



A National Grid ProNet Partner



# INDICATIVE Zero-Cost Steam Trap Proposal

Prepared By:  
Chase Bean, MBA, PE, PMP, CEM  
678-457-3230  
cbean@steammgt.com

**Example School District**



QUALITY. CONSISTENCY. RESULTS.



## EXECUTIVE SUMMARY

Steam Management, Inc. (SMI) is pleased to submit the following indicative proposal for steam trap retrofits at the following schools:

- Admin
- Elementary School #1
- Elementary School #2
- Elementary School #3
- High School
- Middle School

The scope and savings estimates included are based on typical quantities and trap models for each type of building (Admin, HS, MS, ES). Regardless of actual quantities, Steam Management is offering a complete trap repair installation at no cost. Steam Management will perform a pre-construction equipment survey prior to ordering and installing equipment.

The project includes rebuilding F&T traps and thermostatic traps with internal components manufactured by Barnes and Jones.

### Cost Installed: \$0

The school district would assign 100% of the rebate money to Steam Management, Inc.

National Grid would be authorized in writing to pay Steam Management directly.

| Steam Traps                        | Qty | Installed Cost | Rebate    | Savings   |
|------------------------------------|-----|----------------|-----------|-----------|
| Mechanical Steam Trap - Retrofit   | 155 |                | \$46,500  |           |
| Thermostatic Steam Trap - Retrofit | 620 |                | \$186,000 |           |
|                                    |     |                |           |           |
| Subtotal                           |     | \$0            | \$232,500 |           |
| 1-Year Steam Trap Savings (Mlbs)   |     | \$0            |           | 7,792     |
| 1-Year Steam Trap Savings (Therms) |     | \$0            |           | 77,917    |
| 1-Year Savings (\$)                |     | \$0            |           | \$100,834 |
| GRAND TOTAL                        |     | \$0            | \$232,500 | \$100,834 |

*Price quoted includes installation, materials, material delivery and handling, onsite project management, 1<sup>st</sup> or 2<sup>nd</sup> shift labor, legal offsite disposal, system commissioning, written project reporting, as-built database, project coordination and scheduling and material warranty.*

## SCOPE OF WORK

- Rebuild six hundred twenty (620) thermostatic steam traps and one hundred fifty-five (155) float & thermostatic traps on serviceable equipment.
- Work will be performed by trained Steam Management technicians between the hours of 3pm and 11pm when school is in session.
- Materials removed will be stored in labeled boxes for site inspection.

### Scope of Work Material Schedule

Example Quantities:

| Steam Trap Model | Qty |
|------------------|-----|
| 1721             | 310 |
| 1929             | 310 |
| 2FT Kit          | 121 |
| 4FT Kit          | 34  |

### Exclusions:

- Asbestos testing and abatement
- Ineligible steam traps, including (but not limited to):
  - Vacuum breakers
  - Steam traps incentivized in the last six years
  - Steam systems not firing on National Grid gas.

### Savings:

Steam trap savings of 7,792 MLbs (MMBtu) or 77,920 therms per year are based on steam trap failure rate overall of 25%. The failure rate is determined by the age of the existing steam traps.

To calculate the savings for the suggested measures SMI uses Napier's Equation of gaseous flow through a sharp-edged orifice. The calculation steps for the losses presented in the attached appendix are as follows: Start with Napier's equation:

$$\begin{aligned} \text{Steam Loss } \left(\frac{\text{lb}}{\text{hr}}\right) &= (51.43) \times (P_{abs}) \times (A) \\ &= (51.43) \times (P_g + 14.17) \times (3.14) \times \left(\frac{d^2}{4}\right) \\ &= (40.393) \times (P_g + 14.7) \times (d^2) \end{aligned}$$

Steam Management uses 25% of steam loss as a safety factor (assuming 25% of live steam passes through a fixed orifice).

$$(25\%) \times (40.393) \times (P_g + 14.7) \times (d^2) = \text{Steam Losses } \left(\frac{\text{lb}}{\text{hr}}\right) \text{ for a failed steam trap}$$

As a check: A thermostatic steam trap with an orifice of .250" at 5psig

$$(25\%) \times (40.393) \times (5 + 14.7) \times (.25^2) = 12.43 \frac{\text{lb}}{\text{hr}}$$

Lb. per hour steam losses are multiplied by the measured or estimated steam trap failure rate to arrive at the overall steam losses in Mlb per year. For low-pressure steam, 1 Mlb steam ≈ 1 MMBtu. 1 MMBtu = 10 therms.

| BUILDING Name/Number                  | Admin       | Element. School #1 | Element. School #2 | Element. School #3 | High School | Middle School | Totals           |
|---------------------------------------|-------------|--------------------|--------------------|--------------------|-------------|---------------|------------------|
| Primary Fuel Type:                    | Natural Gas | Natural Gas        | Natural Gas        | Natural Gas        | Natural Gas | Natural Gas   |                  |
| Cost of Fuel Unit:                    | \$1.10      | \$1.10             | \$1.10             | \$1.10             | \$1.10      | \$1.10        |                  |
| Cost of Steam:                        | \$12.94     | \$12.94            | \$12.94            | \$12.94            | \$12.94     | \$12.94       |                  |
| Boiler/System Efficiency:             | 85%         | 85%                | 85%                | 85%                | 85%         | 85%           |                  |
| <b>Annual Steam Losses (lb/yr)</b>    | 498,120     | 996,241            | 996,241            | 996,241            | 2,490,602   | 1,814,277     | <b>7,791,721</b> |
| <b>Annual Steam Losses (Mlb/yr)</b>   | 498         | 996                | 996                | 996                | 2491        | 1814          | <b>7792</b>      |
| <b>Annual Economic Losses (\$/yr)</b> | \$6,446     | \$12,893           | \$12,893           | \$12,893           | \$32,231    | \$23,479      | <b>\$100,834</b> |
| Overall Failure Rate                  | 25%         | 25%                | 25%                | 25%                | 25%         | 25%           |                  |