

Integrated Design Solutions

LIVONIA PUBLIC SCHOOLS POTENTIAL SUSTAINABLE AND GREEN DESIGN MEASURES	Estimated Payback in Years
	10 to 20
• Compact fluorescent lamps	2 to 3
• High bay lighting - upgrade to T5	20 to 30
• Occupancy sensors – lights and HVAC	5 to 10
• HVAC to standby mode, plus or minus 2 DegF, zero outdoor air	Immediate
• LED exit sign conversions	10 to 15
• Power capacitors	8 to 10
• High efficiency motors	30 +
• Reduce/eliminate electric heat	8 to 10
• DDC retrofit/upgrade	2 to 10
• VAV retrofit with VFD on fans	10 to 15
• Conversion to VAV pumping	10 to 15
• Demand controlled ventilation	2 to 4
• Increase space temperature deadband	Immediate
• Add economizer controls (air side)	8 to 10
• De-stratification fans	25 +
• Duct insulation	10 +
• Upgrade chillers – higher efficiency	30 +
• Boiler stack economizers (increase efficiency by up to 2.0%)	30 +
• Control excessive boiler cycling (increase eff. by as much as 20%)	5 +
• Upgrade boilers – higher efficiency – condensing	30 +
• Hybrid boiler systems	40 +
• Solar thermal water heating system	20 to 25
• Upgrade domestic water heaters – higher efficiency	20 +
• Tankless water heater	7 to 10
• Pipe insulation	10 +
• Repair/replace steam traps	1 +
• Daylight harvesting – photo sensors with dimming ballast	15 to 40
• HVAC replacement/upgrade	8 to 10
• Discharge temperature reset	5 to 10
• Conversion to geothermal heat pumps (open loop, closed loop)	5 to 7
• Conversion to heat pumps (non-geothermal)	15 +
• Water temperature reset	Immediate
• Distributed energy production (in lieu of district or central plants)	8 to 12
• Thermal storage (ice, water)	10 to 20
• Reduce building steam pressure	2 to 10
• Enthalpy wheel energy recovery	5 to 10
• Plate to plate energy recovery	8 to 12
• Heat recovery loop (run around system), water or heat pipe with refrigerant	8 to 12
• Cooling tower optimization	8 to 10
• PV arrays (static, tracking)	60 to 70
• Wind turbines (energy balls, vertical, etc.)	70 +
• Variable exhaust system	10 to 15
• Chilled beam design	30 +
• Infrared inspection/report and envelope repair	2 +
• Wall insulation	40 +
• Ceiling insulation	30 +

• Roof insulation	30 +
• Reduce window area	50 +
• Window film	20 to 30
• Window replacement	40 +
• Entry door improvements	5 to 10
• Air curtains	5 to 10
• Caulking and weatherstripping	2 +
• Operate CAV single zone AHU similarly to a VAV box	10 to 20
• Pool Cover	2 to 5
• Vending machine controller	5
• CRT to LCD computer monitors	15
• Install a well for tower make up water and irrigation	10 +
• Rainwater harvesting tank/basin	50 +
• Low-flow toilets/urinals	20 to 30
• Low-flow faucets/shower heads	40 +
• Utility rebates	Immediate