OPTIMIZED INSULATION SYSTEMS – ACCELERATE YOUR PROGRESS TOWARD REDUCED ENERGY CONSUMPTION AND GHG EMISSIONS

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Real World Benefits of Mechanical Insulation

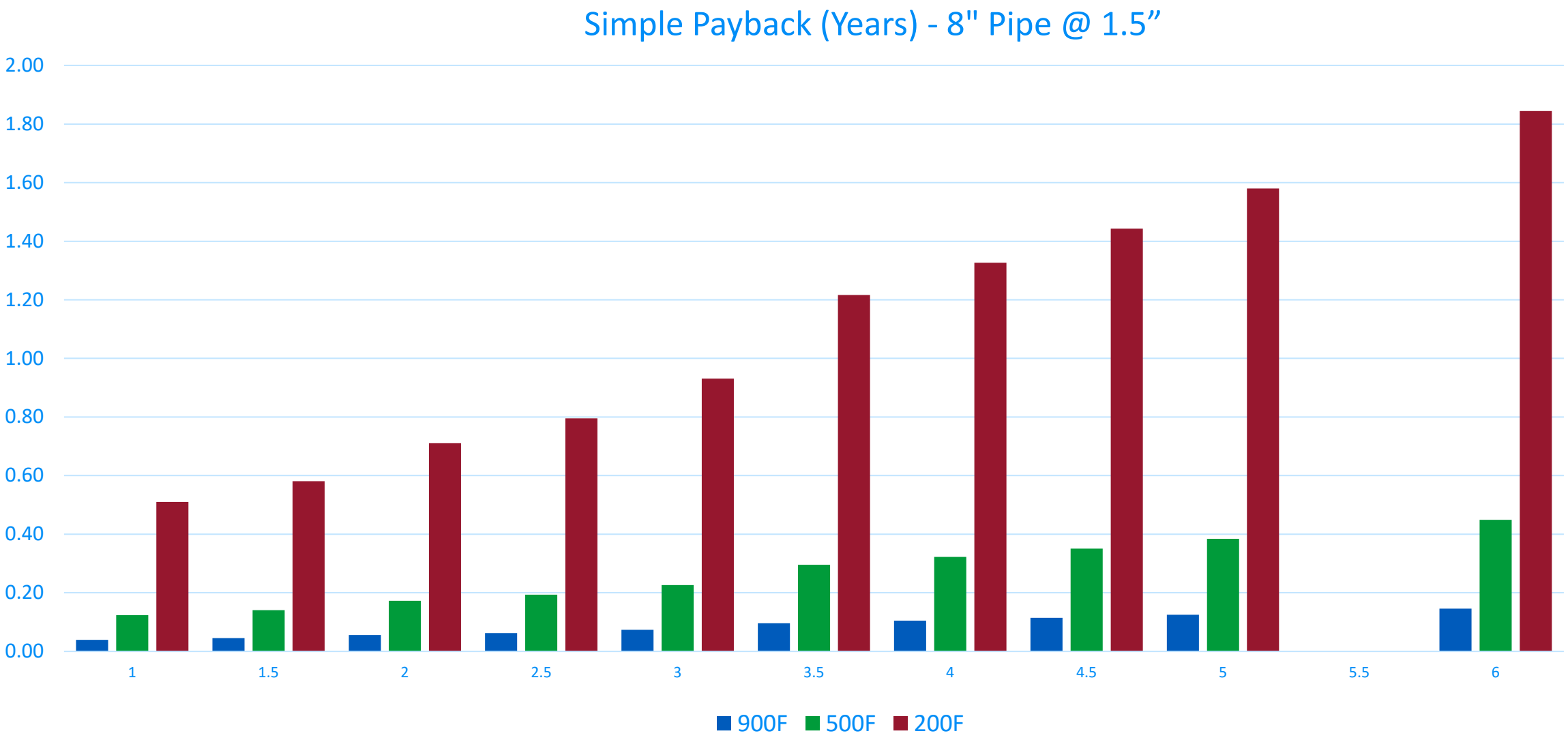
Working in conjunction with a major Houston-based midstream energy services company, an analysis was conducted to look at the optimal economic insulation systems for multiple high temperature process piping scenarios.

- Four pipe sizes were modeled: 3”, 8”, 16” and 30”
- Process temperatures from 200ºF to 1,200ºF were analyzed
  - Ambient temperature of 90ºF with 6mph wind speed for personnel protection (PP)
  - Ambient temperature of 55ºF with 6mph wind speed for economic thickness
- Installed costs for calcium silicate insulation with aluminum jacket were averaged across several leading industrial insulation contractors

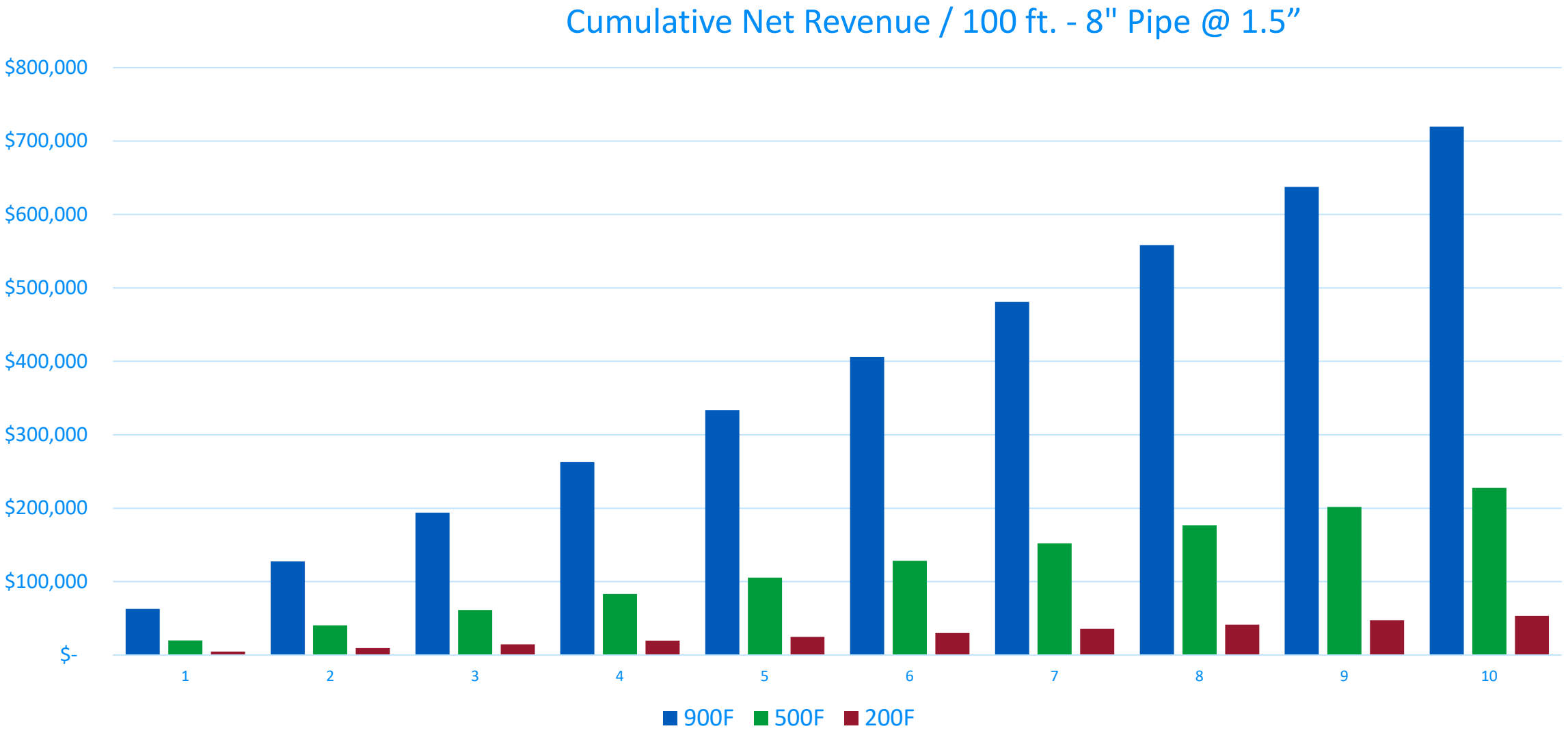
Real World Benefits of Mechanical Insulation

- Costs were based on an effective 100 feet of pipe—two elbows, one block valve, one 1” vent, one 1” drain, and sufficient straight pipe to total 100 equivalent feet of pipe.
- Modeled on a natural gas fuel source at a cost of $4.50/MMBtu, an 80% heater efficiency, and 8,000 hours per year operation
- Heat loss, fuel consumption reduction, energy cost savings, and emissions reductions were calculated using the NAIMA 3E® Plus tool

8” PIPE


Simple Payback (Years) - 8" Pipe @ 1.5”
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
900F
500F
200F

8” PIPE

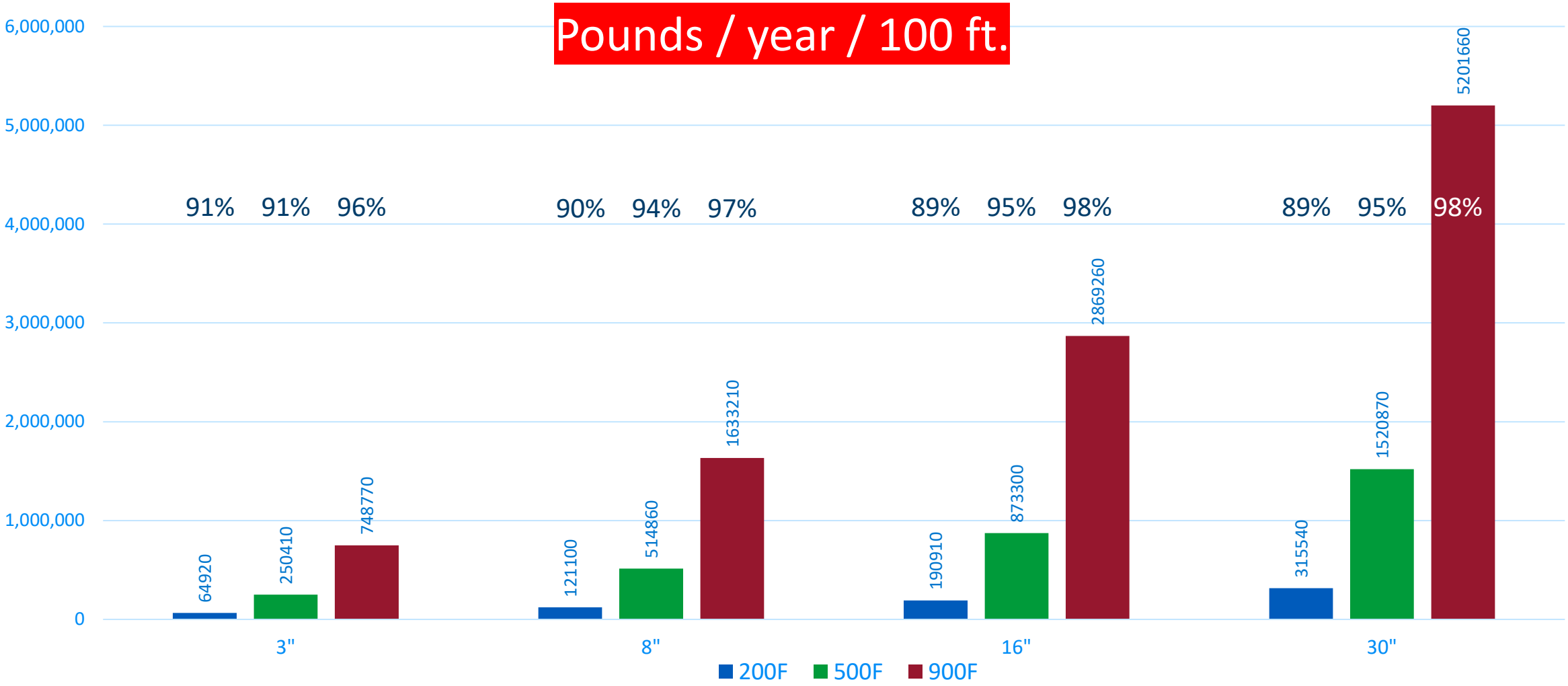

Cumulative Net Revenue / 100 ft. - 8" Pipe @ 1.5”
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$-
1
2
3
4
5
6
7
8
9
10
900F
500F
200F

So you can save money, what about emissions?

$ → $

CO_2 EMISSIONS REDUCTION

(Reduction calculated at insulation thickness for personnel protection)



8” Pipe, Emission **EVERY YEAR** er Foot, per YEAR

Process Temp (°F)	Insulation Thickness (in)	CO_2 (lb/ft/yr)	NOx (lb/ft/yr)	Process Temp (°F)	Insulation Thickness (in)	CO_2 (lb/ft/yr)	NOx (lb/ft/yr)	Process Temp (°F)	Insulation Thickness (in)	CO_2 (lb/ft/yr)	NOx (lb/ft/yr)
200	Bare	[illegible]	2.69	500	Bare	5505.8	11.04	900	Bare	16816.4	7.63
200	0.5	[illegible]	0.49	500	0.5	[illegible]	1.79	900	0.5	2061.1	0.93
200	**1**	**132.1**	**0.26**	500	1	[illegible]	0.98	900	1	1144.4	0.52
200	1.5	[illegible]	0.19	**500**	**1.5**	**357.2**	**0.72**	900	1.5	840.4	0.38
200	2	[illegible]	0.16	500	2	[illegible]	0.57	900	**2**	[illegible]	**0.31**
200	2.5	[illegible]	0.13	500	2.5	[illegible]	0.47	900	2.5	[illegible]	0.25
200	3	[illegible]	.11	500	3	[illegible]	0.41	**900**	**3**	**484.3**	**0.22**
200	3.5	[illegible]	.1	500	3.5	[illegible]	.37	900	3.5	[illegible]	.2
200	4	[illegible]	.09	500	4	[illegible]	.34	900	4	[illegible]	.18
200	4.5	42.0	0.08	500	4.5	[illegible]	.31	900	4.5	[illegible]	.17
200	5	39.2	0.08	500	5	145.3	0.2	900	5	[illegible]	6
Reduction at PP thickness			**90%**				**96%**				

24 Trees
21 light bulbs

10 Feet
240 Trees
210 light bulbs

100 Feet
2400 Trees
2100 light bulbs

103 Trees
89 light bulbs

10 Feet
1030 Trees
890 light bulbs

100 Feet
10300 Trees
8900 light bulbs

327 Trees
282 light bulbs

10 Feet
3270 Trees
2820 light bulbs

100 Feet
32700 Trees
28200 light bulbs

PP Thickness

SUMMARY

Insulation projects are low cost.

Project execution is typically weeks to a few months.

Simple payback less than 1 year, often only 1 or 2 months.

All design thicknesses delivered reductions in CO_2 and NO_x emissions of 88 to 98%.

THANK YOU
ANY QUESTIONS

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