infrared unit heater
10. Replace single pane windows with double pane with low-e on glazing surface #3 (VLT > 50%, U ≤ 0.31)

3 electric utility ECMs will reduce electric costs by $495 annually and CO₂ emissions by 33%, with a potential payback of 2.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Medic 10 could support rooftop PV that would meet 318% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 191%.
Police Zone 1 Recommendations

2 gas utility ECMs will reduce gas costs by $335 annually and CO₂ emissions by 2%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

10 electric utility ECMs will reduce electric costs by $4,460 annually and CO₂ emissions by 33%, with a potential payback of 7.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Upgrade exit signs to LED
7. Install dual-enthalpy economizer onto exist. RTU
8. Install occupancy detection timers at window ACs
9. Install variable freq. drives on HVAC fan motors
10. Upgrade to high eff. packaged AC (SEER ≥ 20)

After ECMs, Police Zone 1 could support rooftop PV that would meet 28% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 27%.
Police Zone 2 Recommendations

2 gas utility ECMs will reduce gas costs by $160 annually and CO$_2$ emissions by 2%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

10 electric utility ECMs will reduce electric costs by $2,310 annually and CO$_2$ emissions by 33%, with a potential payback of 7.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Upgrade exit signs to LED
7. Install dual-enthalpy economizer onto exist. RTU
8. Install occupancy detection timers at window ACs
9. Install variable freq. drives on HVAC fan motors
10. Upgrade to high eff. packaged AC (SEER ≥ 20)

After ECMs, Police Zone 2 could support rooftop PV that would meet 79% of the electric load to create a resilient vital service facility and reduce CO$_2$ emissions by 74%.
Firehouse 6 Recommendations

5 gas utility ECMs will reduce gas costs by $1,455 annually and CO₂ emissions by 7%, with a potential payback of 9.7 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
5. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

7 electric utility ECMs will reduce electric costs by $1,590 annually and CO₂ emissions by 12%, with a potential payback of 5.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Install occupancy detection timers at window ACs
7. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 6 could support rooftop PV that would meet 92% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 76%.

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22% Source Energy Savings
Firehouse 15 Recommendations

9 gas utility ECMs will reduce gas costs by $3,770 annually and CO₂ emissions by 7%, with a potential payback of 16.1 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Install min. R24 insulation at truck bay walls and attic ceiling
7. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)
8. Upgrade to high efficiency infrared unit heater
9. Replace single pane windows with double pane with low-e on glazing surface #3 (VLT > 50%, U ≤ 0.31)

3 electric utility ECMs will reduce electric costs by $1,140 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 15 could support rooftop PV that would meet 82% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 68%.
Police Headquarters Recommendations

2 gas utility ECMs will reduce gas costs by $2,410 annually and CO₂ emissions by 2%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

10 electric utility ECMs will reduce electric costs by $31,925 annually and CO₂ emissions by 33%, with a potential payback of 7.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Upgrade exit signs to LED
7. Install dual-enthalpy economizer onto exist. RTU
8. Install occupancy detection timers at window ACs
9. Install variable freq. drives on HVAC fan motors
10. Upgrade to high eff. packaged AC (SEER ≥ 20)

After ECMs, Police Headquarters could support rooftop PV that would meet 104% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 103%.
Firehouse 3 Recommendations

5 gas utility ECMs will reduce gas costs by $1,450 annually and CO₂ emissions by 7%, with a potential payback of 9.7 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
5. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

7 electric utility ECMs will reduce electric costs by $1,485 annually and CO₂ emissions by 12%, with a potential payback of 5.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Install occupancy detection timers at window ACs
7. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 3 could support rooftop PV that would meet 131% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 108%.
Ammon Recreation Center Recommendations

1 gas utility ECMs will reduce gas costs by $2,385 annually and CO₂ emissions by 3%, with a potential payback of 7.3 years, ordered by payback:

1. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

7 electric utility ECMs will reduce electric costs by $5,575 annually and CO₂ emissions by 21%, with a potential payback of 8.1 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install dual-enthalpy economizer onto existing RTU
6. Install variable frequency drives on HVAC fan motors
7. Upgrade to high efficiency packaged AC unit (SEER ≥ 20)

After ECMs, Ammon Recreation Center could support rooftop PV that would meet 57% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 48%.
Police Zone 5 Recommendations

Gas utility ECMs will reduce gas costs by $625 annually and CO₂ emissions by 2%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

Electric utility ECMs will reduce electric costs by $6,335 annually and CO₂ emissions by 33%, with a potential payback of 5.4 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade exit signs to LED
6. Install occupancy detection timers at window ACs
7. Install variable freq. drives on HVAC fan motors

After ECMs, Police Zone 5 could support rooftop PV that would meet 68% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 58%.
Firehouse 10 Recommendations

6 gas utility ECMs will reduce gas costs by $1,955 annually and CO₂ emissions by 12%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,020 annually and CO₂ emissions by 18%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 10 could support rooftop PV that would meet 205% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 143%.
Police Zone 4 / Fire Station 18 Recommendations

3 gas utility ECMs will reduce gas costs by $2,405 annually and CO₂ emissions by 3%, with a potential payback of 12.2 years, ordered by payback:

1. Install Low-Flow Showers and Faucets
2. Install Programmable Thermostats
3. Upgrade to High Eff. Condensing DHW Heater

4 electric utility ECMs will reduce electric costs by $3,550 annually and CO₂ emissions by 13%, with a potential payback of 4.9 years, ordered by payback:

1. Upgrade lamps to LED for fixtures that are not T12 / T8 / T5
2. Lighting Occupancy Controls in Transient Spaces OR 1-2 Upgrade Fixtures to LED with Occupancy Controls
3. Install Smart Outlets at Vending Machines
4. Upgrade Refrigerator(s) to EnergyStar Rating

After ECMs, Police Zone 4 / Fire Station 18 could support rooftop PV that would meet 163% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 127%.
Firehouse 30 Recommendations

3 gas utility ECMs will reduce gas costs by $825 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

6 electric utility ECMs will reduce electric costs by $1,505 annually and CO₂ emissions by 12%, with a potential payback of 5.2 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs
6. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 30 could support rooftop PV that would meet 60% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 48%.

24% Source Energy Savings
Phillips Recreation Center Recommendations

X gas utility ECMs will reduce electric costs by $2,005 annually and CO₂ emissions by 12%, with a potential payback of 4.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces

6 electric utility ECMs will reduce electric costs by $5,095 annually and CO₂ emissions by 12%, with a potential payback of 5.0 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Install variable frequency drives on HVAC fan motors

After ECMs, Phillips Recreation Center could support rooftop PV that would meet 177% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 151%.

28% Source Energy Savings
Firehouse 19 Recommendations

**Natural Gas**

Equipped with ECMs, Firehouse 19 could support rooftop PV that would meet 73% of the electric load to create a resilient vital service facility and reduce CO2 emissions by 59%.

## Before ECMs

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

## After ECMs

6 gas utility ECMs will reduce gas costs by $1,440 annually and CO2 emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

## Electric - Grid

3 electric utility ECMs will reduce electric costs by $750 annually and CO2 emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

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**34% Source Energy Savings**
Firehouse 26 Recommendations

6 gas utility ECMs will reduce gas costs by $2,500 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,305 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 26 could support rooftop PV that would meet 12% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 11%.
Firehouse 38 Recommendations

3 gas utility ECMs will reduce gas costs by $1,110 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:
1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

6 electric utility ECMs will reduce electric costs by $2,025 annually and CO₂ emissions by 12%, with a potential payback of 5.2 years, ordered by payback:
1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs
6. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 38 could support rooftop PV that would meet 145% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 117%.
Hazelwood Senior Center Recommendations

4 gas utility ECMs will reduce gas costs by $1,130 annually and CO₂ emissions by 7%, with a potential payback of 7.3 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Upgrade to high efficiency furnace (AFUE ≥ 95%)

5 electric utility ECMs will reduce electric costs by $2,560 annually and CO₂ emissions by 12%, with a potential payback of 10.7 years, ordered by payback:

1. Upgrade lamps to dimmable LED (CRI > 90)
2. Install occupancy controls for transient spaces
3. Install dual-enthalpy economizer onto existing RTU
4. Install variable frequency drives on HVAC fan motors
5. Upgrade to high efficiency packaged AC unit (SEER ≥ 20)

After ECMs, Hazelwood Senior Center could support rooftop PV that would meet 116% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 101%.
Medic 2 Recommendations

6 gas utility ECMs will reduce gas costs by $1,215 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $635 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Medic 2 could support rooftop PV that would meet 210% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 174%.
Firehouse 7 Recommendations

3 gas utility ECMs will reduce gas costs by $1,140 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

6 electric utility ECMs will reduce electric costs by $2,080 annually and CO₂ emissions by 12%, with a potential payback of 5.2 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs
6. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 7 could support rooftop PV that would meet 72% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 60%.

28% Source Energy Savings
West Penn Recreation Center Recommendations

5 gas utility ECMs will reduce gas costs by $4,830 annually and CO₂ emissions by 7%, with a potential payback of 8.7 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Calibrate and fix: operation schedule, sensors, dampers and valves
5. Upgrade to high efficiency furnace (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $3,755 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, West Penn Recreation Center could support rooftop PV that would meet 209% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 142%. 

32% Source Energy Savings
Olympia Park Recreation Center Recommendations

2 gas utility ECMs will reduce gas costs by $150 annually and CO₂ emissions by 7%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

4 electric utility ECMs will reduce electric costs by $1,060 annually and CO₂ emissions by 12%, with a potential payback of 2.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces
4. Install dual-enthalpy economizer onto existing RTU

After ECMs, Olympia Park Recreation Center could support rooftop PV that would meet 144% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 139%.
Medic 1 Recommendations

6 gas utility ECMs will reduce gas costs by $1,115 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $580 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Medic 1 could support rooftop PV that would meet 260% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 220%.
4 gas utility ECMs will reduce gas costs by $1,175 annually and CO₂ emissions by 7%, with a potential payback of 7.3 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Upgrade to high efficiency furnace (AFUE ≥ 95%)

5 electric utility ECMs will reduce electric costs by $2,495 annually and CO₂ emissions by 12%, with a potential payback of 10.7 years, ordered by payback:

1. Upgrade lamps to dimmable LED (CRI > 90)
2. Install occupancy controls for transient spaces
3. Install dual-enthalpy economizer onto existing RTU
4. Install variable frequency drives on HVAC fan motors
5. Upgrade to high efficiency packaged AC unit (SEER ≥ 20)

After ECMs, Mount Washington Senior Center could support rooftop PV that would meet 167% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 140%.
5 gas utility ECMs will reduce gas costs by $1,670 annually and CO₂ emissions by 7%, with a potential payback of 8.7 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Calibrate and fix: operation schedule, sensors, dampers and valves
5. Upgrade to high efficiency furnace (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,390 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces
Jefferson Recreation Center Recommendations

5 gas utility ECMs will reduce gas costs by $595 annually and CO₂ emissions by 7%, with a potential payback of 8.7 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Calibrate and fix: operation schedule, sensors, dampers and valves
5. Upgrade to high efficiency furnace (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $775 annually and CO₂ emissions by 12%, with a potential payback of 16.1 years, ordered by payback:

1. Upgrade lamps to dimmable LED (CRI > 90)
2. Install variable frequency drives on HVAC fan motors
3. Upgrade to high efficiency packaged AC unit (SEER ≥ 20)

After ECMs, Jefferson Recreation Center could support rooftop PV that would meet 100% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 86%.
Firehouse 13 Recommendations

3 gas utility ECMs will reduce gas costs by $965 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

6 electric utility ECMs will reduce electric costs by $1,755 annually and CO₂ emissions by 12%, with a potential payback of 5.2 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs
6. Replace window ACs with high efficiency ductless mini split AC (SEER ≥ 30)

After ECMs, Firehouse 13 could support rooftop PV that would meet 173% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 142%.
### Firehouse 35 Recommendations

6 gas utility ECMs will reduce gas costs by $2,695 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,405 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

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After ECMs, Firehouse 35 could support rooftop PV that would meet 126% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 106%.
Brookline Recreation Center Recommendations

X gas utility ECMs will reduce electric costs by $1,580 annually and CO₂ emissions by 4%, with a potential payback of 4.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces

After ECMs, Brookline Recreation Center could support rooftop PV that would meet 106% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 91%.

6 electric utility ECMs will reduce electric costs by $3,760 annually and CO₂ emissions by 26%, with a potential payback of 5.0 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade to high efficiency refrigerators (< 300 kWh/yr) and freezers (< 300 kWh/yr)
6. Install variable frequency drives on HVAC fan motors

After ECMs, Brookline Recreation Center could support rooftop PV that would meet 106% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 91%.
Firehouse 17 Recommendations

1 gas utility ECMs will reduce gas costs by $183 annually and CO2 emissions by 7%, with a potential payback of 5.0 years, ordered by payback:

1. Install thermostatic radiator valves

5 electric utility ECMs will reduce electric costs by $2,170 annually and CO2 emissions by 12%, with a potential payback of 3.5 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs

After ECMs, Firehouse 17 could support rooftop PV that would meet 157% of the electric load to create a resilient vital service facility and reduce CO2 emissions by 111%.
Firehouse 27 Recommendations

1 gas utility ECMs will reduce gas costs by $210 annually and CO₂ emissions by 7%, with a potential payback of 5.0 years, ordered by payback:

1. Install thermostatic radiator valves

5 electric utility ECMs will reduce electric costs by $2,525 annually and CO₂ emissions by 12%, with a potential payback of 3.5 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs

After ECMs, Firehouse 27 could support rooftop PV that would meet 112% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 77%.

22% Source Energy Savings
Firehouse 23 Recommendations

3 gas utility ECMs will reduce gas costs by $3,510 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,835 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 23 could support rooftop PV that would meet 194% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 154%.
Medic 4 Recommendations

6 gas utility ECMs will reduce gas costs by $2,530 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,320 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Medic 4 could support rooftop PV that would meet 222% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 158%.
Firehouse 37 Recommendations

6 gas utility ECMs will reduce gas costs by $3,835 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $2,000 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 37 could support rooftop PV that would meet 260% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 208%.
Firehouse 32 Recommendations

1 gas utility ECMs will reduce gas costs by $225 annually and CO₂ emissions by 7%, with a potential payback of 5.0 years, ordered by payback:

1. Install thermostatic radiator valves

5 electric utility ECMs will reduce electric costs by $2,675 annually and CO₂ emissions by 12%, with a potential payback of 3.5 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs

After ECMs, Firehouse 32 could support rooftop PV that would meet 181% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 140%.
Kennard Recreation Center Recommendations

2 gas utility ECMs will reduce gas costs by $55 annually and CO₂ emissions by 7%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

4 electric utility ECMs will reduce electric costs by $395 annually and CO₂ emissions by 12%, with a potential payback of 2.4 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces
4. Install dual-enthalpy economizer onto existing RTU
Firehouse 34 Recommendations

6 gas utility ECMs will reduce gas costs by $3,075 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,605 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 34 could support rooftop PV that would meet 165% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 150%.
Firehouse 31 Recommendations

6 gas utility ECMs will reduce gas costs by $2,780 annually and CO2 emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $1,450 annually and CO2 emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 31 could support rooftop PV that would meet 36% of the electric load to create a resilient vital service facility and reduce CO2 emissions by 35%.
Firehouse 28 Recommendations

3 gas utility ECMs will reduce gas costs by $1,200 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

3 electric utility ECMs will reduce electric costs by $1,685 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 28 could support rooftop PV that would meet 275% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 193%.
**Firehouse 29 Recommendations**

3 gas utility ECMs will reduce gas costs by $1,515 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

44% Source Energy Savings

3 electric utility ECMs will reduce electric costs by $2,125 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 29 could support rooftop PV that would meet 212% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 149%.

![Solar PV Area (75% coverage)](image)

![Graph](image)

44% Source Energy Savings
Overbrook Senior Center Recommendations

3 gas utility ECMs will reduce gas costs by $1,055 annually and CO₂ emissions by 7%, with a potential payback of 4.5 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

3 electric utility ECMs will reduce electric costs by $1,855 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Overbrook Senior Center could support rooftop PV that would meet 129% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 100%.
Medic 9 / Rescue 2 Recommendations

6 gas utility ECMs will reduce gas costs by $4,055 annually and CO₂ emissions by 7%, with a potential payback of 9.0 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install outdoor air reset controls for boiler
3. Install thermostatic radiator valves
4. Install boiler back draft damper
5. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
6. Upgrade to high efficiency condensing boiler (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $2,115 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Medic 9 / Rescue 2 could support rooftop PV that would meet 414% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 397%.
Magee Recreation Center Recommendations

5 gas utility ECMs will reduce gas costs by $3,720 annually and CO₂ emissions by 7%, with a potential payback of 8.7 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces
4. Calibrate and fix: operation schedule, sensors, dampers and valves
5. Upgrade to high efficiency furnace (AFUE ≥ 95%)

3 electric utility ECMs will reduce electric costs by $3,100 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Magee Recreation Center could support rooftop PV that would meet 853% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 575%.
Firehouse 4 Recommendations

3 gas utility ECMs will reduce gas costs by $3,475 annually and CO₂ emissions by 7%, with a potential payback of 5.8 years, ordered by payback:

1. Install insul. on all exposed htg. and DHW piping
2. Install thermostatic radiator valves
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

3 electric utility ECMs will reduce electric costs by $4,870 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Firehouse 4 could support rooftop PV that would meet 472% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 316%. 
Homewood Senior Center Recommendations

3 gas utility ECMs will reduce gas costs by $1,770 annually and CO₂ emissions by 7%, with a potential payback of 4.5 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

3 electric utility ECMs will reduce electric costs by $2,915 annually and CO₂ emissions by 12%, with a potential payback of 2.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Homewood Senior Center could support rooftop PV that would meet 170% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 160%.
Police Accident Investigation / SWAT Recommendations

3 gas utility ECMs will reduce gas costs by $3,080 annually and CO₂ emissions by 9%, with a potential payback of 12.2 years, ordered by payback:

1. Install Low-Flow Showers and Faucets
2. Install Programmable Thermostats
3. Upgrade to High Eff. Condensing DHW Heater

4 electric utility ECMs will reduce electric costs by $4,545 annually and CO₂ emissions by 40%, with a potential payback of 4.9 years, ordered by payback:

1. Upgrade lamps to LED for fixtures that are not T12 / T8 / T5
2. Lighting Occupancy Controls in Transient Spaces OR 1-2 Upgrade Fixtures to LED with Occupancy Controls
3. Install Smart Outlets at Vending Machines
4. Upgrade Refrigerator(s) to EnergyStar Rating

After ECMs, Police Accident Investigation / SWAT could support rooftop PV that would meet 1600% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 1400%.
Police Zone 3 Recommendations

2 gas utility ECMs will reduce gas costs by $845 annually and CO₂ emissions by 2%, with a potential payback of 2.8 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones

7 electric utility ECMs will reduce electric costs by $8,545 annually and CO₂ emissions by 33%, with a potential payback of 5.4 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Upgrade exit signs to LED
6. Install occupancy detection timers at window ACs
7. Install variable freq. drives on HVAC fan motors

After ECMs, Police Zone 3 could support rooftop PV that would meet 518% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 389%.
Brighton Heights Senior Center Recommendations

3 gas utility ECMs will reduce gas costs by $1,545 annually and CO₂ emissions by 10%, with a potential payback of 4.5 years, ordered by payback:

1. Adjust heating / cooling setpoint (68°F/75°F) and setback (58°F/85°F) temperatures
2. Add smart thermostat and control zones
3. Install weatherstripping at all doors to exterior and (semi)unconditioned spaces

3 electric utility ECMs will reduce electric costs by $2,725 annually and CO₂ emissions by 53%, with a potential payback of 2.9 years, ordered by payback:

1. Install occupancy sensor and power management device at vending machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install occupancy controls for transient spaces

After ECMs, Brighton Heights Senior Center could support rooftop PV that would meet 680% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 530%.

62% Source Energy Savings
Medic 14 / Rescue 2 Recommendations

1 gas utility ECMs will reduce gas costs by $285 annually and CO2 emissions by 7%, with a potential payback of 5.0 years, ordered by payback:

1. Install thermostatic radiator valves

5 electric utility ECMs will reduce electric costs by $3,370 annually and CO2 emissions by 12%, with a potential payback of 3.5 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs

After ECMs, Medic 14 / Rescue 2 could support rooftop PV that would meet 364% of the electric load to create a resilient vital service facility and reduce CO2 emissions by 215%.
Medic 6 Recommendations

1 gas utility ECMs will reduce gas costs by $145 annually and CO₂ emissions by 7%, with a potential payback of 5.0 years, ordered by payback:

1. Install thermostatic radiator valves

5 electric utility ECMs will reduce electric costs by $1,730 annually and CO₂ emissions by 12%, with a potential payback of 3.5 years, ordered by payback:

1. Install Smart Outlets at Vending Machines
2. Upgrade lamps to dimmable LED (CRI > 90)
3. Install dimming controls for workspaces
4. Install occupancy controls for transient spaces
5. Install occupancy detection timers at window ACs

After ECMs, Medic 6 could support rooftop PV that would meet 1100% of the electric load to create a resilient vital service facility and reduce CO₂ emissions by 478%.