Goreham Shower Head Economic Analysis

Line Item	Value	Units
Conversion factors		
density of water	8.33	lbs/gallon
specific heat of water	1	Btu/lb/degree F
volume	748	gal/HCF
Assumptions		
cold water temperature	50	degrees F
mixed water temperature	110	degrees F
school days per year	240	days/year
number of shower heads	310	heads
cost to replace shower head	55	$/head
average flow rate before retrofit	2.6	gpm
average flow rate after retrofit	1.5	gpm
length of shower	8	min
number of resident students	1000	students
number of showers per day	1.5	shower/day/student
cost of natural gas	6.5	$/MMBtu
efficiency of CHP and distribution	0.6	
cost of water	7.30	$/HCF
Calculations		
cost of heat at shower	10.83	$/MMBtu
number of showers per day	1500	showers/day
per shower (before retrofit)	20.8	gal/shower
	10,396	Btu's/shower
cost of heat	0.11	$/shower
cost of water	0.20	$/shower
per shower (after retrofit)	12	gal/shower
	5,998	Btu's/shower
cost of heat	0.06	$/shower
cost of water	0.12	$/shower
saved	13,200	gal/day
	6.60	MMBtu/day (at shower)
	200	$/day
	3,168,000	gal/year
	353	HCF/month
	4,235	HCF/year
	1,583	MMBtu/year (at shower)
heat expense reduction	17,153	$/year
water expense reduction	30,918	$/year
total expense reduction	48,071	$/year
project investment	17,050	$
payback	4.3	months