



## CARBON FOOTPRINT



## MONTH 1 - THE ENERGY CONSERVATION OPPORTUNITY: Hot Water Heating System with Domestic Hot Water Heating Building Applications

### BASIS OF DESIGN - (B-Of-D) - 1986

**Original Design Intent** - Central hot water plant serving 50,000-sq-ft health club building

Boiler	Capacity	Months Online/Hrs of Operation	Building Pump	Domestic HW Pump	Remarks
Cast Iron	2,000 MBtuh	Year round / 24 hrs/day	Constant flow	Constant flow	On demand

Building Pump	GPM	Pump Head	Balancing Valve Setting	Motor	VFD	Remarks
Two-pipe system	200	60 ft	35% closed	Original	No	Inline pump
Two-pipe system	10	60 ft	None	Original	No	Inline pump

ATC Controls	Flow Control Boiler/HW	Temperature Control	Zone Control	Domestic HW Control
Electric	Three-way valve	On at 170° and off at 190°	Space thermostat	On at 125° and off at 140°

Building Heating Hot Water Temperatures	Domestic Hot Water Temperatures	Remarks
190° to 170° HWS	110° to fixtures	Three-way domestic HW blending valve

### ENERGY RETROCOMMISSIONING

#### REPORT/RECOMMENDATION/IMPLEMENTATION OPPORTUNITIES:

**ECM1:** Excessive primary P-1, and domestic hot water pump P-2 pump head, can be enhanced with replacing the pump with a correct sized primary pump and removal of building's heat three-way blending valve. **ECM2:** Replace antiquated boiler, B-1, with high-performance condensing boiler. **ECM3:** High hot water supply temperature is a fixed setpoint with a 20° hot water supply-to-return temperature (190° to 170°) that can be reprogrammed to operate off outdoor air temperature reset down to a minimum hot water supply temperature for domestic hot water. In addition, include removal of three-way valves with two-way ATC valves. **ECM4:** System operates 24/7/365 and can be programmed to operate based on time of year and addition of domestic hot water system solar tank capacity sized for 100% solar heated domestic hot water during the summer season.

**New BofD** - Building hot water heating system will operate on calendar program start-up and compensated hot water system temperature in place of constant flow compensated temperature design intent. Domestic hot water system shall receive solar heated domestic water enhancement with 100% solar heat during the summer months. Building water system will be rebalanced. DDC shall be added to replace the antiquated electrical controls.

### NEW 2012 B-Of-D

Boiler	Capacity	Months Online/Hrs of Operation	Building Pump	Domestic HW Pump	Remarks
Condensing	2,000 MBtuh	September to May / 24 hrs/day	Constant flow	Constant flow	

Building Pump	GPM	Pump Head	Balancing Valve Setting	Motor	VFD	Remarks
Two-pipe system	100	25 ft	100% open	High-efficiency	No	Inline pump

Domestic HW Pump	GPM	Pump Head	Motor	Solar Panel System Addition
Two-pipe system	10	18 ft	High-efficiency	Web-based system sized-panels/heat exchanger/pump/ATC

ATC Controls	Boiler/HW Temperature Control	Domestic HW Control
DDC	120° to 190°, based on OA temperature	115° to fixtures

### OTHER ENERGY CONSERVATION OPPORTUNITIES

**ECM-5:** Consider completing an entire hydraulic model assessment to select the optimum pump/circulators. **ECM-6:** Consider independent domestic hot water solar heat to remove heating load and downsize new condensing boiler. **ECM-7:** Consider a utility dashboard (see November 2010 "Tomorrow's Environment" column) mounted in building lobby to raise awareness to energy conservation, as well as other energy and environmental initiatives.