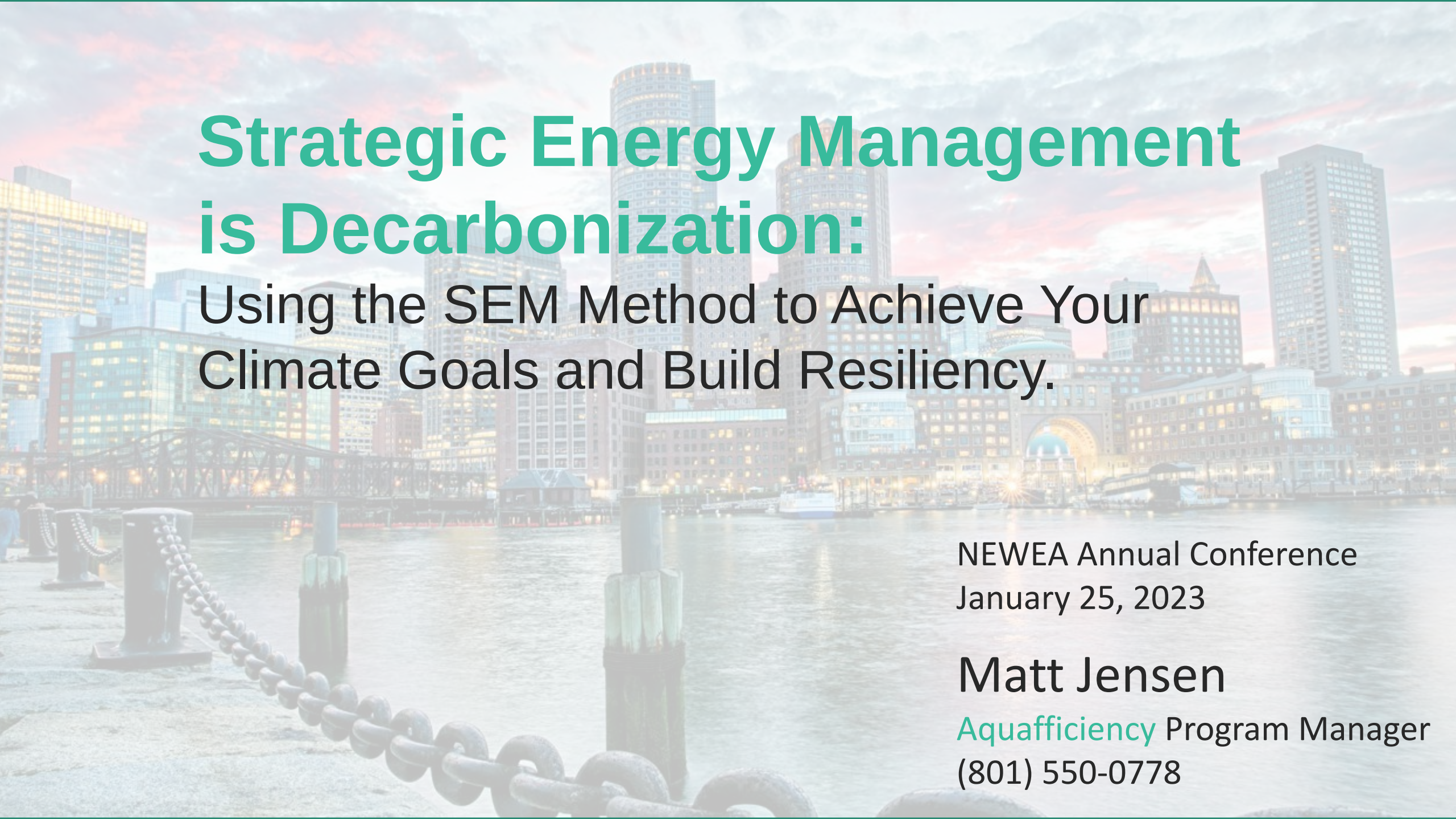




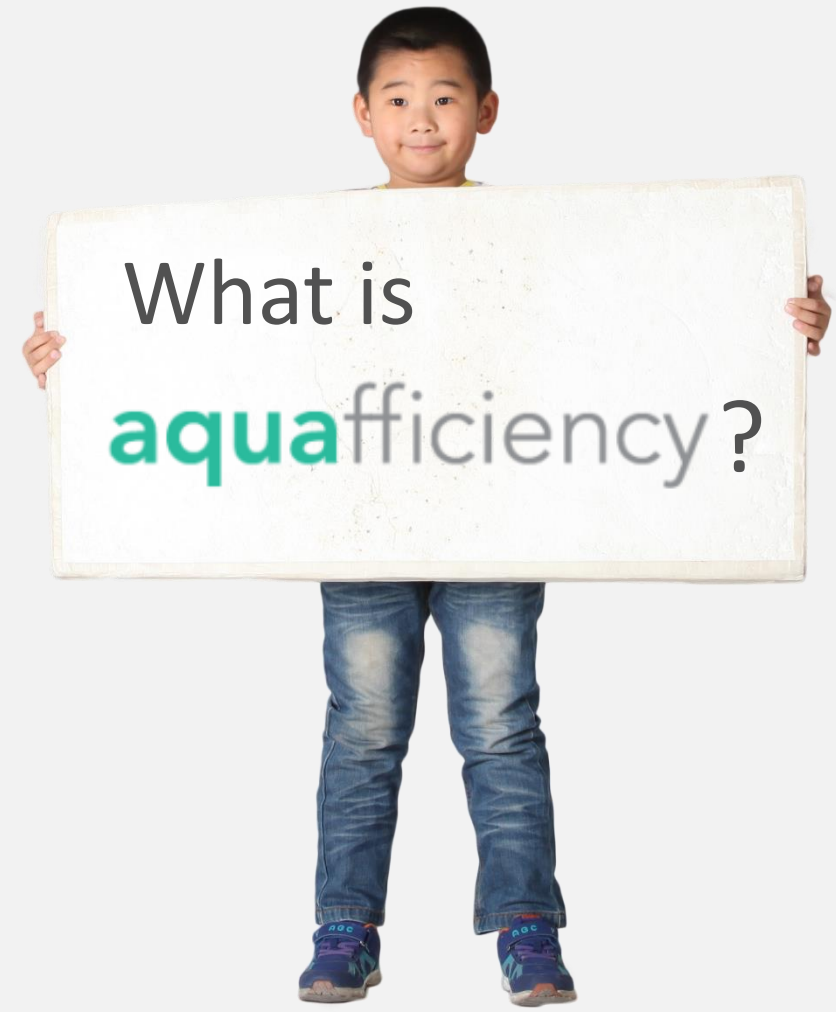
Strategic Energy Management is Decarbonization:

Using the SEM Method to Achieve Your
Climate Goals and Build Resiliency.

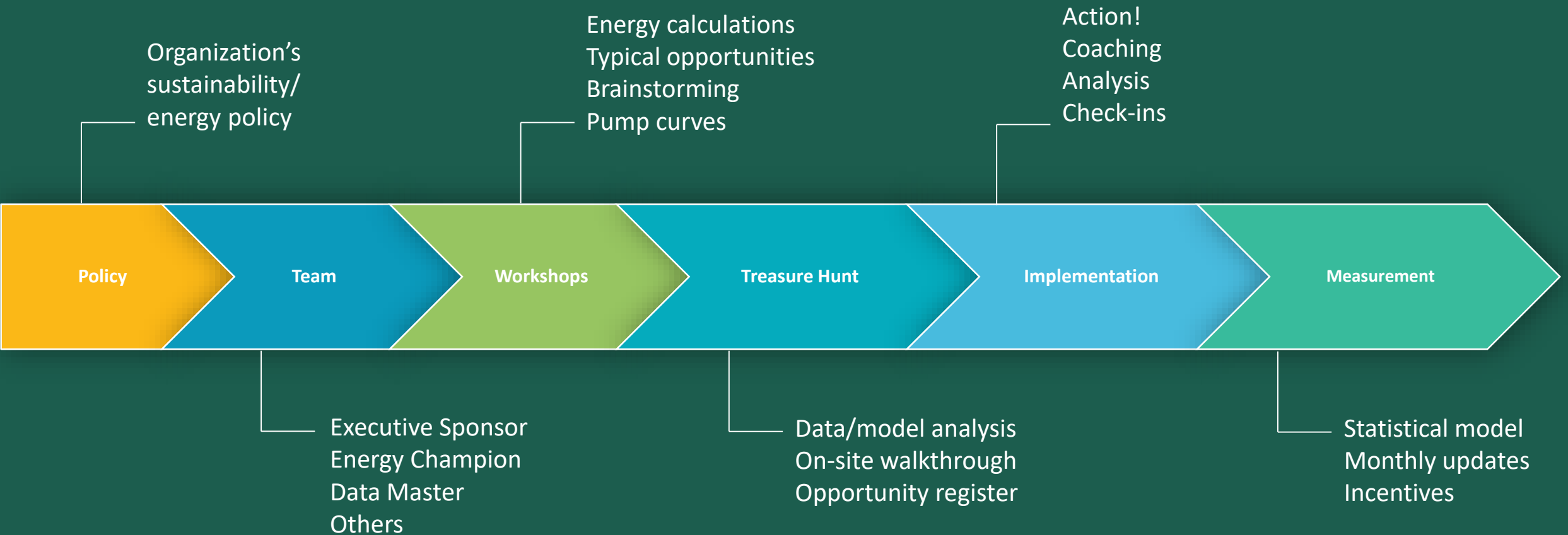
NEWEA Annual Conference
January 25, 2023

Matt Jensen

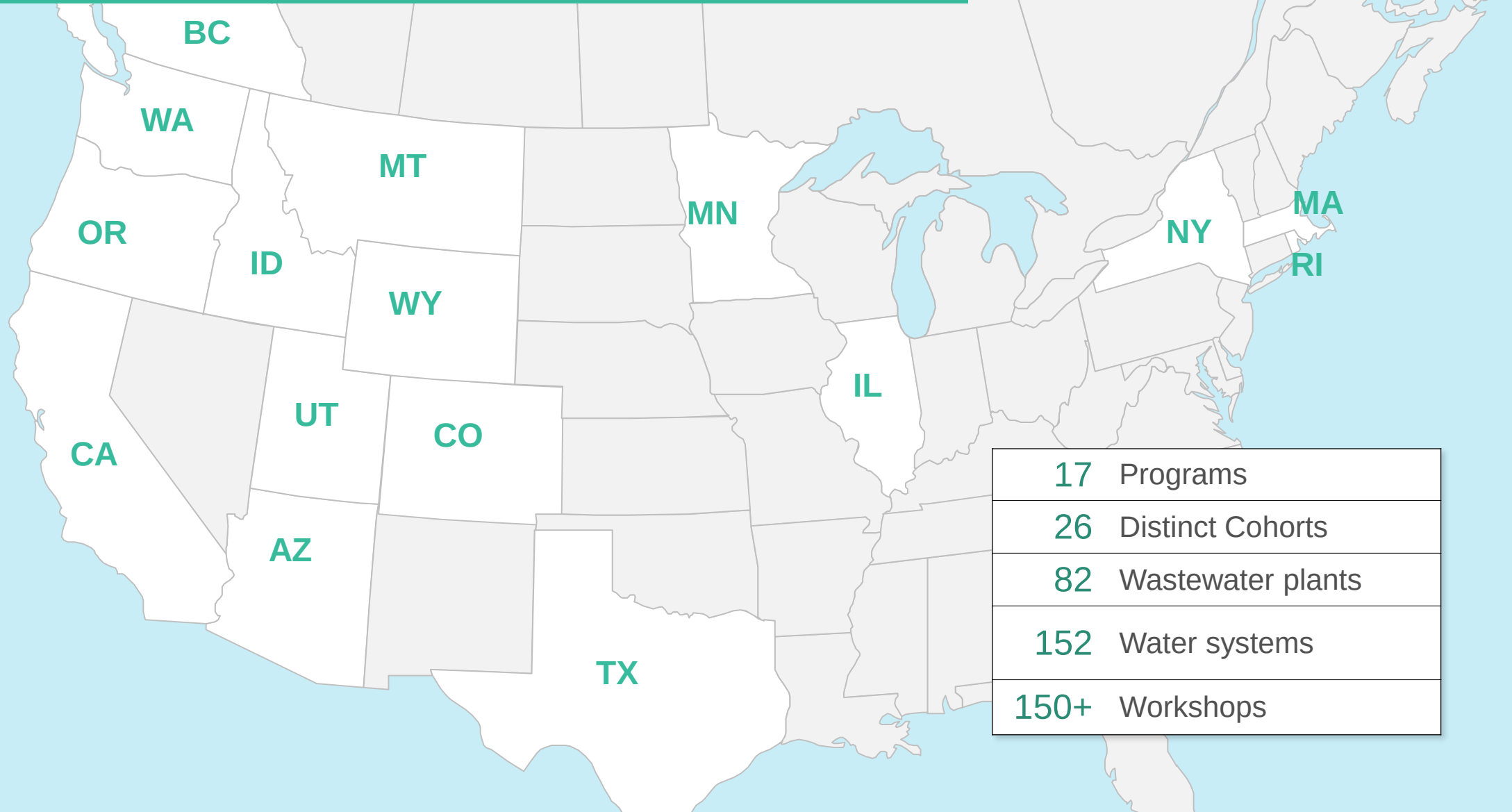
Aquafficiency Program Manager
(801) 550-0778



SEM Process



Our Water/Wastewater SEM Experience



17 Programs

26 Distinct Cohorts

82 Wastewater plants

152 Water systems

150+ Workshops

Saving Money While Saving the Planet: Implementing Massachusetts' Carbon Neutral Goals at Your Facility

What Are We Talking About?

PRESS RELEASE

Governor Baker Signs Climate Legislation to Reduce Greenhouse Gas Emissions, Protect Environmental Justice Communities

Bipartisan Law Will Combat Climate Change While Growing Massachusetts' Economy

MASSACHUSETTS 2050
DECARBONIZATION ROADMAP

Massachusetts' comprehensive climate plan, significantly increases the state's commitment to achieve Net Zero greenhouse gas emissions by 2050. The new law, Senate Bill 9 - An Act Creating a Next Generation Building Code for Municipalities, establishes new interim goals for emissions reductions for municipalities, and allows the Commonwealth to procure an additional 2,400 megawatts (MW) of clean, reliable offshore wind energy by 2027. Building upon the framework established in the Administration's 2050 Decarbonization Roadmap and Clean Energy and Climate Goals for 2030, the bipartisan bill allows the Commonwealth to pursue ambitious climate goals in a cost-effective and equitable manner while creating jobs and economic development throughout Massachusetts.

Of What Language Are We Really Speaking?

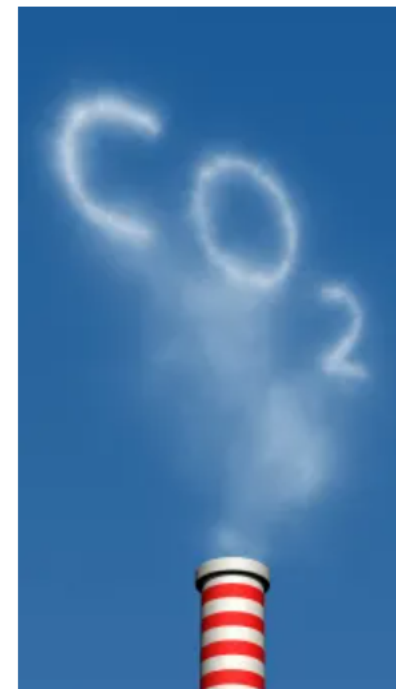
CO₂ EQUIVALENTS

Charts and tables in this Emissions section of our website **convert** all greenhouse gas (GHG) emissions **into CO₂ equivalents** so they can be **compared**.

Each greenhouse gas (GHG) has a different **global warming potential (GWP)** and persists for a different length of time in the atmosphere.

The **three main greenhouse gases** (along with water vapour) and their **20-year** global warming potential (GWP) **compared to carbon dioxide** are: (1)

- **1 x – carbon dioxide (CO₂)** NOTE: Any carbon dioxide added to the atmosphere will hang around for a *long* time: between 300 to 1,000 years. All this time, it will be contributing to trapping heat and warming the atmosphere.
- **84 x – methane (CH₄)** – I.e. Releasing 1 kg of CH₄ into the atmosphere is about equivalent to releasing 84 kg of CO₂. **Methane's 100-year GWP is about 28x CO₂** – but it only persists in the atmosphere for a little more than a decade. **The 100-year GWP is used to derive CO₂e.**
- **298 x – nitrous oxide (N₂O)** – I.e. Releasing 1 kg of N₂O into the atmosphere is about equivalent to releasing about 298 kg of CO₂. Nitrous oxide persists in the atmosphere for more than a century. It's 20-year and 100-year GWP are basically the same.



<https://climatechangeconnection.org/emissions/co2-equivalents/>

How clean is the electricity you use?

Electricity is produced by many different sources of energy, including, but not limited to, wind, solar, nuclear, and fossil fuels. The type and amount of emissions produced depend on how electricity is generated in your region. Type in your zip code (or select a region) to view your power profile. [More Info](#)

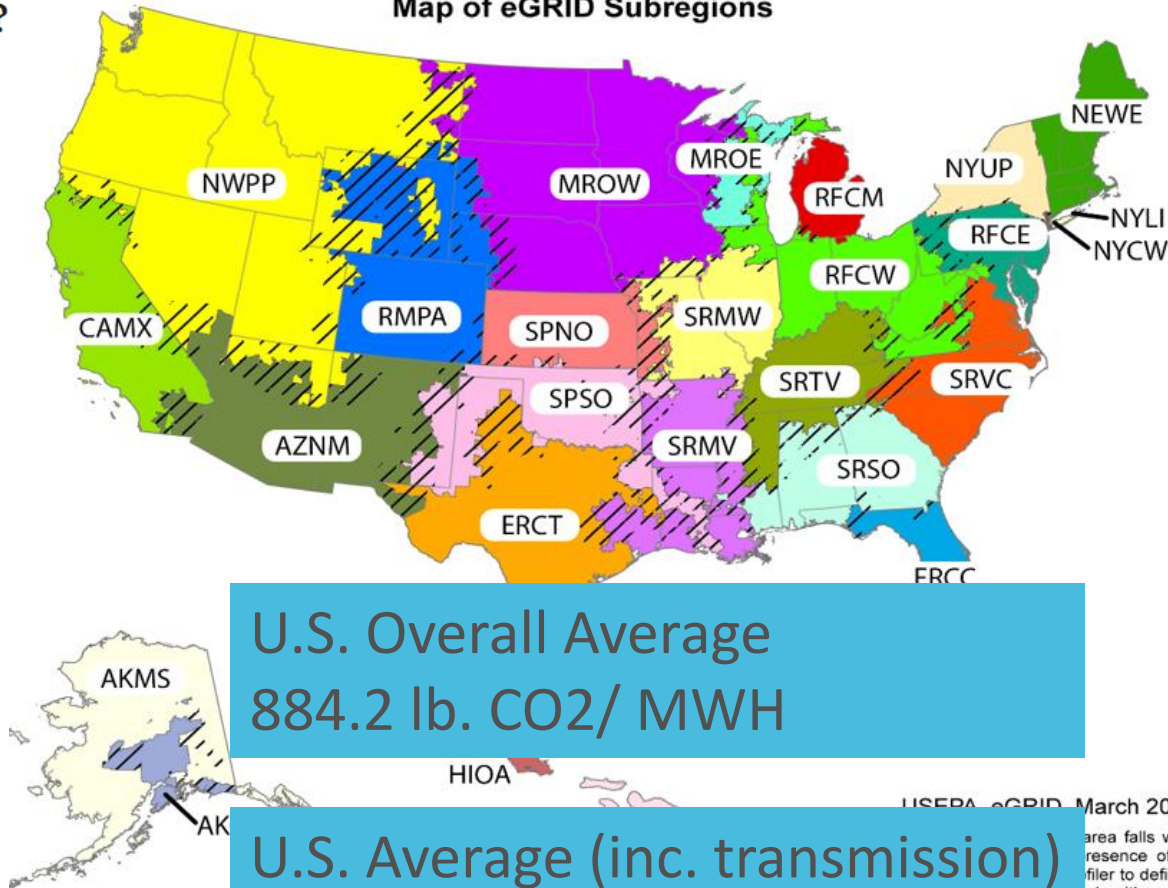
Power Profiler

Enter zip code:

Go



Map of eGRID Subregions



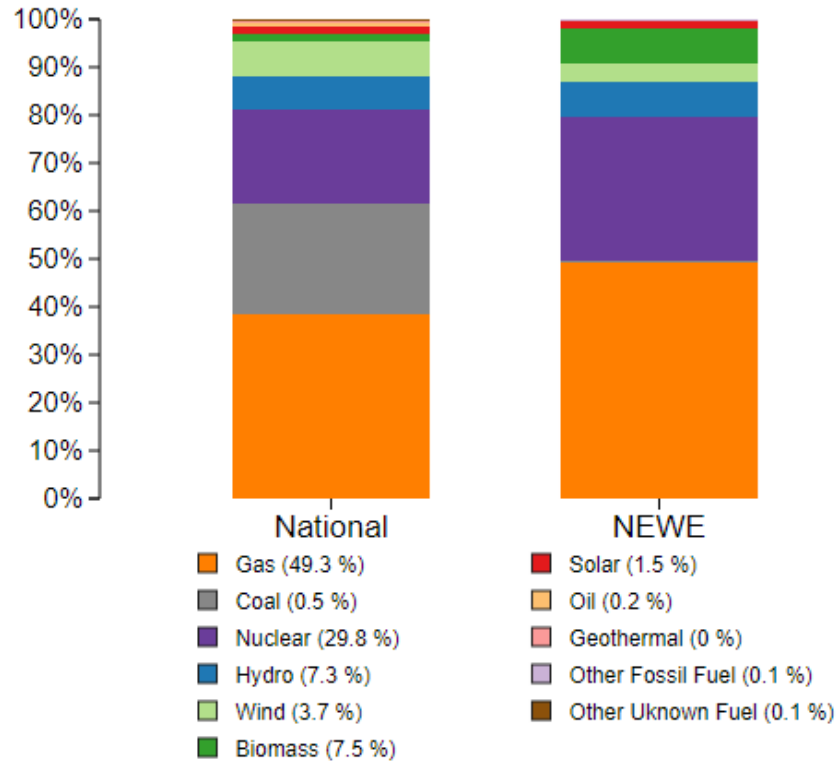
U.S. Overall Average
884.2 lb. CO₂/ MWH

U.S. Average (inc. transmission)
948.7 lb. CO₂/ MWH

USEPA eGRID March 2020

area falls within overlapping
presence of multiple electric
filer to definitively determine
ed with your location and
profiler

Generation



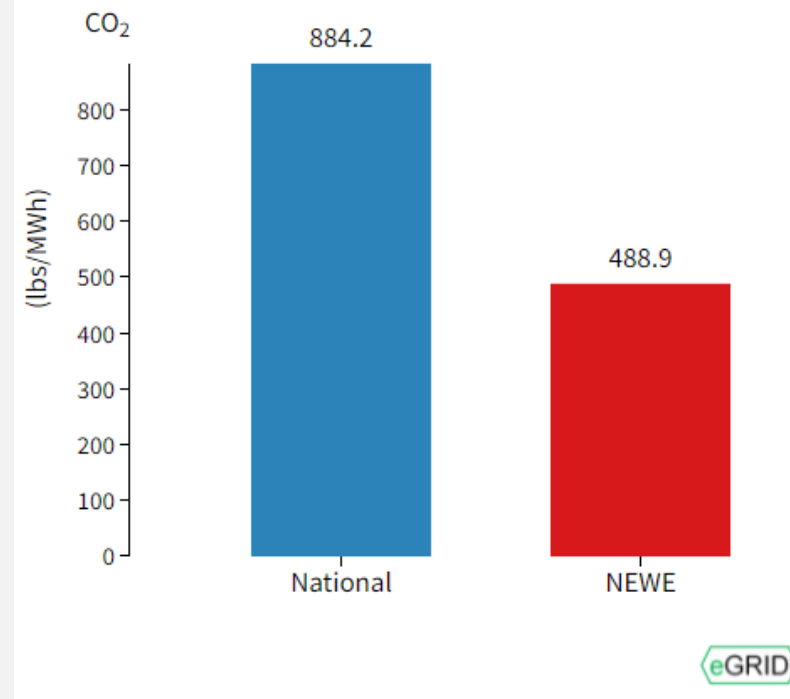
Fuel (NEWE Generation %)



New England (NEWE)
49.8% fossil fuel
29.8% nuclear
7.3% hydro

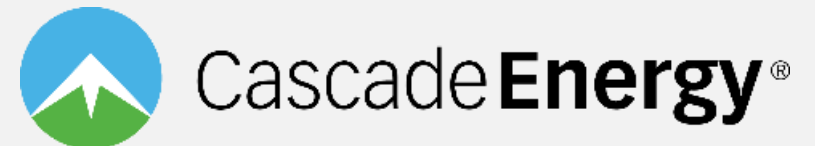
NEWE Average
488.9 lb. CO₂/ MWH

NEWE Average (inc. transmission)
524.6 lb. CO₂/ MWH



Case Study: South Essex Sewerage District, Salem, MA

National Grid Continuous Energy Improvement Initiative



SESD Wastewater Treatment Facility

- Regional WWTP that serves Salem, Beverly, Danvers, Marblehead, and Peabody
- Secondary WWTP
- Pure oxygen secondary treatment process
- Average daily flow of 28 MGD, peak capacity of 99 MGD
- Average daily electrical load of 2,000 kW
- Year-round thermal demand for process heat loads (Odor Control)



SESD Energy Management Program

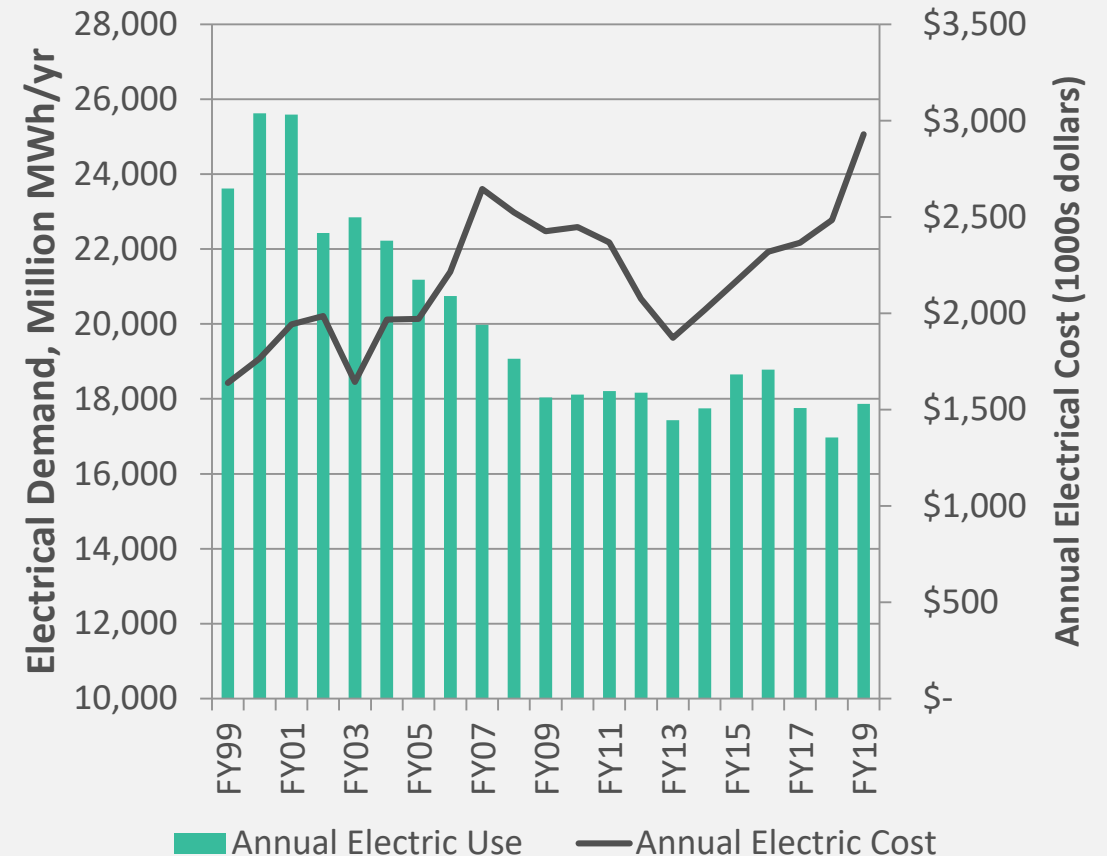
- **Started in 2002 to assist in reduction of O&M costs**
- **Formed Energy Use and Conservation Team**
- **Worked with electric and natural gas utilities and suppliers**
 - ▶ Investigate rebate and incentive programs
 - ▶ Certified Building Operator/Energy Manager
 - ▶ Motor Management Plan
 - ▶ 5 Year Rotating Electrical System preventative maintenance and CIP Plan



Electrical Optimization

- HVAC air balancing
- Replaced interior lighting with T8/T5 fluorescent, LED and tritium gas type lamps
- Replaced emergency exit lighting with LED lamps
- Continued use of NEMA Premium efficiency motors for all new and replacement purchases
- Optimized aeration mixer speeds
- Installed new high efficiency aeration mixer blades
- Improved oxygen feed control to secondary reactors
- Optimized water chilling system for Admin/Maintenance building
- Lighting automation controls
- VFDs installed on HVAC fans

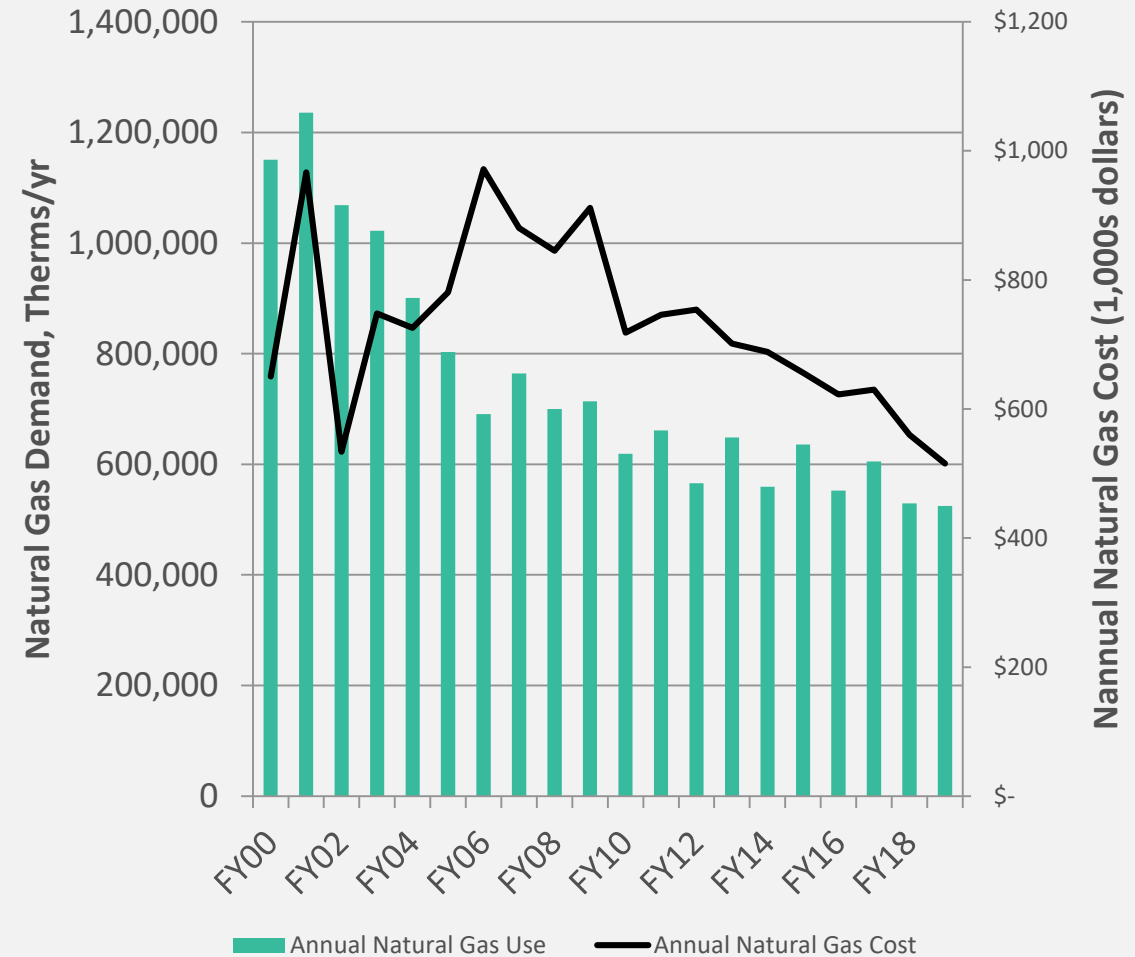
Electrical Demand and Cost Trend



Natural Gas Optimization

- HVAC adjustments for occupied vs non-occupied building space
- Replaced facility roofing, improved insulation
- Replacement of some boilers and burner units
- Tightened seasonal control strategy for heat intensive process needs (i.e. odor control)

Natural Gas Demand and Cost Trend

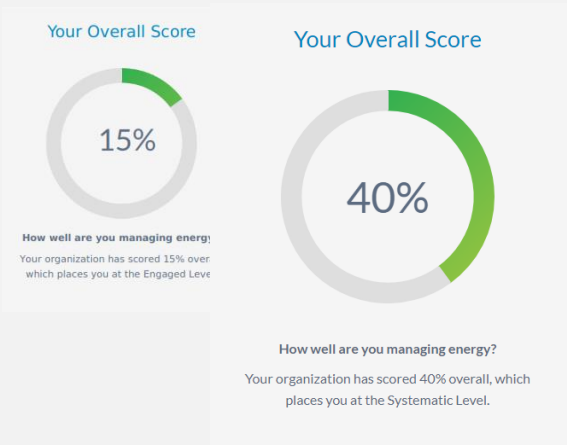


National Grid-Sponsored Continuous Energy Improvement (CEI/SEM)

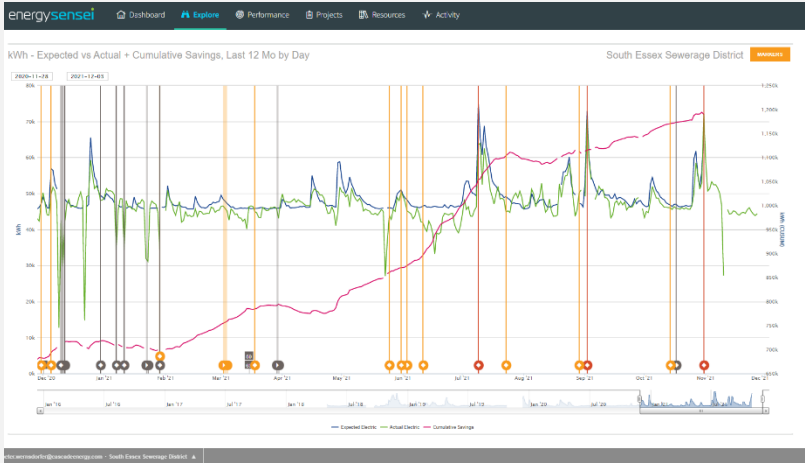


And a goal of further savings of 5% on their consumption

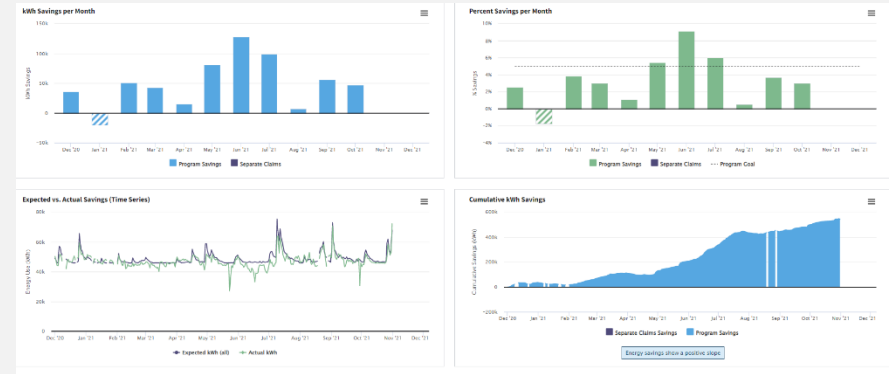
Finding Energy Savings – Tools and Techniques



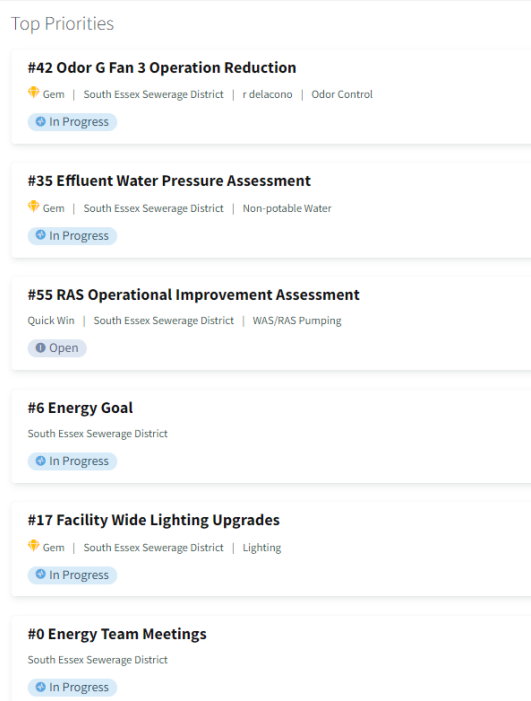
EMA



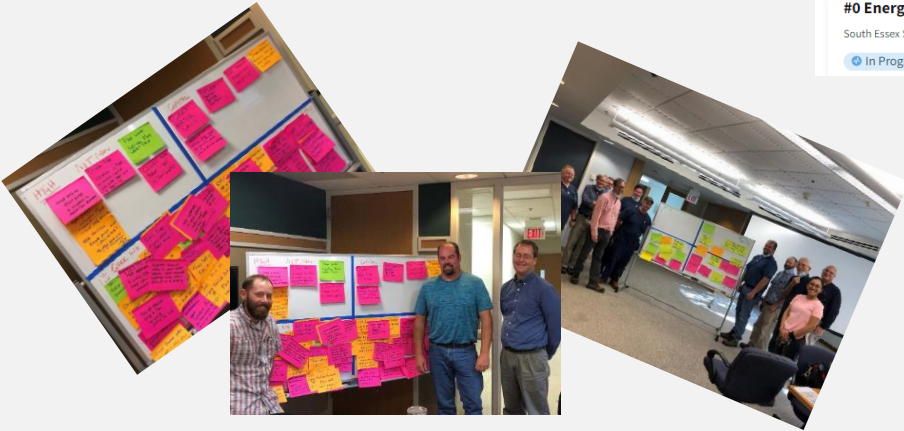
Linear Regression Modeling



Savings Tracking



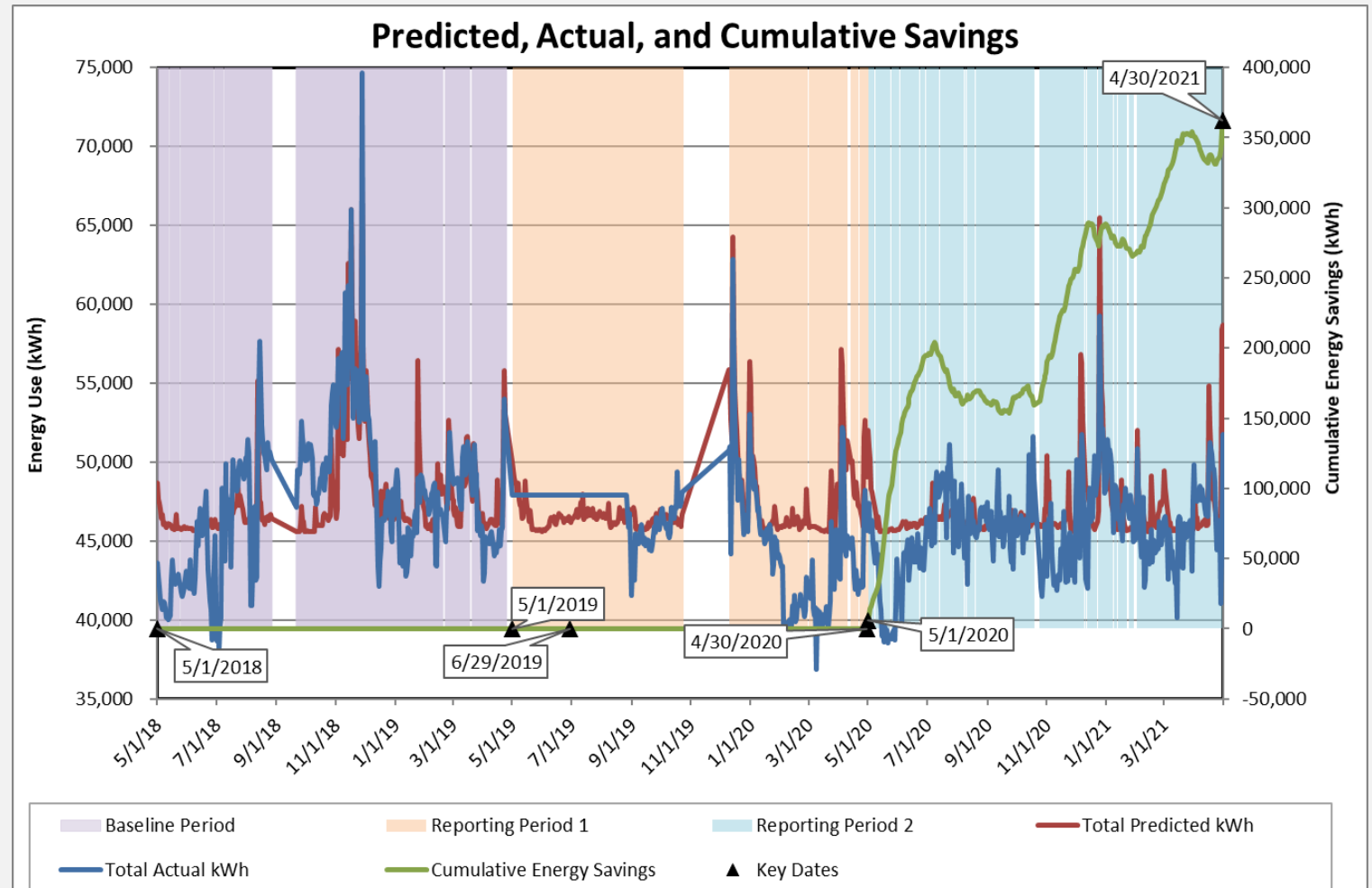
Project Tracking



Treasure Hunts

Savings Achieved

(4/1/19 – 10/20/21)
1,190,000 kWh
\$167,193 electric cost
\$35,820 incentives
~230 hp off-line
846 metric tons – CO₂-e



<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Energy

Save the ~~Cheerleader~~...

Save the World!

We can help

HEROES

Thank You!

Matt Jensen

Aquafficiency

Program Manager

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801-550-0778

Rob Hart

SEM Coach

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