

WRP & ESI RESOURCES FOR YOUR ENERGY PROGRAMS

ON-SITE ASSISTANCE AND ENERGY TOOLKIT

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Section Chief

Waste Reduction Partners

Partnership of:

NC Division of Environmental Assistance & Customer Service &
Land of Sky Regional Council



ESI Members | Past WRP Clients



WHAT IS WASTE REDUCTION PARTNERS?

- Team of highly experienced retired engineers and scientists - Volunteers
- Provide businesses and institutions on-site consulting and guidance in North Carolina
- Assist facilities to reduce environmental impact through efficiency techniques that save money
- Non-regulatory, no-cost, confidential
- Innovative partnership between local, state and federal agencies.
- Established in 1992, NCDEQ Partnership in 2000



Waste Reduction Partners Services

no-cost, non-regulatory assistance for business & institutions

- On-site Energy Assessments
- ECM recommendations
- Cost/Benefit Analysis, Payback
- Benchmark Comparisons
- Rebate & financials
- Carbon goals

Energy
Efficiency

- Benchmarking
- Water conservation recommendations
- Cost/benefit analysis

Water
Efficiency

- Recycling program review, vendor identification
- Zero Waste to Landfill
- New products from wastes
- Waste sorts
- Organics and food waste options

Waste
Reduction

- Greening Assessments
- Env. Regulatory Help
- Grant Application Assistance
- Special Projects

Pollution
Prevention
/ Special
Projects

SUPPORTING ESI MEMBERS GOALS



Energy Use Reduction Goals/KPI Targets

Utility Cost Control/Reduction Objectives

Carbon Emission Reduction Goal/Supplier Mandates/
SBTi/

Decarbonization Strategies

Water Use Reduction Objectives

ISO 14001 Sustainability Goals



Energy Efficiency Assistance

- Conduct On-site Surveys
 - ASHRAE level 1 - 2
- Review & Analyze Utility Bills & Histories
- External & Internal Benchmarking
- Target Energy Uses
 - Process heating, motors, pumps
 - Compressed air
 - HVAC & Cooling Towers
 - Lighting
 - Building Envelope
 - Controls & EMS
- Identify Energy Efficiency/Carbon Opportunities
- Provide Reports with Cost/Benefit Analysis
- Align with Corporate Goals, policies and planning

ASSESSMENT PROCESS

- Initiate a Project
 - WasteReductionPartners.org
- Needs Discussion
- Pre-Assessment Form
 - Utility Use & Cost History
 - What to Expect
- On-site Team Assessment
- Report Delivery (3-4 weeks)
- Follow-up

The screenshot shows a 'PRE-ASSESSMENT SURVEY' form with the following sections:

- Client:** Name, Building, Year Built
- Site Contact:** Name, Title, Street, City, County, Phone, Mobile
- Mailing Address:** Street, Water - No., Zip, Email
- Site Information:** No. of floors, No. of occupants, Water Issues usage/yr., Use (office, etc.)

Initiate a Project

WRP technical assistance is provided at no cost to our clients, funded by government-sponsored grants, contracts, and private contributions. North Carolina only.

Organization *

Name *

Address

State, Zip

Report Summary Table

Energy Savings Measure	Electricity Savings (kWh/yr)	Natural Gas Savings (MMBtu/yr)	Cost Savings (\$/yr)	Installed Cost (\$) ¹	Payback Period (yrs)
Air Compressors					
11 Reduce compressed air pressure.	13,104	0	\$839	\$0	Immediate
12 Implement compressed air leak detection program.	87,360	0	\$5,591	\$5,000	0.9
Subtotal	100,464	0	\$6,430	\$5,000	0.8
Laboratory Hoods					
13 Upgrade lab hoods.	115,817	534	\$12,097	\$84,000	6.9
Subtotal	115,817	534	\$12,097	\$84,000	6.9
Limit Demand					
14 Limit demand with Tracer Summit BMS.	50,000	0	\$11,644	\$5,000	0.4
Subtotal	50,000	0	\$11,644	\$5,000	0.4
Water Heating					
15 Replace electric water heaters with nat. gas WHs.	9,500	0	\$608	\$2,000	3.3
Subtotal	9,500	0	\$608	\$2,000	3.3
Chillers					
16 Cut off Chiller No. 3 during weekends.	124,800	0	\$7,987	\$0	Immediate
Subtotal	124,800	0	\$7,987	\$0	Immediate
Totals	3,007,637	1,471	\$223,335	\$286,988	1.3



ROADMAP TOWARDS NET ZERO CARBON

Project Scope

- 3+ Industrial Sectors (NC)**
- Toolkit Resource Compilation for GHG reporting
 - Financial Decision Model for GHG action items
 - Direct one-on-one assistance to 7 businesses/industrial sites

Skill Sets

- Graduate Students**
- GHG reporting and targets research
 - Guidance writing and development and resource tool – Marketing
 - Website editing & embedded applications
 - interested in industrial processes and environments
 - Energy efficiency and renewable technologies awareness

The Team

- Waste Reduction Partners**
- 15 retired engineers and scientists who consult with industries statewide on energy management
 - Partners at NCDEQ, ESI
 - WRP Energy Manager: Kim Van Niekerk
 - WRP Director, Terry Albrecht, PE, CEM
 - WRP Project Manager, Angela Moore
 - University Advisors

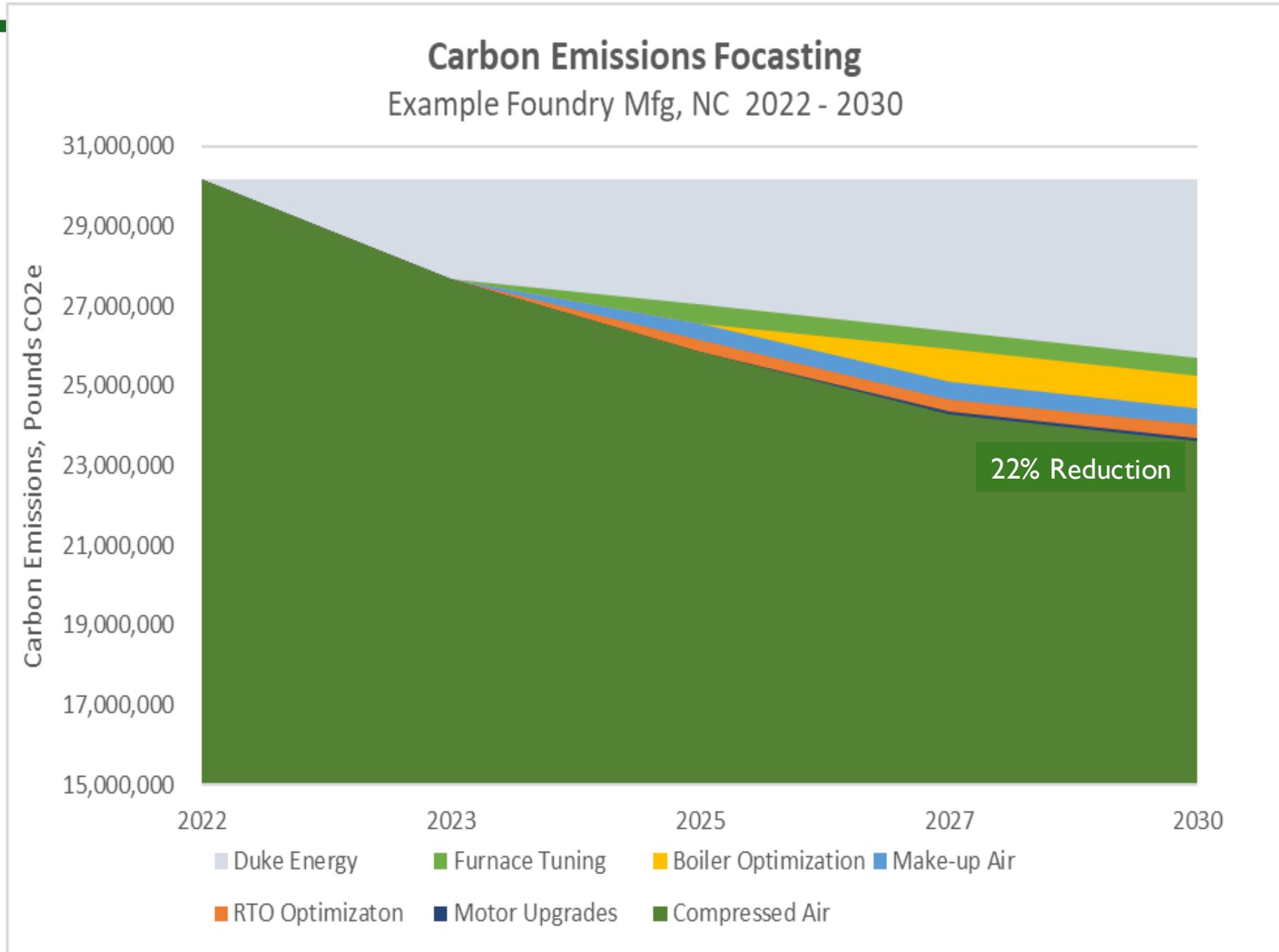
CARBON EMISSIONS - PROJECT APPROACH

Focus Areas

1. Review/Research carbon emissions, GHG protocols
2. Carbon Accounting:
 - Scope I and II emissions
 - Scope 3 emissions and major components
3. Energy Assessment
4. Forecast Roadmap to Achieve Target Reductions

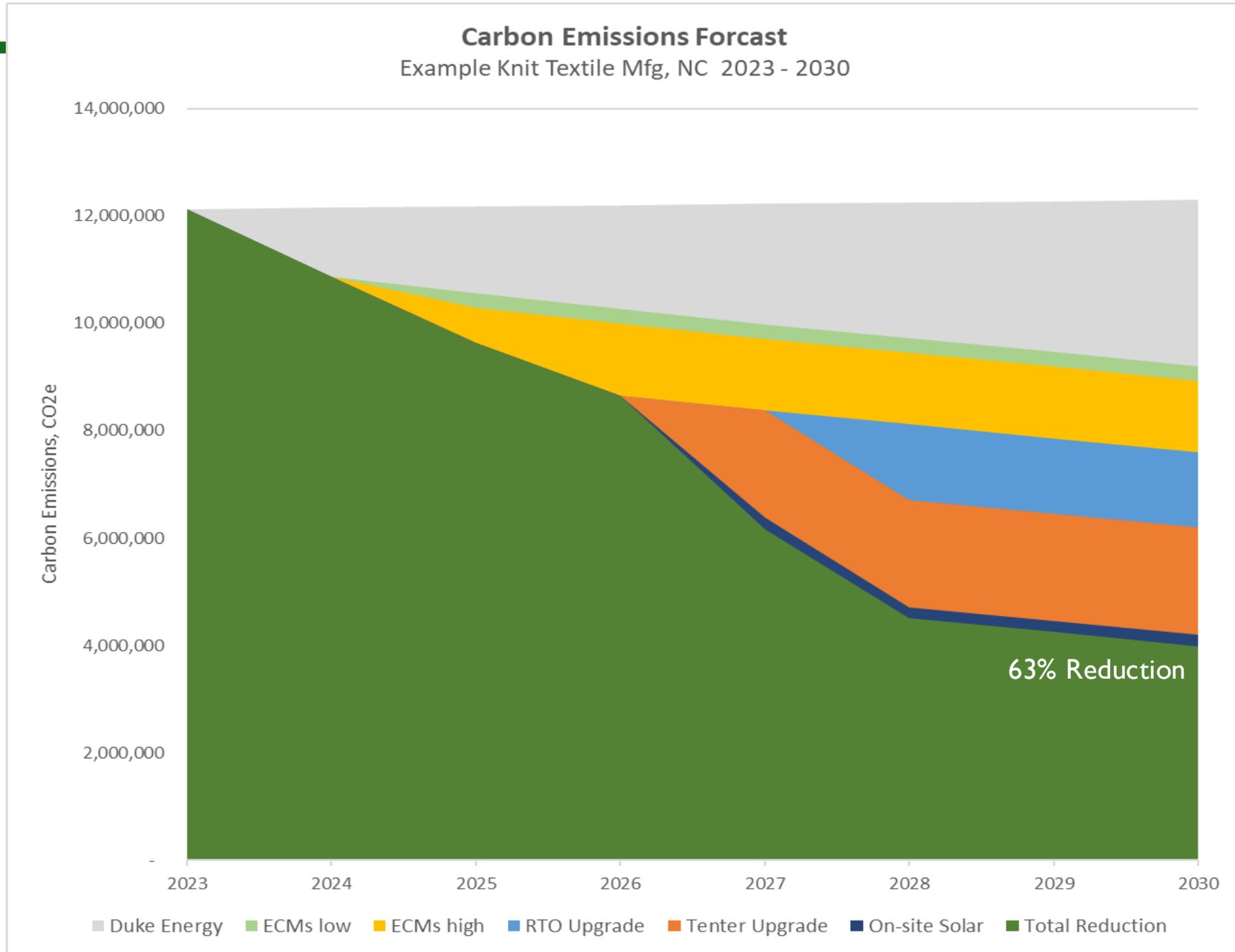
EXAMPLE #1 CARBON EMISSION REDUCTION

ROAD MAP STRATEGY & FORECAST



EXAMPLE #2
CARBON EMISSION
REDUCTION

ROAD MAP STRATEGY
&
FORECAST



ESI ENERGY TOOLKIT - OFFERINGS



115V AC Electrical Usage Monitor



Light Meter



Ultrasonic Leak Detector



Power Quality Camp-on Meter (1000 Amp)



Infrared Camera



+



Recording Power Meter (single/3-phase)

ESI ENERGY TOOLKIT - OFFERINGS



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USE OF ULTRASONIC LEAK DETECTOR

Need

- Precor sought to start compressed air leak repair program
- Operational utility cost savings
- Compress air capacity improvements

Assistance | ESI & WRP

- Precor borrows ESI leak detector
- WRP Assessor, Mark Medlin, trains Precor's technicians on use of detector
- WRP provides spreadsheet to estimate leak savings by size & system drawdown tests.

Outcome

- 45 Leaks tagged and repaired by Precor Technicians
- Conducted post-program compressor draw down test: 21% compressed air savings
- Cost savings estimated: \$12,300 for the year

USE OF ULTRASONIC LEAK DETECTOR

Custom Spreadsheet for Compressed Leak Losses Provided by WRP

A	B	C	D	E	F	G	H	I	J	K	L
Air Compressor Leakage Calculator - Precor											
Estimating Total System Leakage											Yellow color
Drawdown Test Method appropriate for Modulating Compressors (i.e. 75HP Model)											Pink denote
a drawdown leakage test during non-production showed a 37 psig drop over 10 minutes - per James Boystun 12/5/22											Green denote
Inputs											
total system volume, receiving tanks, piping etc	V	380	cubic feet	Air Storage Volume, 1200 gallon r							
Normal Operation Pressure	P1	120	PSIG	2400 gal	equals						
Lower Pressure (to which allowed to drop)	P2	91	PSIG	3" piping	1200	ft					
Time to dropped pressure point	T	10	minutes								
Leakage (cfm free air) =		94	cfm								
"= (V x (P1 - P2) x 1.25)/(14.7 x T)											https://www.airbestpractices.com/system-assessments/leaks/are-compre
Capacity Rating (acfm)											
372 Acfm @ 120 psi =		372	cfm	calculator							https://www.falmouthproducts.com/catoxflowconversion.html
per 75 HP QNW-G-371-F rotary screw compressor											
% System Leakage Calculated		25.2	% leakage								
Total Power Consumption											
HP x .746 = KW			kW								
HP		75									
		60.16	kW								
		8760	op hours/year								
		527,013	kWh/year								
		0.069	\$/kWh								
		\$ 36,364	per year cost								
Turn off on Weekends											
		2502	op hours saved/year								
		150,524	kWh/year								
		0.069	\$/kWh								
		\$ 10,386	per year savings								

Leak Size Estimator	
Small "quick connect" types of leaks (not audible)	so
0.2 - 0.7 cfm	ht
An Audible Air leak is at least 1 cfm	ht
1 cfm or larger	
A larger leak (audible)	ht
3 cfm	



USE OF INFRARED CAMERA

Client NEED

- Identify energy cost savings
- Show good faith effort to address aggressive carbon emission reduction goals
- Understand cost/benefit analysis of solutions

Assistance | ESI & WRP

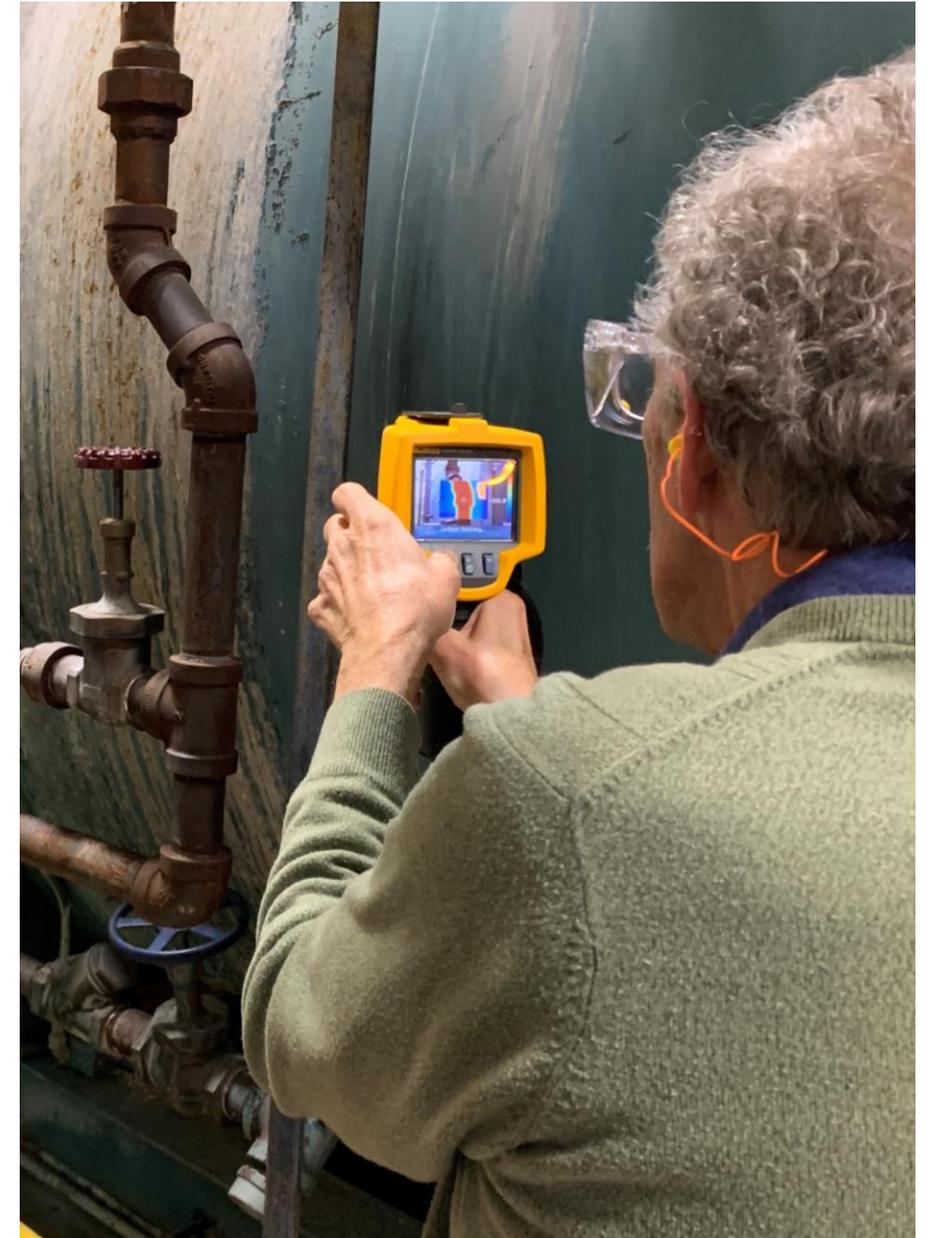
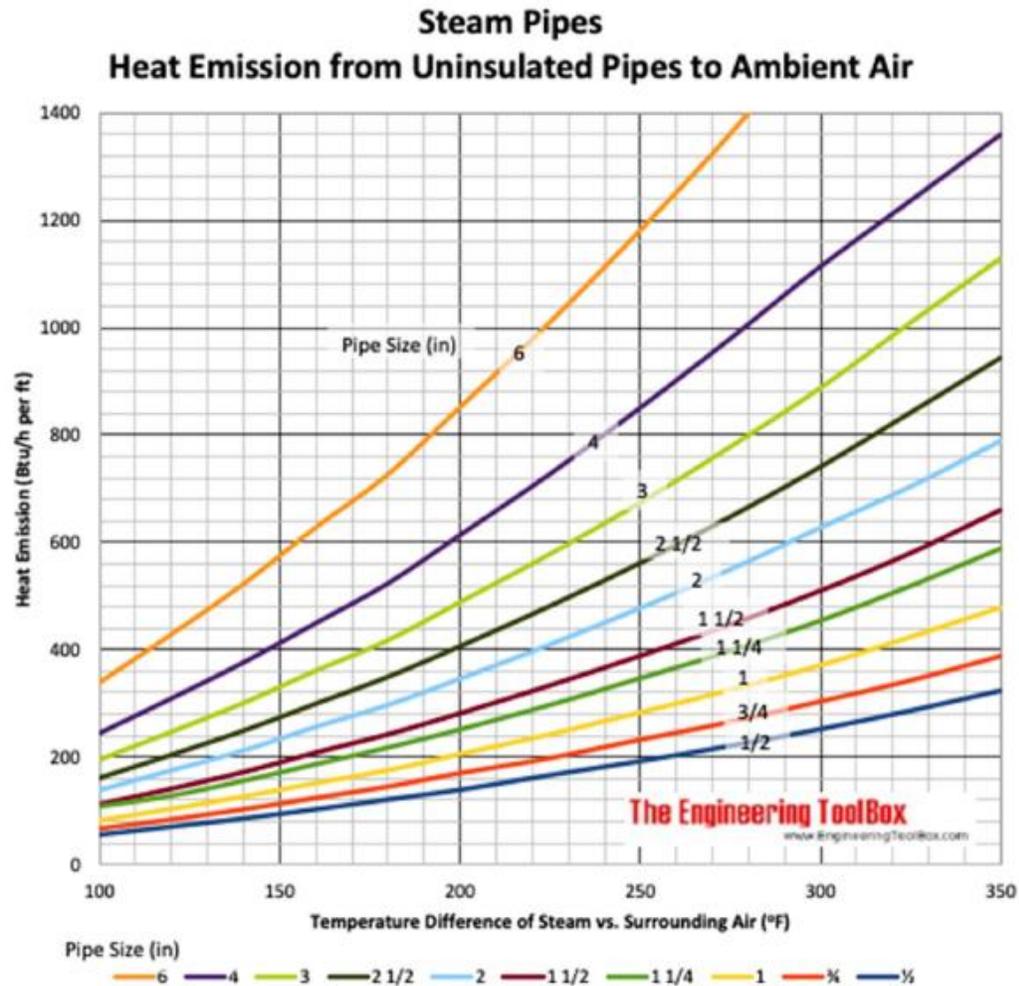
- As follow-up to a Plant Wide Energy Assessment, Focus on heat loss areas
- Capture images of boiler lines heat loss and oven seals
- Produced report showing cost/benefit of pipe insulation effort

Outcome

- Potential Saving: \$13,500
- Carbon Emission Reduction: 465,000 lb/year
- Payback 1.5 years

USE OF ULTRASONIC LEAK DETECTOR

Energy Saving Chart Provided: per linear foot of pipe



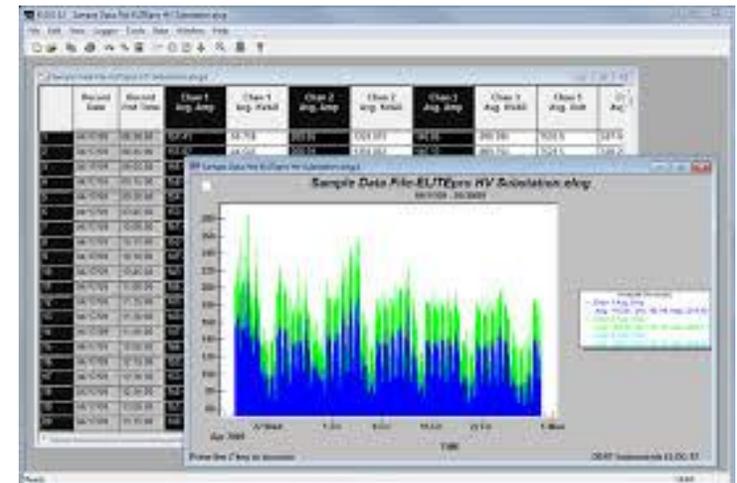
APPLICATIONS FOR RECORDING POWER METER

Applications

- Power quality and power factor measurement
- Motor run time and draw for VFD applications
- Analysis of controls applications, Pre & Post
- Fans, pumps, electric ovens, lighting system, compressors air run times, HVAC

Assistance | ESI & WRP

- Help identify the application and set baseline
- Help download and interpret data
- Estimate economics of alternative cost saving measures or equipment.
- Measurement and verification of projects



ENGAGE OUR WRP VOLUNTEER TEAM





Waste Reduction Partners



WRP ASSISTANCE

Initiate a Project

WasteReductionPartners.org

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