Energy Efficiency Opportunities for Massachusetts Manufacturers

May 22, 2025 webinar

Reminders

Monthly webinars provide access to continuing education for TUR planners and others, covering topics that include relevant technology/innovations, case examples of toxics use reduction (TUR) success, updates on chemical hazard information, policy updates impacting manufacturer decisions and TUR planning fundamentals.

This webinar focuses on Resource Conservation.

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Our Speakers

- **Pam Eliason**, TURI
- **John Raschko**, OTA
- **Nate Finch**, Eversource
- **Ron Gillooly**, Leidos
- **Satya Penmatsa**, Adhesive Applications

Today’s Agenda

- TURA basics: Resource conservation in lieu of Toxics Use Reduction planning
- Resources and technical assistance
- Working with the Massachusetts Office of Technical Assistance
- Initiatives to incentivize energy conservation
- Industrial energy efficiency and electrification opportunities
- One company’s experience in energy conservation

Resource Conservation Planning Basics

Applying Toxics Use Reduction Planning Methods to Resource Conservation (RC) Planning

Massachusetts Toxics Use Reduction Act (TURA) of 1989

Who reports

- Massachusetts manufacturers who:
  - Operate under certain Standard Industrial Classification (SIC) codes
  - Have >10 employees
  - Manufacture or process ≥25,000lbs (or otherwise use ≥10,000lbs) of listed substances
- This covers a little over 400 Massachusetts facilities

What TURA requires

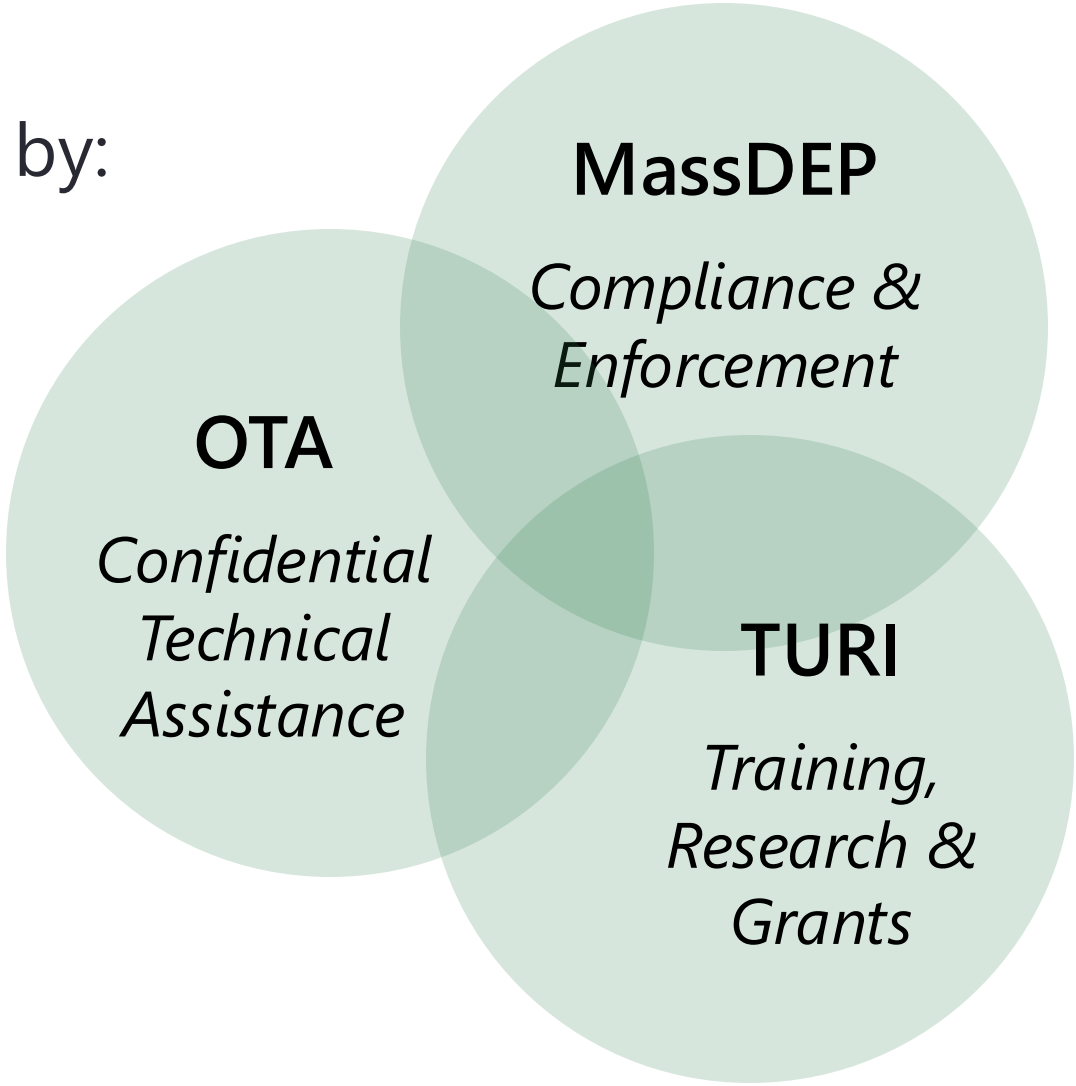
- Report annually to the state
- Pay a fee based on size and usage
- Create a Toxics Use Reduction Plan every two years

Note that TURA does not prohibit companies from using listed chemicals

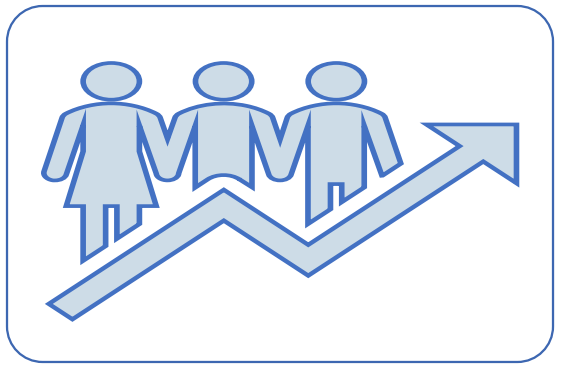
TURA Program Implementation

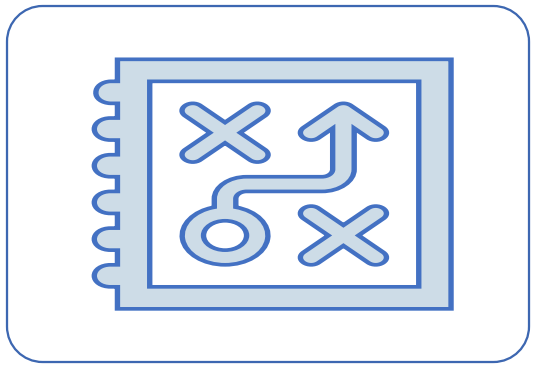
The TURA Program is co-implemented by:

- The Massachusetts Department of Environmental Protection
- The Massachusetts Office of Technical Assistance
- The Toxics Use Reduction Institute at UMass Lowell



Toxics Use Reduction Act 2006 Amendments





Developed to provide options for MA companies who have been engaged in TUR Planning for multiple cycles and are finding limited options

Facilities that have completed one TUR Plan and at least two Plan updates may choose to:

- Continue with Toxics Use Reduction Plan Updates;
- Develop a Resource Conservation Plan;
- Implement a TURA EMS

What is Resource Conservation?

310 CMR 50.10 Definitions

An action that …

decreases the use or consumption of a natural asset such as water, energy, or raw material, or

increases the efficiency of the use of the assets,

without increasing risk to the public, workers, consumers, or environment and

without increasing the amount of waste generated.

RC focuses on “Natural Assets”

Natural Assets Include

- Energy
- Water
- Materials contributing to solid waste
- TURA chemicals used below thresholds
- TURA-exempt substances

https://www.mass.gov/doc/resource-conservation-rc-planning-guidance/download
Page 17

Energy Conservation

- **Big picture:** Any waste is an opportunity for improvement
- Facility-wide use characterization
  - Reduce demand through conservation and efficiency
  - Use cleaner sources of energy
  - Manage energy supply
  - Assess energy required for products and services used
- Detailed evaluation for selected operations
  - Identify opportunities
  - Evaluate technical and financial feasibility

RC Planning Contents

- Target asset(s)
- Review facility-wide use of the asset(s)
- Identify RC opportunities in specific operations
- Conduct detailed assessment of selected operations
  - Process flow diagram
  - Baseline use of asset
  - Identification of RC options
  - Technical and economic evaluation of options
  - Implementation schedule
- Summarize RC options implementation decisions
- Quantify expected change in the use of the asset

Examples of Energy Conservation Opportunities

Reducing demand through conservation and efficiency

- Compressed air systems
- Air handlers
- Boilers, furnaces, chillers
- Computers
- Fan systems
- HVAC systems
- Lighting
- Motors
- Ovens
- Pumps
- Process heaters

Energy supply management

- Purchasing “green” power
- Building on-site renewable energy sources
- Purchasing combined heat and power systems
- Purchasing properly sized boilers and chillers
- Load management

Energy related to products and services

- Reducing vehicles used or miles driven
- Incentivizing use of fuel-efficient vehicles or commuting

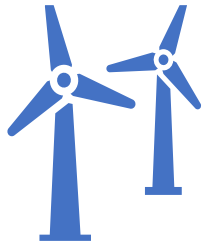
Energy Conservation Planning in Massachusetts

Energy conservation is the most common RC planning asset addressed

Lighting conversion

Office energy use reductions

HVAC system upgrades



Other conservation methods implemented

Variable frequency drives

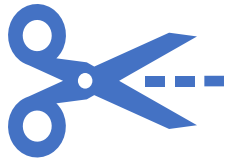
Process equipment automations and controls

Compressed air management

Microturbines that capture heat energy from process

Increased chiller water temperature settings

Renewable energy supply



For example, in planning year 2018:

4 facilities completed energy plans

Expected reduction of 123,800 MMBTU (15%)

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TOXICS USE REDUCTION INSTITUTE

Resource Conservation Activities in Massachusetts

ERVING INDUSTRIES

EthosEnergy

Chēcon™ The Primary Contact

BARNHARDT NATURAL FIBERS GROUP
THE FIRST FAMILY OF AMERICAN COTTON

MILLIPORE SIGMA

EVERSOURCE

ITWfoils®

Parker

Raytheon Technologies

OJI PAPER USA
KANZAKI SPECIALTY PAPERS

genzyme

PHILIPS

Bostik smart adhesives

abbvie

Wyeth

Wheelabrator TECHNOLOGIES

MSI TRANSDUCERS

Dampney Company, Inc.

RIVERDALE

Anchor Seal

ofs
A Furukawa Company

SCP AMETEK SCP®, Inc.

ISP

RUST-OLEUM

SAINT-GOBAIN

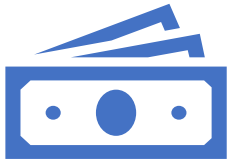
Medtronic

TURI TOXICS USE REDUCTION INSTITUTE

Why do RC Planning?

New focus

Leverage the creative energy and systematic process used by your planning team to address other important opportunities



Cost savings

Other co-benefits

Some RC opportunities lead to toxics reductions as well!

Overall process efficiencies improved

Other assets (e.g., water) also reduced

Things to Consider

- Can only do RC planning every other cycle
- Must track energy conservation achievements and provide progress report next cycle
- Some projects require more than two years to investigate and implement – ***That's OK!***

Industrial Energy Efficiency Resources

Office of Technical Assistance and Technology (OTA)

https://www.mass.gov/orgs/office-of-technical-assistance-and-technology-ota

MassSave Program

Sponsored by MA gas and electric utilities

https://www.masssave.com/en/business

Minnesota Technical Assistance Program (MnTAP)

www.mntap.umn.edu/focusareas/energy

Department of Energy

Industrial Training Assessment Centers

- https://www.energy.gov/mesc/industrial-assessment-centers-iacs
- Southern New England: https://iac.uconn.edu/
- Rhode Island: https://ccri.edu/itac/

Grants

https://www.energywerx.org/itac#:~:text=Supporting%20Small%20and%20Medium%2Dsized,Program%20participants%20in%20implementation%20efforts

Other resources

- www.energy.gov/eere/services/technical-assistance
- https://www.energy.gov/eere/eere-success-stories-projects-map

Mass. Office of Technical Assistance Overview

John S. Raschko, Ph.D.

Sr. Engineer, Massachusetts Office of Technical Assistance

Energy Conservation For Manufacturers Webinar

May 22, 2025

Office of Technical Assistance (OTA)

- **Non-regulatory** agency
- Provides **free, confidential** technical and compliance assistance to MA businesses that use toxic substances
- Gives **concrete recommendations** for toxics reduction and resource conservation

OTA has conducted 3,500 site visits at 1,500 facilities, reducing **millions of pounds** of toxic chemicals and **millions of dollars** in operating costs.

OTA Technical Assistance

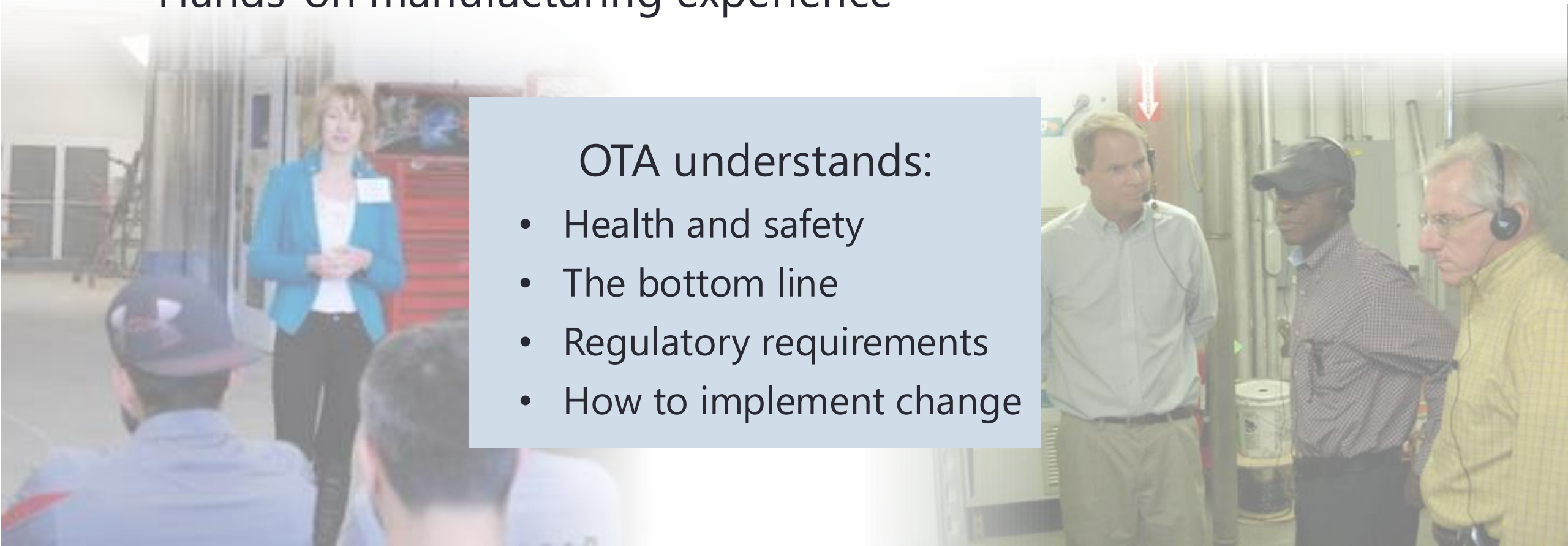
- OTA can assist facilities with:
  - Toxics use reduction
  - Environmental compliance
  - Energy efficiency
  - Resource conservation
- Both onsite and remote assistance are available
- After a site visit, OTA delivers a report with tailored recommendations

OTA Energy Efficiency Services

- Electric bill analysis – focus on demand charges & demand management
- Identify energy efficiency opportunities – focus on process energy use, e.g., compressed air, steam systems, fan systems
- Referrals to Industrial Training & Assessment Centers (ITACs) – free energy audits
- Referrals to energy efficiency incentives –
  - Mass Save – National Grid, Eversource, Unitil, Cape Light Compact, Liberty Utilities, Berkshire Gas
  - Municipal provider programs

OTA Staff

- Chemists, engineers, and public health professionals
- Hands-on manufacturing experience



OTA understands:

- Health and safety
- The bottom line
- Regulatory requirements
- How to implement change

Contact Us

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Sign up for
OTA's newsletter:

Office of Technical Assistance

OTA
Industrial Energy Efficiency and Electrification

May 2025

Ron Gillooly, CEM – Leidos
Nate Finch, CEM, CPHC - Eversource

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EVERSOURCE

Agenda

- Introductions
- Leveraging Data from your Meter
- Industrial Initiative
  - History
  - Process and eligibility
- Energy Efficiency and Electrification Defined
- Utility Incentives
  - Prescriptive
  - Custom
- Case Studies
- Next Steps
- Questions

Leveraging data from your meter

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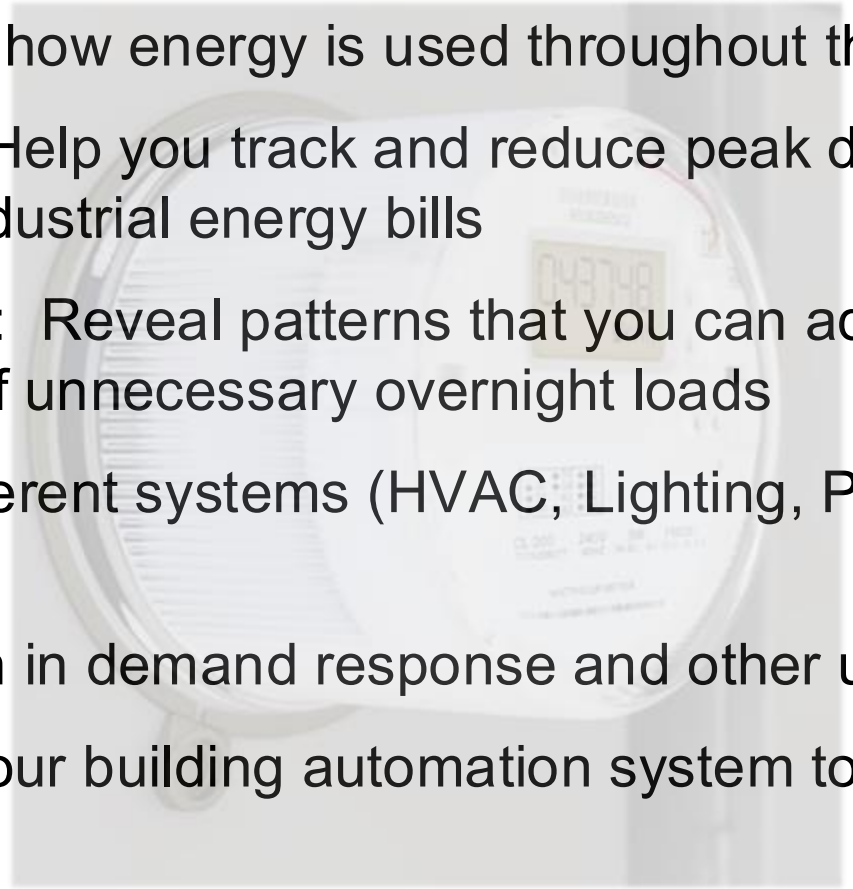
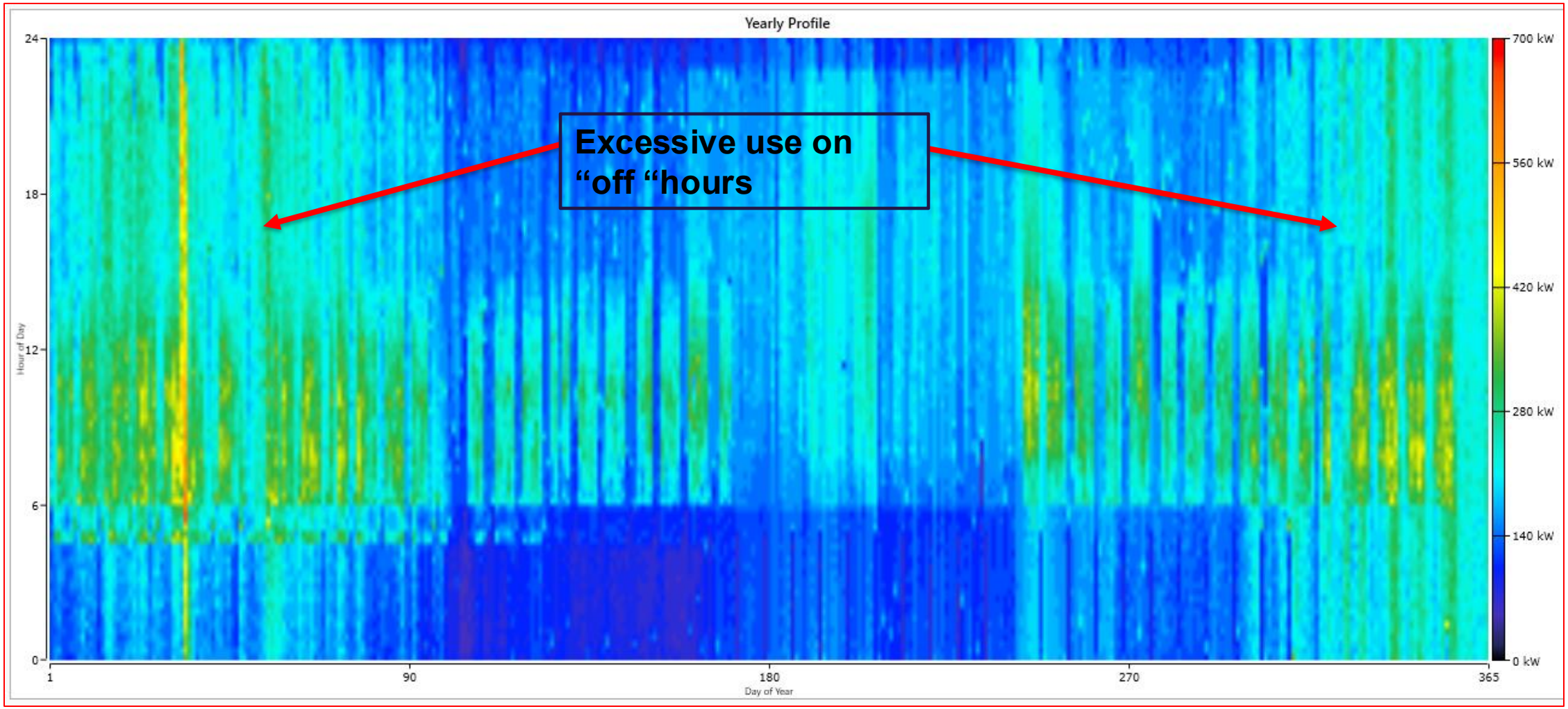
EVERSOURCE

Your electric meter can be a valuable source of information!



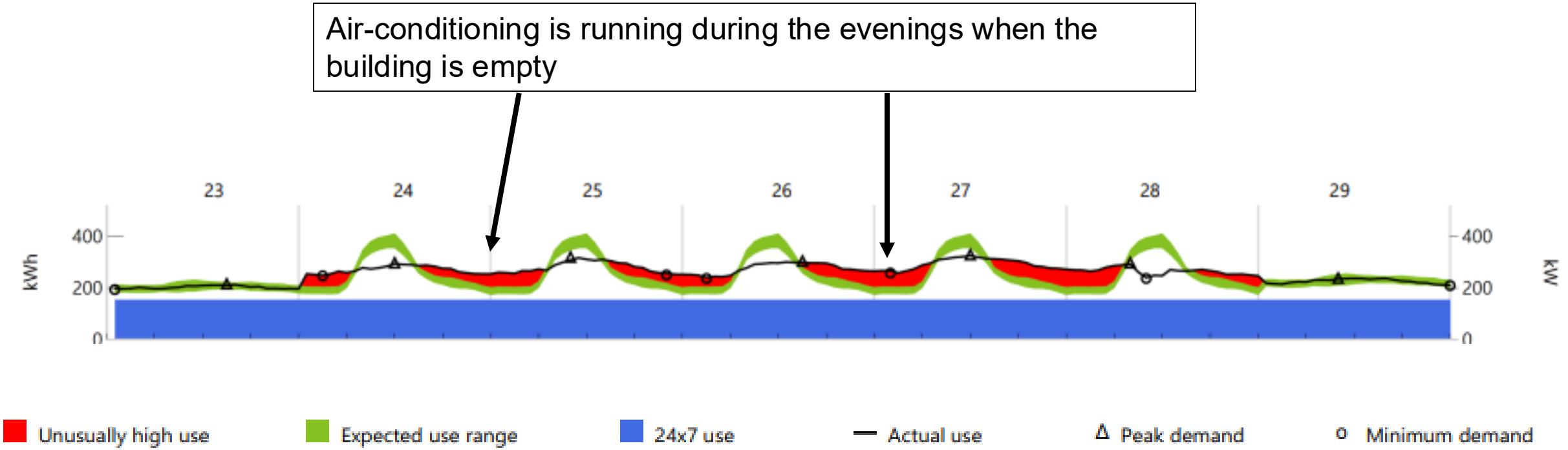
- You can see exactly how energy is used throughout the day
- Optimize Demand: Help you track and reduce peak demand charges, which are often a big part of industrial energy bills
- Behavioral Changes: Reveal patterns that you can adjust such as shifting loads off-peak and shutting off unnecessary overnight loads
- Understand how different systems (HVAC, Lighting, Process, etc.) contribute to your total usage
- Enables participation in demand response and other utility programs
- Can integrate with your building automation system to enable real-time response to usage trends
- Most utilities offer access to detailed electric meter data

Leveraging information from your electric meter (G3 Customers Only)

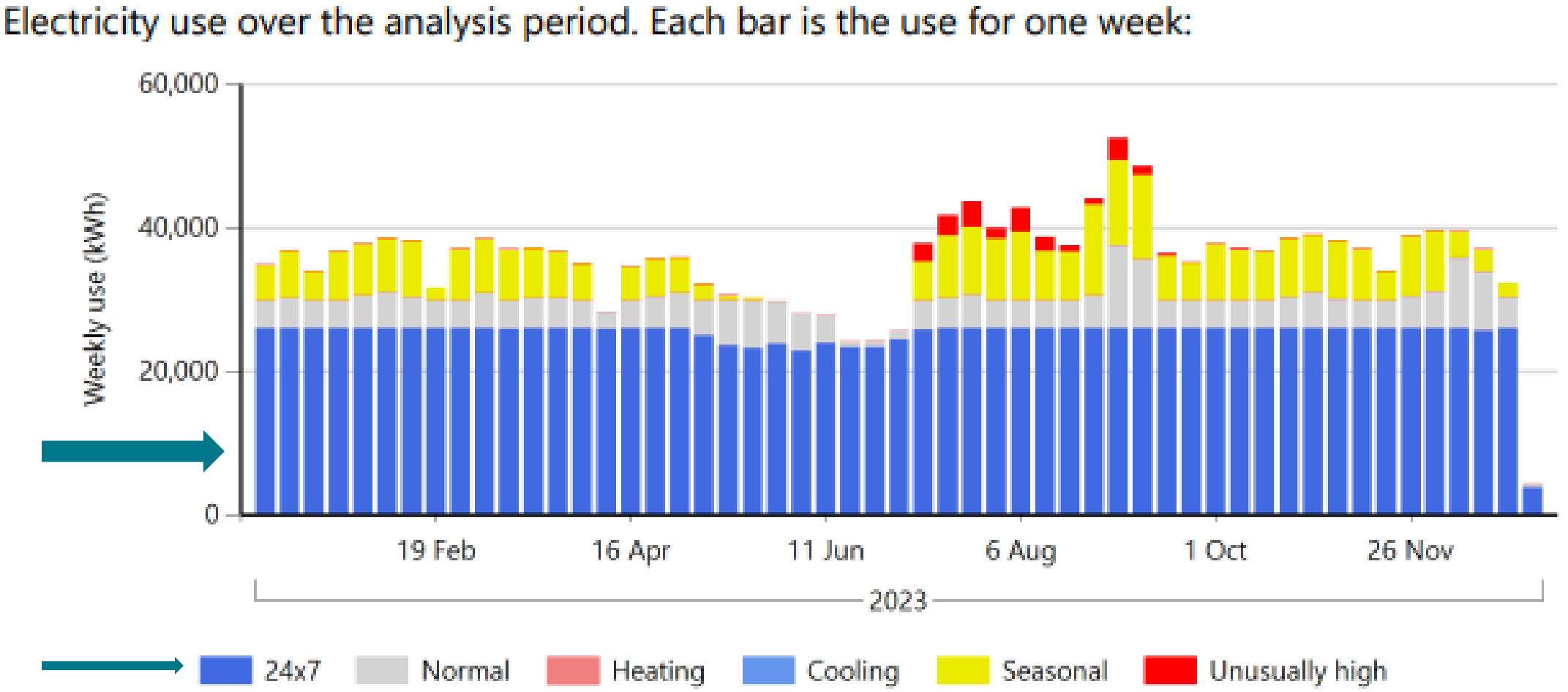


Business Use

“Load” Calendar for sample week in July



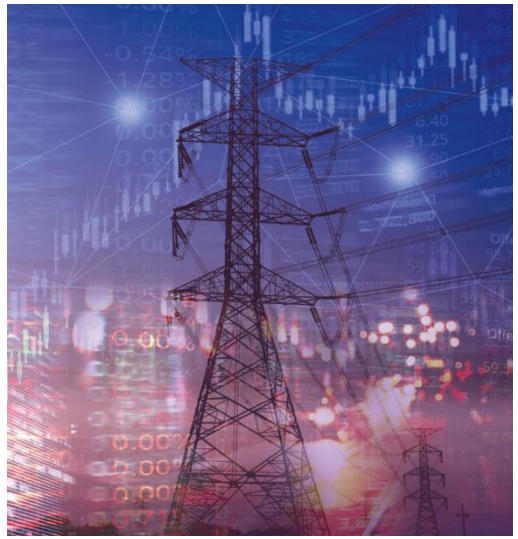
This “base” or 24/7 load is high – Why?



Mass Save® Programs – Savings through energy efficiency & electrification

- Always include when you begin thinking of a project or upgrade at your facility as incentives may be available. For larger facilities you will have a dedicated contact
- Most projects either fall under “custom” or “prescriptive” program tracks
  - Custom Incentives and Technical Assistance information is available **HERE**
  - For retrofit and all other products and services click **HERE**
- We are the beginning of the next 3-year the Massachusetts 2025–2027 Energy Efficiency and Decarbonization Plan ($4.5 Billion)
- The only way to benefit from this plan is to participate!
- There are large budgets for technical studies and incentives to help you improve and upgrade your equipment and systems at your facilities
- The Mass Save Sponsors offer specialized services for industrial customers to evaluate opportunities at their facilities
- If you do not know your Mass Save Sponsor contact visit **MassSave.com**

Energy Efficiency & Electrification



- **Energy Efficiency**
  - Using less energy to perform the same task or provide the same service
  - Goal is to reduce energy consumption
  - Example: Installing LED lighting, VFD's on pumps and motors
- **Electrification**
  - Replacing technologies that use fossil fuels with ones that use electricity
  - Goal is to shift energy use from fossil fuels to electricity (ideally clean electricity)
  - Example: Switching from a boiler to a heat recovery chiller or heat pump where applicable
- Electrification increases electricity demand. If combined with energy efficiency, that demand can be managed or reduced

Industrial Initiative Services

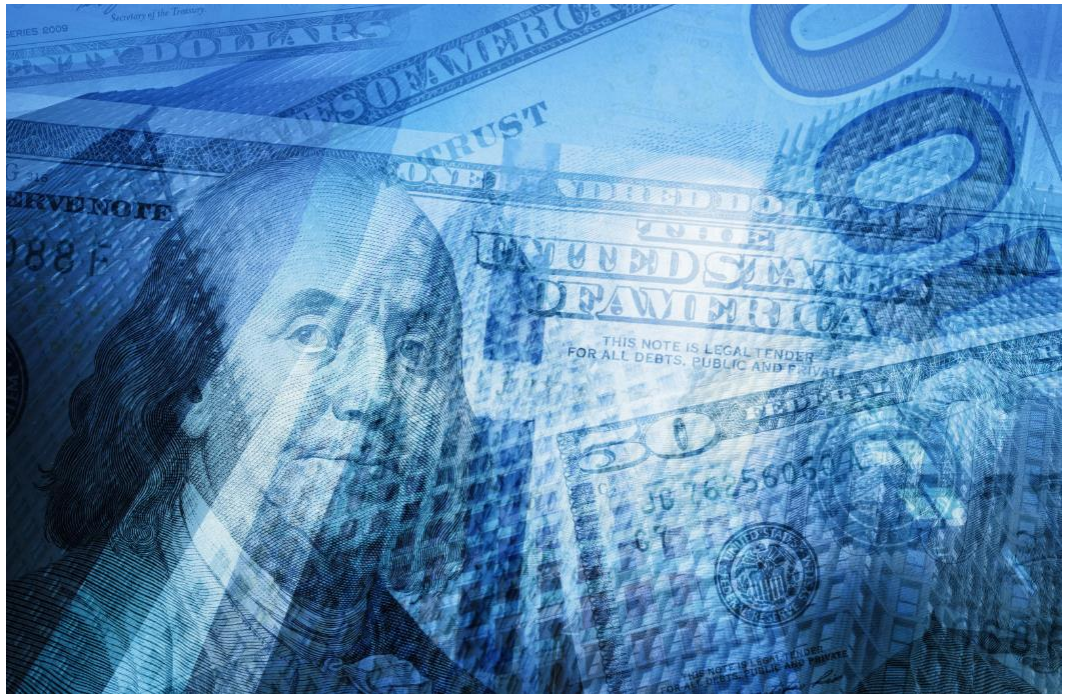
The program has been designed to deliver cost savings, improve building sustainability, and allow the customer's staff to stay focused on their primary responsibilities.

- Energy savings and reduced operational expenses
- Incentives to offset upfront project costs and provide faster payback
- Improved equipment performance and decreased maintenance costs
- Process improvements for enhanced energy efficiency
- Sophisticated control strategies that prevent system downtime
- Increased comfort and safety for employees and customers

Join other manufacturing customers in securing Mass Save Program incentives!

Industrial Initiative Results

- More than **$66 million** in incentives funding an estimated **$330 million** in efficient equipment and system upgrades
- More than **$40 million** annually in energy savings
- More than **205 million kWh** of electricity saved
- More than **7 million therms** of natural gas savings
- Significant reductions in CO2!

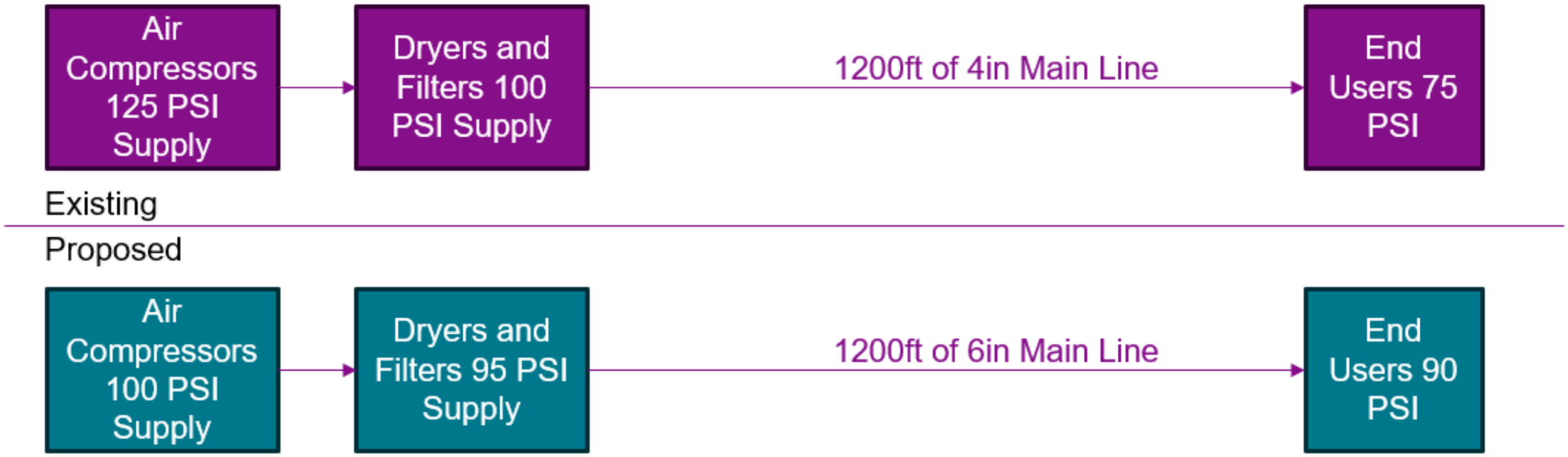


Benefits for small businesses

- Small Business
  - Under 1.5M kwh and 40,000 therms
  - Landlord-tenant & Non-Profit offer up to 100% of project cost
  - Main Streets targeted community programs
  - Lighting incentives (non-controlled)
  - Customer Directed Offer (CDO)
    - No charge application and program pathway assistance

Business Use

Case Study – Compressed Air - Distribution



Avg SCFM: 3,000
Savings: 2,639,000 kWh (Part of New System)
Piping Savings: ~450,000 kWh

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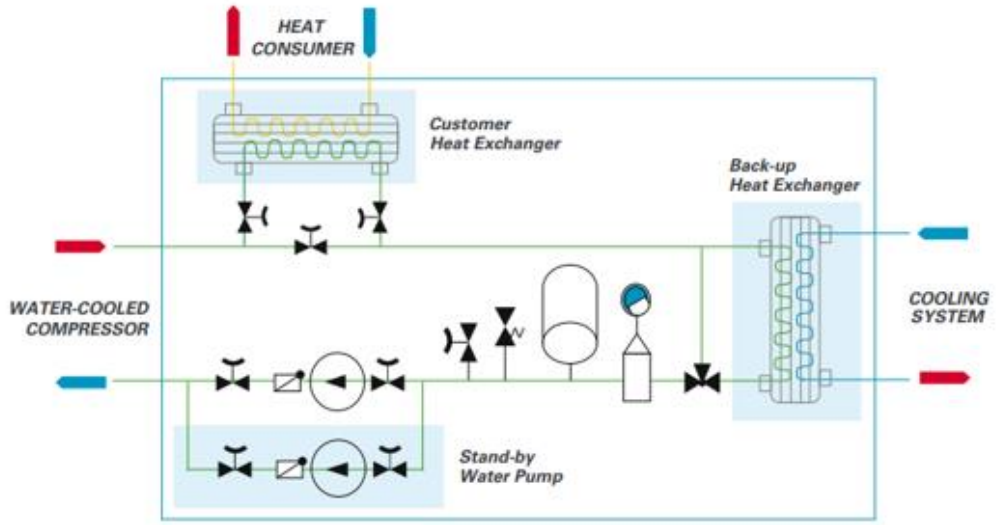
Compressed Air-Heat Recovery

Compressed Air- Heat Recovery



Atlas Copco water to water heat recovery – Used to provide tempered water

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Case Study – Convert Steam to Hot Water

Energy Savings: 19,800 Therms
Hot water is used for clean in place.

<80% Efficient

94% Efficient

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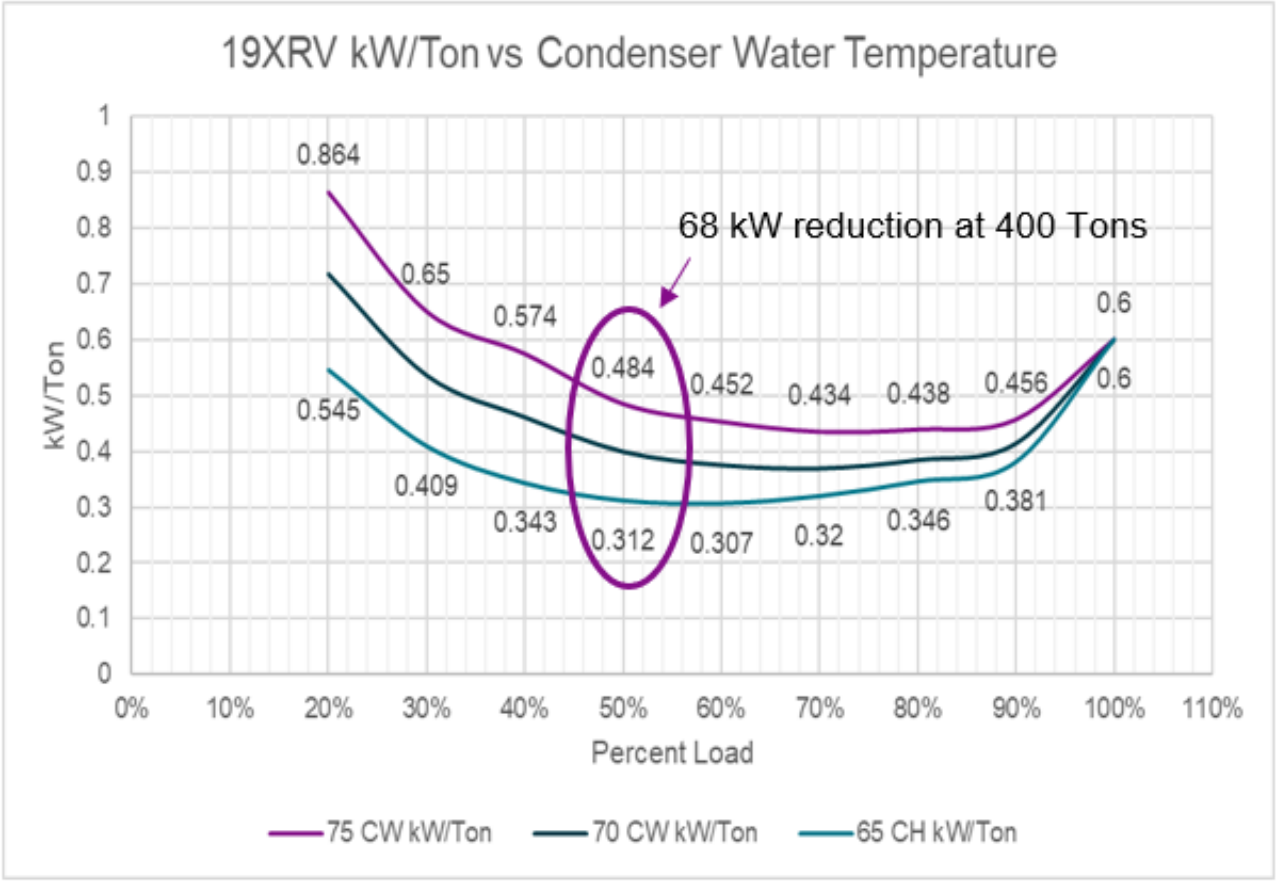
Case Study – Chiller Plant – Condenser water reset

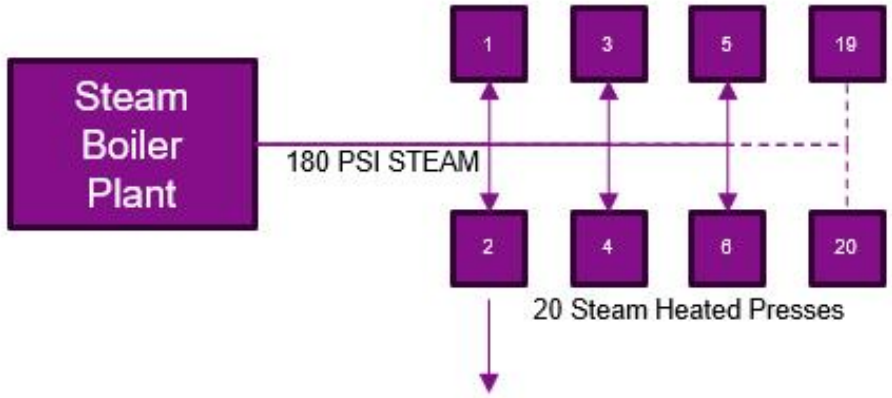
- Customer operating at a fixed 75F condensing temperature.
- Project Cost: $2,933
- Annual Savings: 134,434 kWh
  - Savings in shoulder months only due to Free Cooling.



Case Study – Chiller Plant – Data Center Free Cooling

- Energy Savings: 1,055,000 kWh
- Customer increased chilled water supply temperature from 47F to 52F
  - Added 1,000 hrs of Free Cooling

Case Study– Electrification – Electric Press



- Customer replaced 20 steam heated presses with electric.
- Saving gas and fuel oil
- Lower operating cost
  - Labor Savings – boiler operators
  - Maintenance Savings

89

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Process Improvement Case Study

Process Improvement Project – Scrap Reduction

- Metal Casting Mold Modifications - Material Reduction:
  - Annual Raw Material Saves: 48.125 Tons
  - Energy Consumption per Ton: 500 kWh/Ton
  - Foundry Energy Savings: 24,063 kWh or $2,888 per Year
    - Other Savings
      - Wax (material and heating/cooling)
      - Grinding operation
      - Labor

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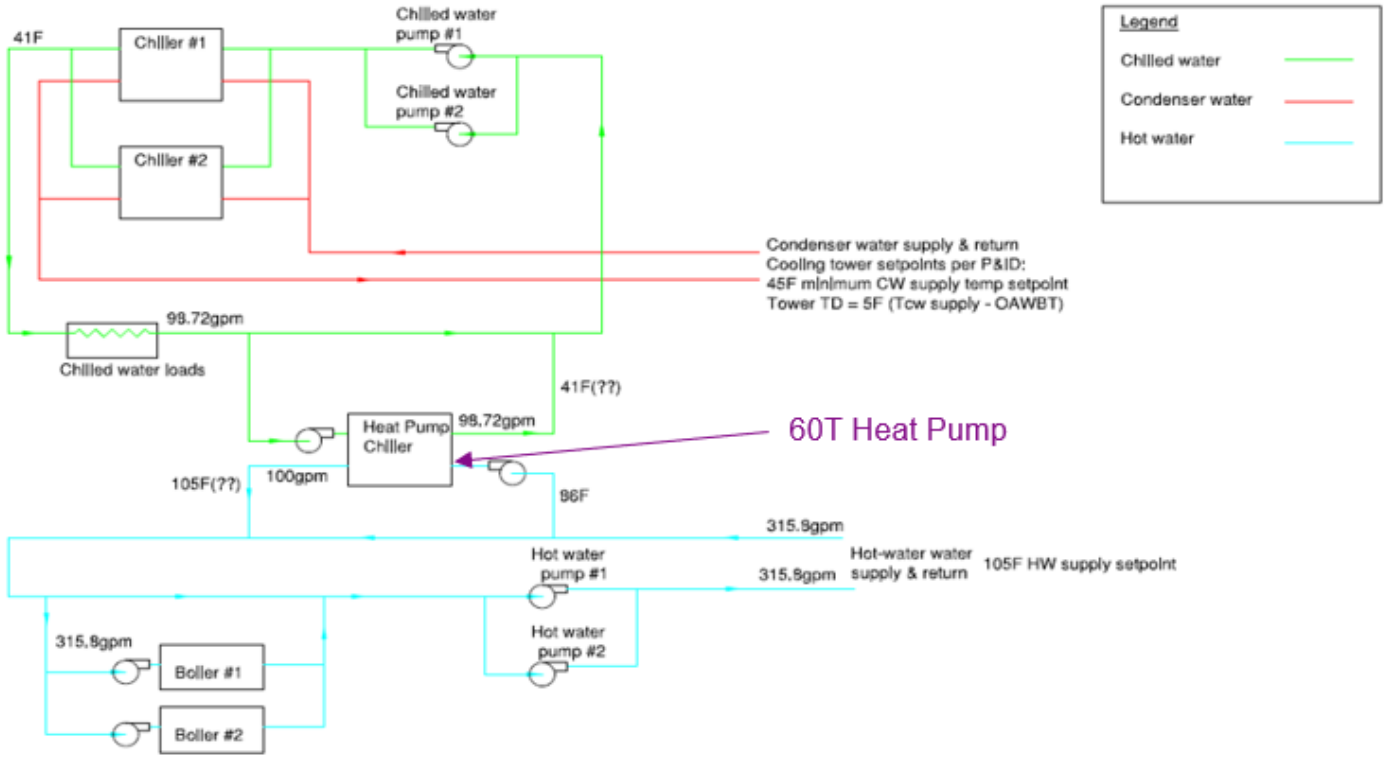
94

Electrification Case Study

Electrification - Case Study – 60Ton Heat Pump Chiller

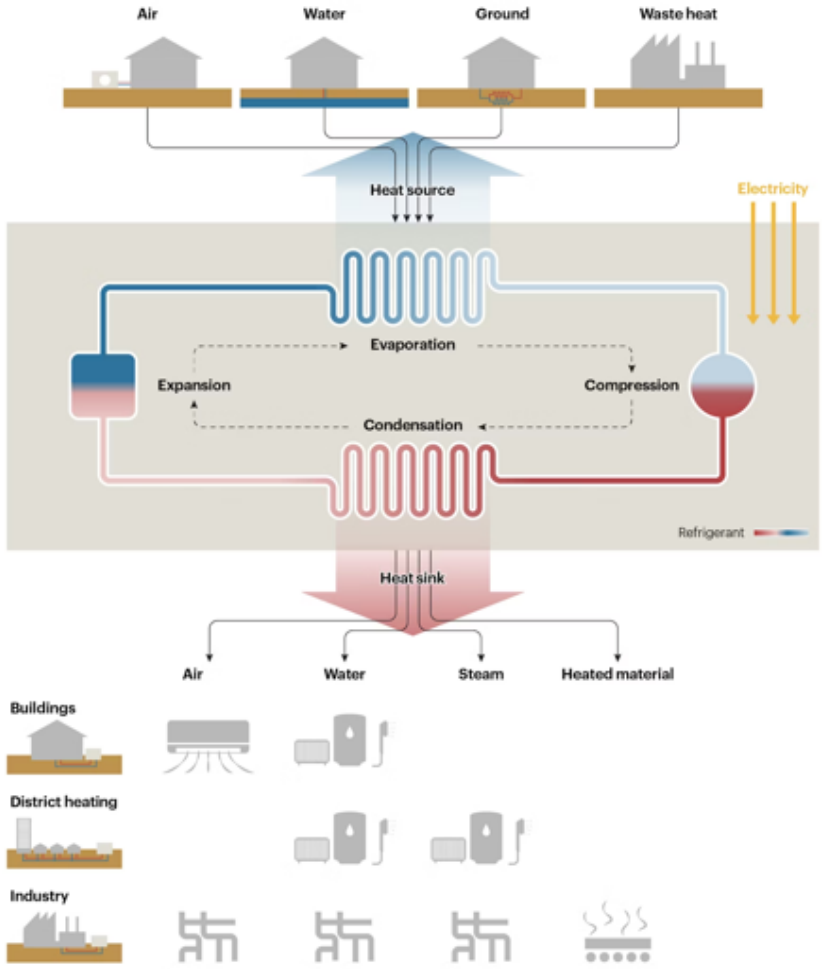
- Heat Pump Chiller
  - -139,187 kWh
  - 59,066 Therms
- High Eff. Chiller
  - 97,279 kWh
- CO2
  - 295 Tons



Electrification Case Study

Electrification – Industrial Heat Pumps

- Heat Source and Heat Sink
- How do you identify a good opportunity?
- What info do you need from the customer?



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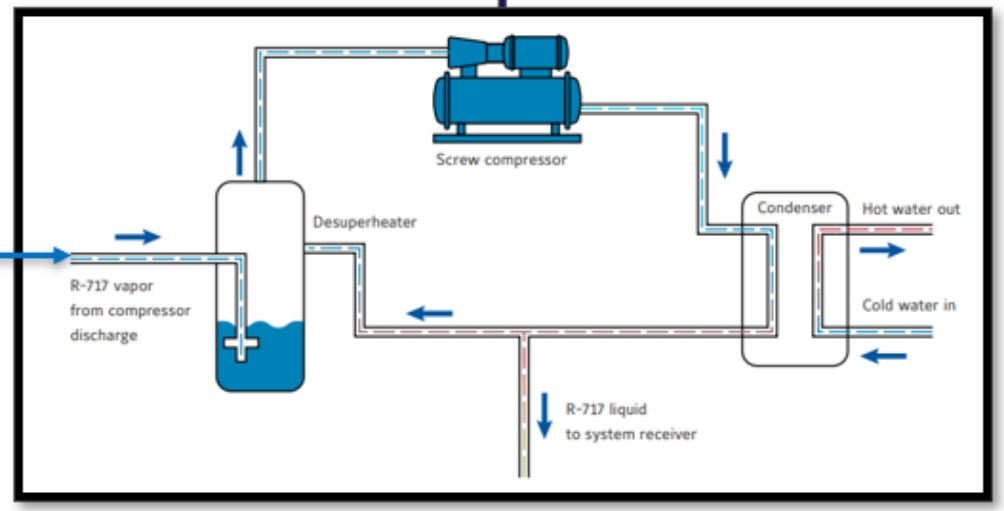
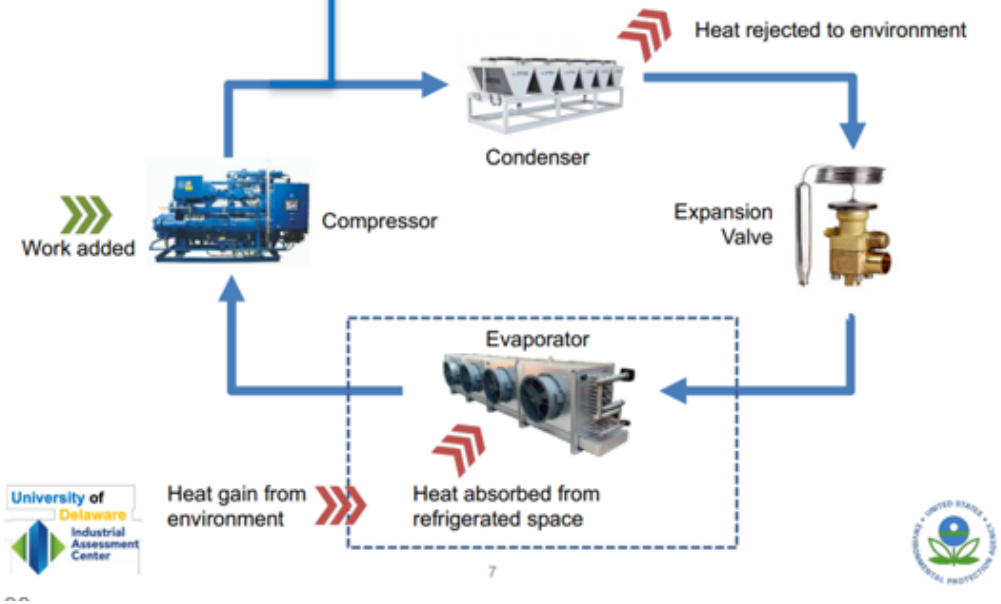
Electrification Replacing Steam Boilers

Electrification – Ammonia Based Industrial Heat Pumps



Frick Ammonia Heat Pump



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Case Study: Adhesive Applications

Hot Melt Coating Line Electrification

Adhesive Applications upgraded their coating line by replacing solvent-based adhesives/resins, which required gas-fired ovens for solvent removal and disposal via a regenerative thermal oxidizer, with a more efficient and environmentally friendly process

The new hot melt coating line uses 100% solid resins with no solvent.
This eliminates the need for the gas fired ovens and the oxidizer in the process.

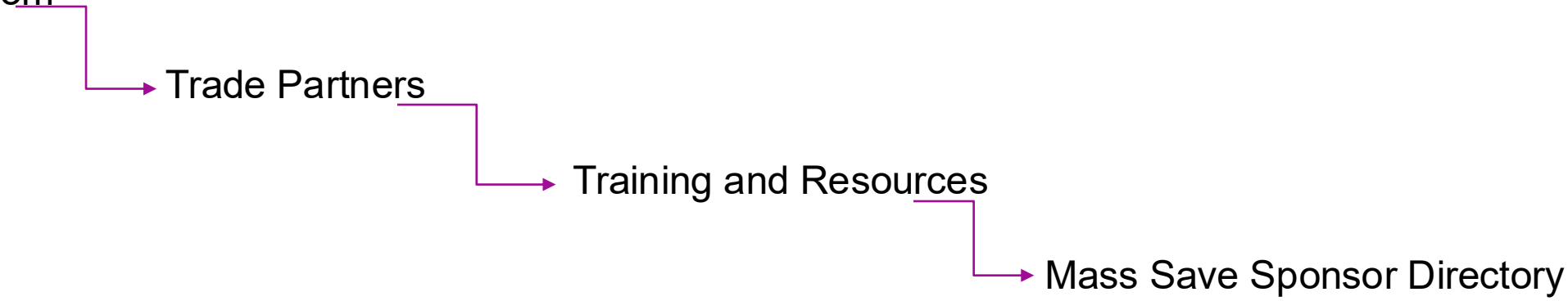
Savings- 114,000 annual therms, or over 20% of usage
Incentive – over $300,000 or over 15% of total project cost

Summary and Next Steps

Engage with your Mass Save sponsor, we want to hear from you!

Go to:

MassSave.com



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Eversource

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Contact TURI for information on upcoming events

June 4, 1:30 PM EDT – Achieving Environmental Justice through TUR
June 17, 12:00 PM EDT – Math for TUR Planners

Pam Eliason, TURI Training Director (pamela_eliason@uml.edu)

Agnes Cheng, TURI Training Associate (agnes_cheng@uml.edu)

When in doubt, please use our general access email: training@turi.org

We welcome your feedback and ideas!