Can States Pass Residential Hot Waterline Insulation Legislation?

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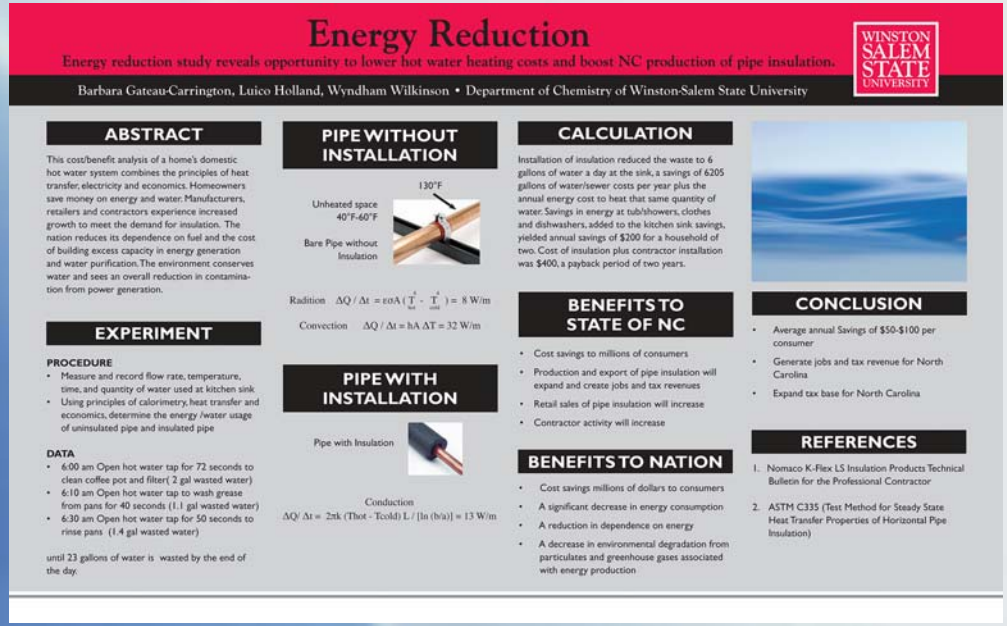
INTRODUCTION

- North Carolina recently passed legislation requiring insulation on residential hot waterlines for all new construction beginning 2008.

- Can this legislation be replicated in other states?



Energy Reduction

Energy reduction study reveals opportunity to lower hot water heating costs and boost NC production of pipe insulation.

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ABSTRACT

This cost/benefit analysis of a home's domestic hot water system combines the principles of heat transfer, electricity and economics. Homeowners save money on energy and water. Manufacturers, retailers and contractors experience increased growth to meet the demand for insulation. The nation reduces its dependence on fuel and the cost of building excess capacity in energy generation and water purification. The environment conserves water and sees an overall reduction in contamination from power generation.

EXPERIMENT

PROCEDURE

- Measure and record flow rate, temperature, time, and quantity of water used at kitchen sink
- Using principles of calorimetry, heat transfer and economics, determine the energy /water usage of uninsulated pipe and insulated pipe

DATA

- 6:00 am Open hot water tap for 72 seconds to clean coffee pot and filter(2 gal wasted water)
- 6:10 am Open hot water tap to wash grease from pans for 40 seconds (1.1 gal wasted water)
- 6:30 am Open hot water tap for 50 seconds to rinse pans (1.4 gal wasted water)

until 23 gallons of water is wasted by the end of the day.

PIPE WITHOUT INSTALLATION

130°F

Unheated space 40°F-60°F

Bare Pipe without Insulation

Radition $\Delta Q / \Delta t = \varepsilon \sigma A (T_{hot}^4 - T_{cold}^4) = 8$ W/m

Convection $\Delta Q / \Delta t = hA \Delta T = 32$ W/m

PIPE WITH INSTALLATION

Pipe with Insulation

Conduction

$\Delta Q / \Delta t = 2\pi k (Thot - Tcold) L / [\ln (b/a)] = 13$ W/m

CALCULATION

Installation of insulation reduced the waste to 6 gallons of water a day at the sink, a savings of 6205 gallons of water/sewer costs per year plus the annual energy cost to heat that same quantity of water. Savings in energy at tub/showers, clothes and dishwashers, added to the kitchen sink savings, yielded annual savings of $200 for a household of two. Cost of insulation plus contractor installation was $400, a payback period of two years.

BENEFITS TO STATE OF NC

- Cost savings to millions of consumers
- Production and export of pipe insulation will expand and create jobs and tax revenues
- Retail sales of pipe insulation will increase
- Contractor activity will increase

BENEFITS TO NATION

- Cost savings millions of dollars to consumers
- A significant decrease in energy consumption
- A reduction in dependence on energy
- A decrease in environmental degradation from particulates and greenhouse gases associated with energy production

CONCLUSION

- Average annual Savings of $50-$100 per consumer
- Generate jobs and tax revenue for North Carolina
- Expand tax base for North Carolina

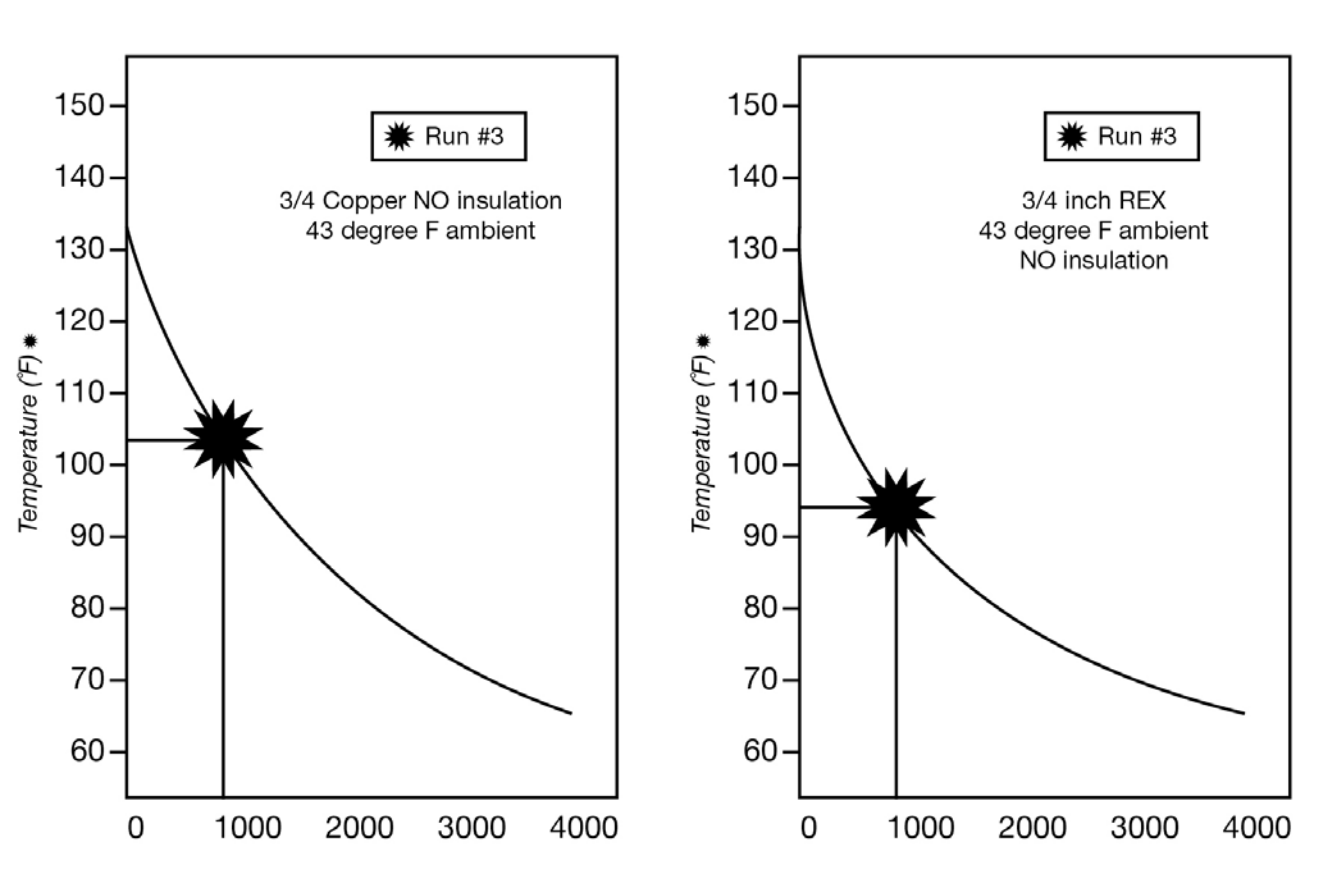
REFERENCES

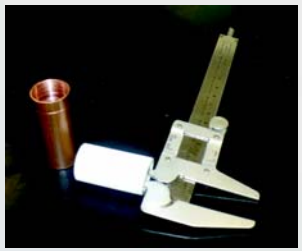
1. Nomaco K-Flex LS Insulation Products Technical Bulletin for the Professional Contractor
2. ASTM C335 (Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation)

RESULTS

- Science students compared data from un-insulated pipes and insulated pipes in the same home.
- Key finding: 200 GWh and 800Mgal saved annually per 100,000 homes.
- They put their conclusions in a poster displayed in the NC Legislative Building during a Research Symposium.
- A legislator was inspired to enter legislation requiring pipe insulation on all new construction beginning 2008.

One of the Student Findings During Testing

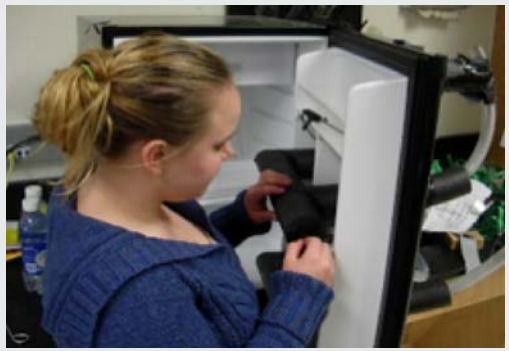




The graphs show that the temperature of water drops faster in PEX pipe than in copper.

WHAT DOES THIS MEAN?

- The right information (state-specific test data)
- In the right form (poster)
- Coming from the right source (students)
- Presented to the right legislator (action-oriented)
- Will yield legislation (H1702, in the case of NC)



WHAT SHOULD WE DO?

- Direct the skills and natural entrepreneurial energy of our students to create posters they can present to legislators.
- Legislators love student action.
- Work with Building Code Councils to meet their needs.
- It’s working for North Carolina.
- It can work for you.

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