



## **Massachusetts Case Study**

# **Eliminating the Use of Toxic Chemicals in Dry Cleaning:**

*A Feasibility and Cost Comparison of Perchloroethylene Dry  
Cleaning and Professional Wet Cleaning*

**NJ DEP Wet Cleaning & Perc Replacement Grant Workshop  
June 14, 2010**

## What is Perc and Why is it a Problem?

**Able to dissolve most organic materials, perchloroethylene (PCE or perc) is the most widely used dry cleaning solvent in Massachusetts and nationally.**



A typical dry cleaning machine...



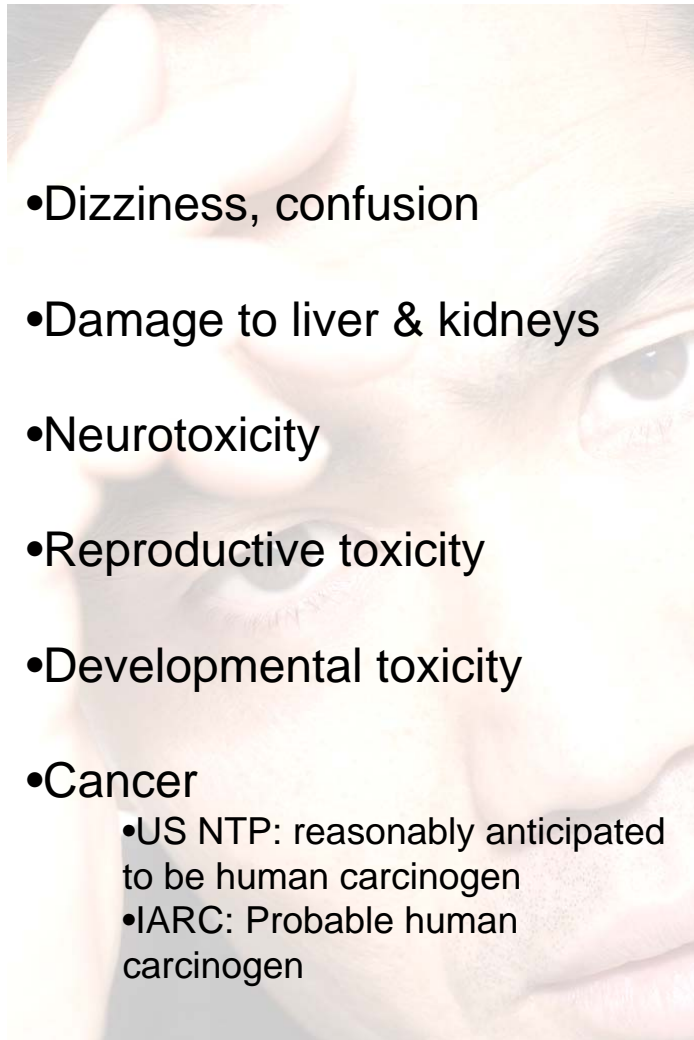
generates hazardous waste



and has fugitive emissions

Though perc machines have improved emissions over time, there is still exposure to workers and residual solvent at co-located residences and on clothes taken home.

Short and long term health effects linked to use of perc include:



- Dizziness, confusion
- Damage to liver & kidneys
- Neurotoxicity
- Reproductive toxicity
- Developmental toxicity
- Cancer
  - US NTP: reasonably anticipated to be human carcinogen
  - IARC: Probable human carcinogen



Misuse of perc can lead to soil and groundwater contamination.

75% of drycleaner sites in the US are contaminated.

Many are Superfund sites.

Wet Cleaning and CO2 are considered the most environmentally friendly options.  
Wet Cleaning technology is the more affordable of the two.

Washer and dryer use  
biodegradable  
detergents, and  
conditioners

Finishing equipment re-shapes and  
dries the slightly damp clothes



# MA Case Study: Silver Hanger Cleaners

- In 2008, the Institute provided a matching grant to Silver Hanger Cleaners in Bellingham, Massachusetts to convert their operations from Perchloroethylene-based to professional wet cleaning.
- Two years of data have been collected from the facility, reflecting one year of solvent use and one year of dedicated professional wet cleaning.

# Data Collection

- Capital costs
- Performance data
  - send-outs, re-dos, and claims
- Operational costs
  - machine maintenance, filters, solvent, detergent, spotting agents, hazardous waste disposal, regulatory fees, labor time
- Resource use
  - electricity for equipment, electricity for the facility, natural gas for the boiler, water, and sewage

# Capital Costs

New PCE machine:  
\$44,000

Assuming a 15-year life for the equipment, and a cost of capital of five percent, the annualized cost of using a PCE machine is \$3,054

New Wet Cleaning  
Equipment: \$48,443

Assuming a 20-year life for the equipment, and a cost of capital of five percent, the annualized cost of using wet cleaning equipment is \$2,553

# Performance Data

<i>Attribute</i>	<i>PCE</i>	<i>Wet Cleaning</i>	<i>Qualitative Analysis</i>
<i>Send-outs</i>	5 items/month	Initial: 15-40 items/month After experienced: 5 items/month	Learning curve applies; eventually no difference
<i>Re-dos</i>	0	Initial: 3 items/month After experienced: <3 items/month	Staff learning curve effects rate of re-dos; eventually slight increase
<i>Claims</i>	\$1226	Initial: \$1125 After experienced: \$0	Saved >\$100/year initially; saved >\$1000/year with experience

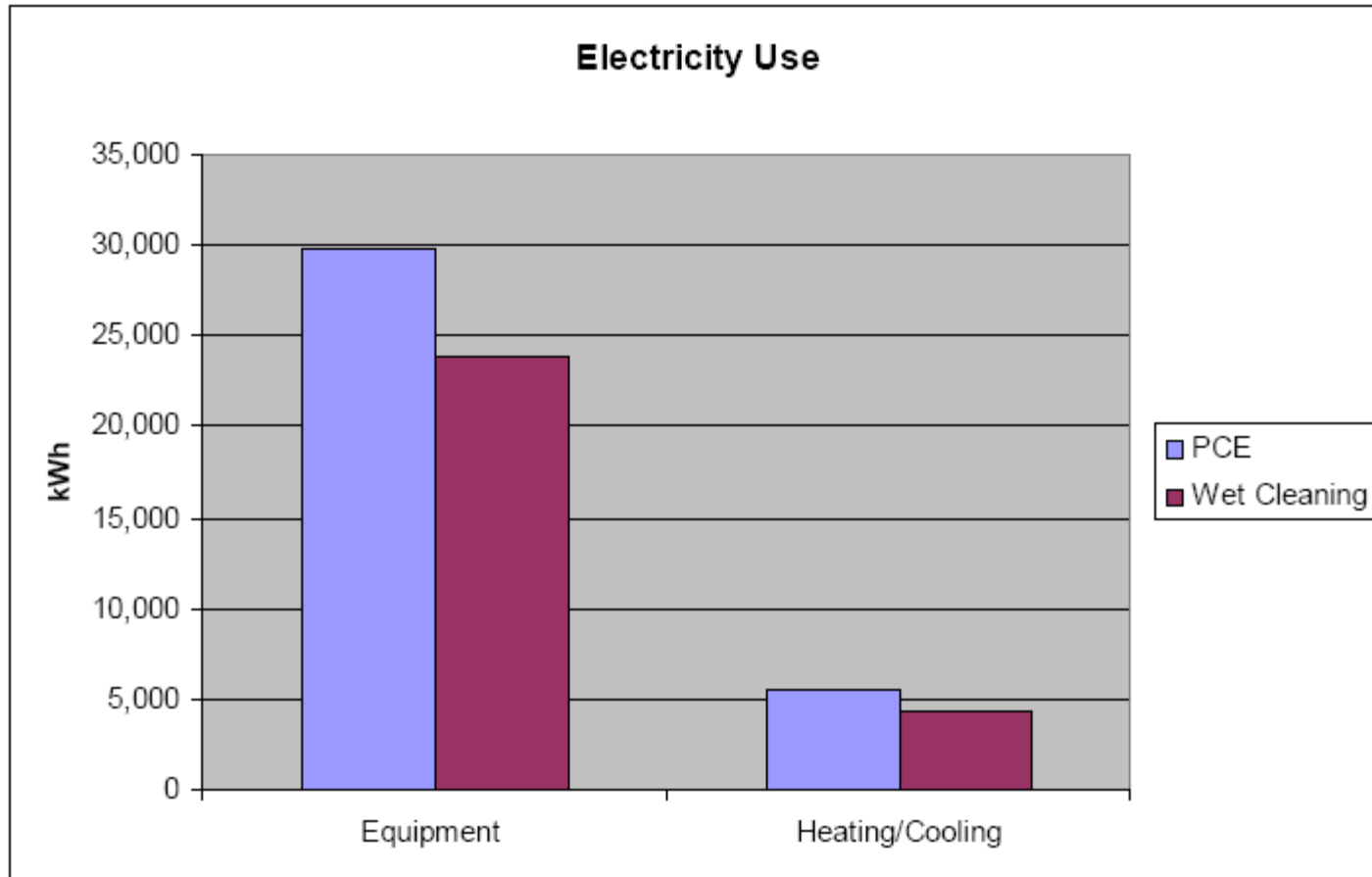
# Operational Costs

<b>Item</b>	<b>Costs/month</b> <i>(areas where costs are higher with wet cleaning)</i>	<b>Savings/month</b> <i>(areas where costs are lower with wet cleaning)</i>	<b>Costs/Savings per year</b>
Maintenance	--	\$227	-\$2,721
Filters	--	\$26	-\$316
Solvent	--	\$130	-\$1,560
Detergent	\$631	--	+\$7,572
Spotting Agents	\$41	--	+\$492
Hazardous Waste Disposal	--	\$179	-\$2,148
Regulatory fees	--	\$21	-\$250
Totals	\$672	\$583	
Total Costs		+\$89	+\$1,069

# Electricity Use

	<b>2008 PCE Data</b>	<b>2009 Wet Cleaning Data</b>	<b>Decrease in Use</b> <i>from PCE to Wet Cleaning</i>	<b>Savings</b> <i>in Dollars at rate of 16.961¢/kWh</i>
Total Electricity Use for Equipment (kWh)	29,736	23,892	5,844	\$991
Monthly Average Electricity Use for Equipment (kWh)	2,480	1,990	490	\$83
Total Electricity Use for Heating/Cooling (kWh)	5,489	4,377	1,112	\$189
Monthly Average Electricity Use for Heating/Cooling (kWh)	460	365	95	\$16

# Electricity Use Comparison

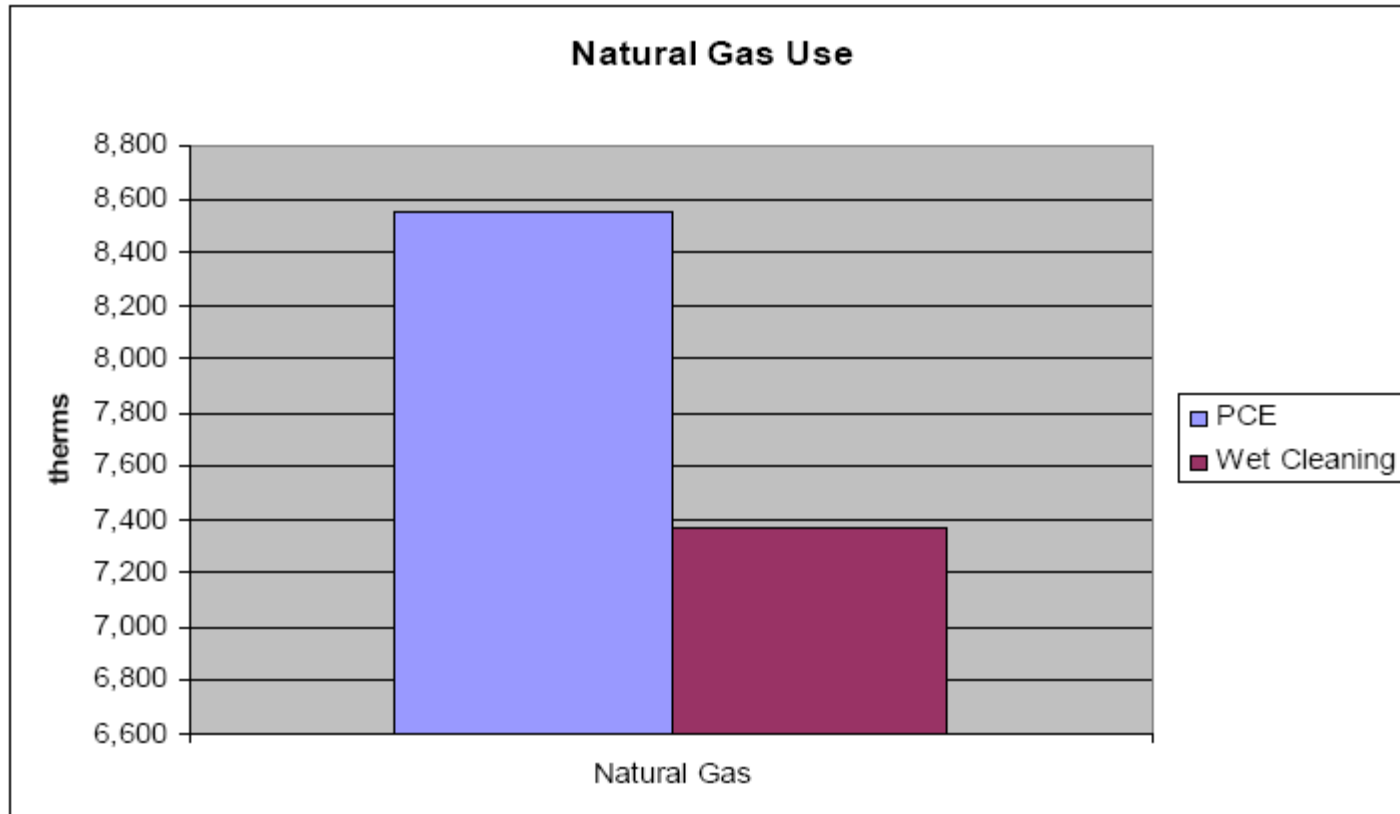


# Natural Gas Use

	<b>2008 PCE Data</b>	<b>2009 Wet Cleaning Data</b>	<b>Decrease in Use</b> <i>from PCE to Wet Cleaning</i>	<b>Savings*</b> <i>in Dollars</i>
Total Natural Gas Use for Boiler (therms)	8,547	7,367	1,180	\$1,090
Monthly Average Natural Gas Use for Boiler (therms)	712	614	98	\$90

\*reflects average rates over the two years.

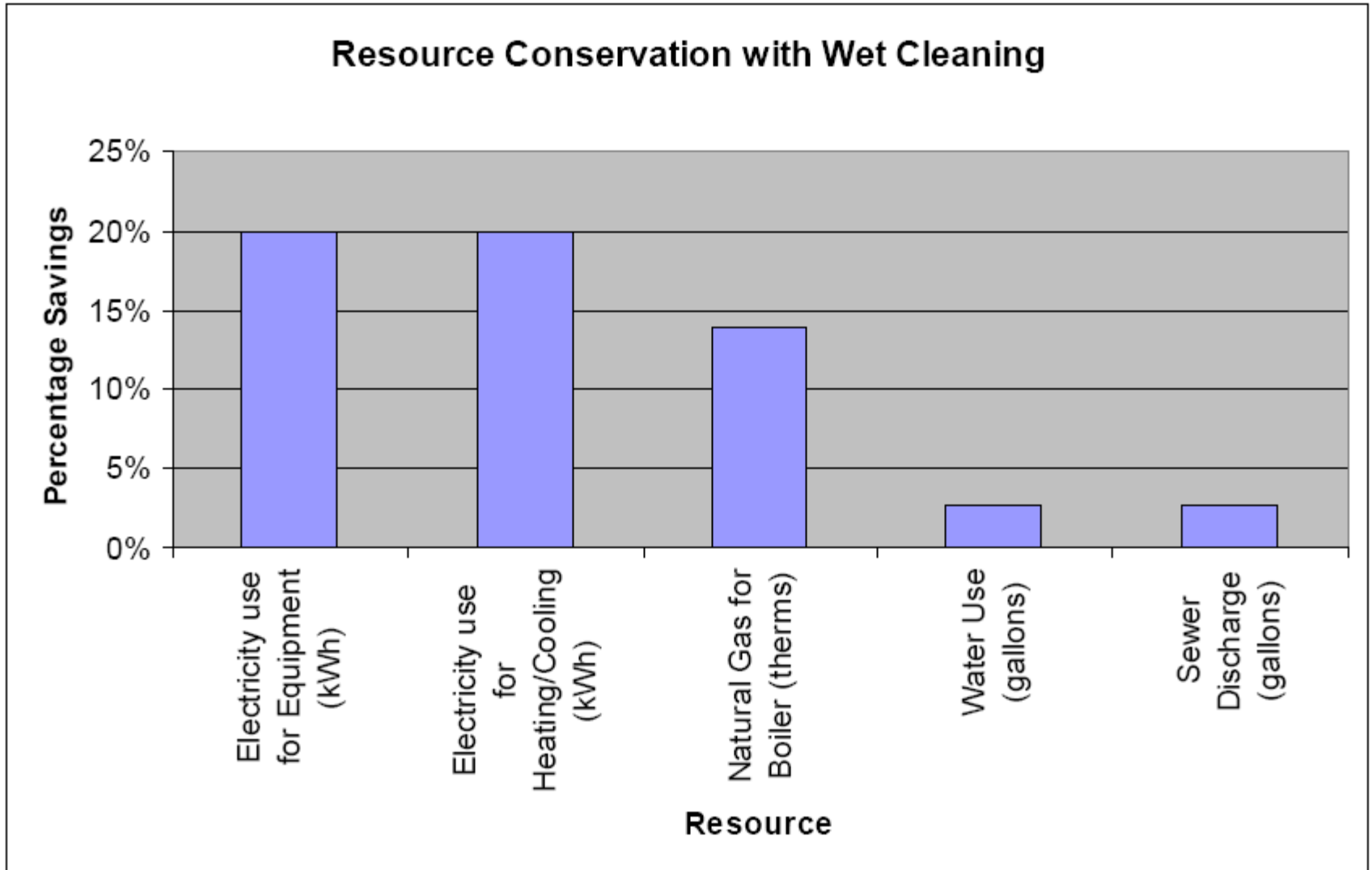
# Natural Gas Use Comparison



# Water Usage

	<b>2008 PCE Data</b>	<b>2009 Wet Cleaning Data</b>	<b>Decrease in Use</b> <i>from PCE to Wet Cleaning</i>	<b>Savings</b> <i>in Dollars</i>
Total Water Usage (gallons)	223,000	217,000	6,000	\$20
Monthly Average Water Usage (gallons)	18,583	18,083	500	\$1.63

# Resource Use Savings



# Summary of Costs/Savings: Resource Use

<b>Item</b>	<b>Increased Use/month</b> <i>(areas where use is higher with wet cleaning)</i>	<b>Reduced Use/month</b> <i>(areas where use is lower with wet cleaning)</i>	<b>Cost/Savings per month</b> <i>(in dollars)</i>	<b>Cost/Savings per year</b> <i>(in dollars)</i>
Electricity use for Equipment (kWh)	--	490 or 20%	-\$83	-\$991
Electricity use for Heating/Cooling (kWh)	--	95 or 20%	-\$16	-\$189
Natural Gas for Boiler (therms)	--	98 or 14%	-\$90*	-\$1,090*
Water Use (gallons)	--	500 or 2.7%	-\$1.63	-\$20
Sewer Discharge (gallons)	--	500 or 2.7%	-\$2.30*	-\$28*
<b>Total Savings</b>			<b>-\$193*</b>	<b>-\$2,318*</b>

\*reflects average rates over the two years.

# Total Wet Cleaning Savings

<b>Item</b>	<b>Annual Costs</b>	<b>Annual Savings</b>
Equipment		\$500
Performance (Claims)		\$1,000
Operations	\$1,069	
Resource Use		
• Electricity		\$1,180
• Natural Gas		\$1,090
• Water		\$20
• Sewer		\$28
Total Cost/Savings in 12 months	<b>\$1,069</b>	<b>\$3,818</b>
Total Savings	<b>\$2,749/year</b>	

# Return on Investment

- \$2,749 in savings over the 12 months of the study.
- The facility spent approximately \$12,000 (in actual costs, but not factoring in discounts and grant monies received) more than it would have to simply replace their solvent machine.
- This equates to a return on investment realized in just under 4.5 years.

# Additional Benefits of Wet Cleaning

- Time Savings:
  - The Bellingham cleaner has stated that the process, in fact, does not take any longer once the wet cleaning system is learned. In fact, less time is spent on pre- and post- spotting. Just a few months in to using the new technology, his finisher was completing his work earlier each day than when they were using PCE.
- Significantly improved air quality in the facility.
- Customers are happy with the conversion to wet cleaning – as more and more consumers are looking for environmentally friendly services.

# Comment from the Cleaner...

- *“I was anxious to get rid of the perc machine because of the health and waste issues but I wanted to replace it with something that I wouldn’t find out later caused other problems. Wet cleaning was the logical solution for me and I couldn’t be happier with the results. It works much better than I imagined, my workers are grateful, and my customers are happy.”*

– Mark Isabelle, Owner, Silver Hanger Cleaner, Bellingham, MA

# Cleaner's Video Testimonial

(4 minute video clip)





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