



# PEPSICO



**Fuel Utility Incentive Supporting Boiler Heat  
Recovery Project**

CEM/PE

BS/MS Mechanical Engineering

LSS Black Belt

## Work Experience

- Energy Consulting
- Facility Engineering (GE)
- HQ Sustainability Engineering (PepsiCo)

## Personal Interests

- Visited all but 6 national parks in continental US in 49 states
- Backpacked over 500 miles in Great Smoky Mountain's National Park
- Traveled to 49 states
- Renovated/built 4 homes
  - Next one will be off the grid



# AGENDA

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Company Overview

2

Project Background

3

Partnership with Utility

4

Conclusion

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## Nutrition



## Snacks



## Beverages



## Internal to Operations

### GOAL NO. 1

Cut water use  
by 25% by 2025

60%  
of NAB's  
beverage volume



### GOAL NO. 2

Reduce absolute GHG  
emissions by 20% by 2030

330,000  
metric tons



### GOAL NO. 3

Eliminate waste  
to landfill by 2025

5,700  
metric tons



## External to Manufacturing

### GOAL NO. 1

Replenish 100% of water use  
in scarce areas

**1.5**  
billion  
gallons



### GOAL NO. 2

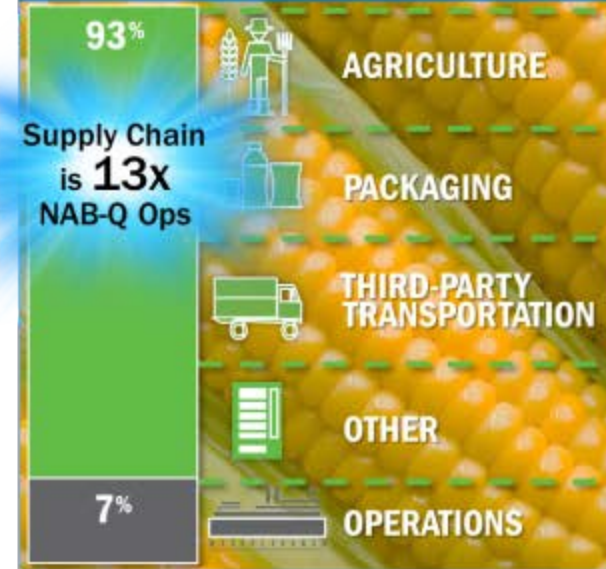
Sustainably source  
raw materials

HFCS; Sugar;  
Oats; Oranges



### GOAL NO. 3

Eliminate 20% of supply chain  
carbon emissions



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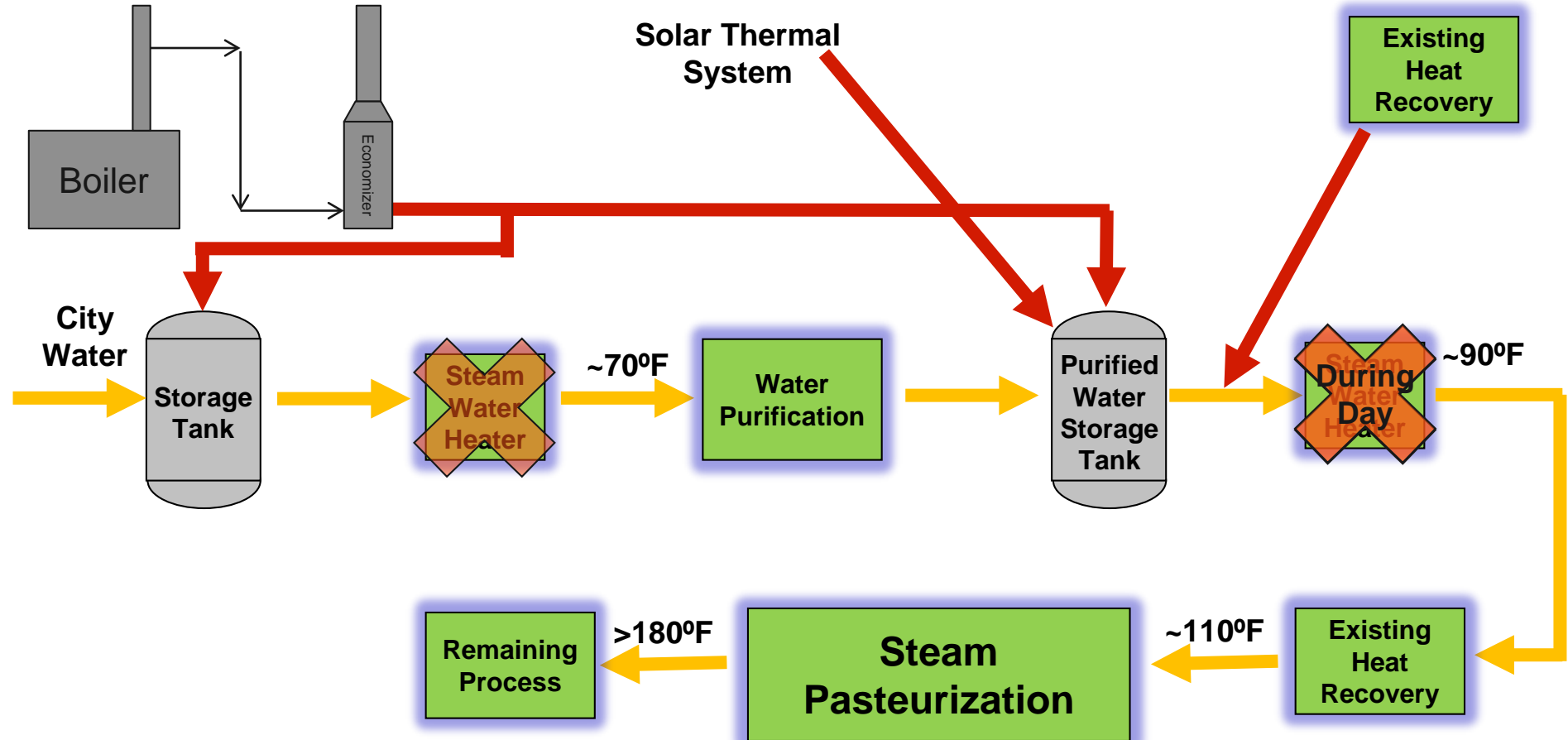
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# Typical Heat Recovery Systems



- Heat Sink Availability
  - Maximum allowable temperature can not be exceeded for mixing of ingredients
  - Existing heat recovery system provided good portion of low grade waste heat
  - Solar thermal system and existing HR provided 100% of heat requirements while the sun was shining ~2,000 hours
- Economics
  - Reduced hours of savings project could not meet minimum requirements to get funded

A green, diamond-shaped sign with the word "Challenges" written in white, sans-serif font. The sign is mounted on two wooden posts and is set against a background of a blue sky with scattered white clouds. The sign is slightly tilted and has a white border.

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- [www.DSIREUSA.org](http://www.DSIREUSA.org)

**DSIRE**<sup>®</sup>

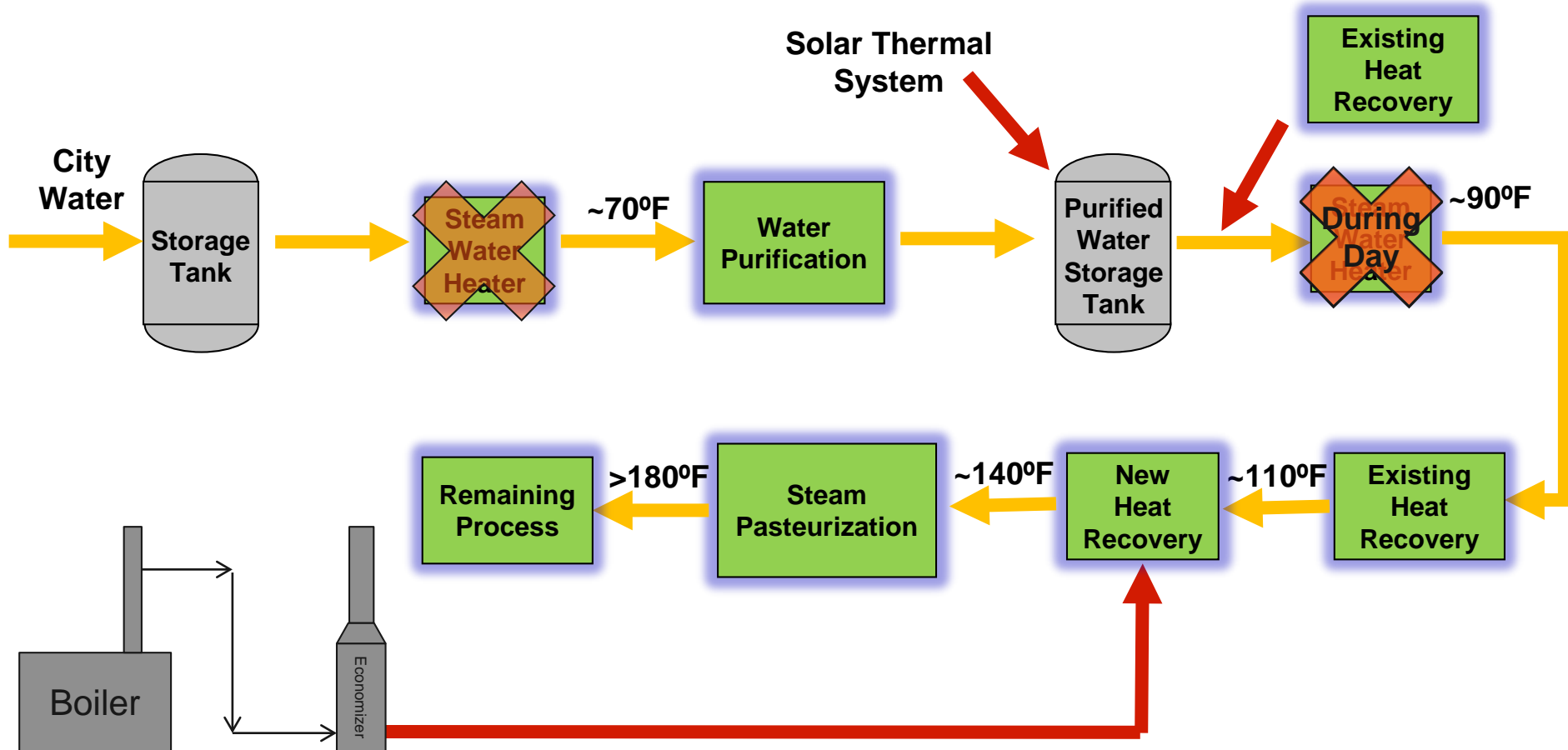
- Operated by the N.C. Clean Energy Technology Center at N.C. State University and is funded by the U.S. Department of Energy
- Excellent source to investigate national database of energy reduction incentives
- Free resource but does accept tax deductible donations

- Initial Investigation
  - Heat Recovery Project was developed in 2015
  - SouthWest Gas
    - No prescriptive fuel incentive for this type of project
    - Custom fuel incentive - \$1/therm
  - Site was on 10 year contract through 2016 and not served under traditional tariff schedule
  - Site was not eligible for any incentive



- 2017
  - Contract had ended and site went on traditional tariff
  - Fuel pricing increased
  - Eligible for incentive
- Original project still could not meet economic hurdle
  - No savings when sun shined

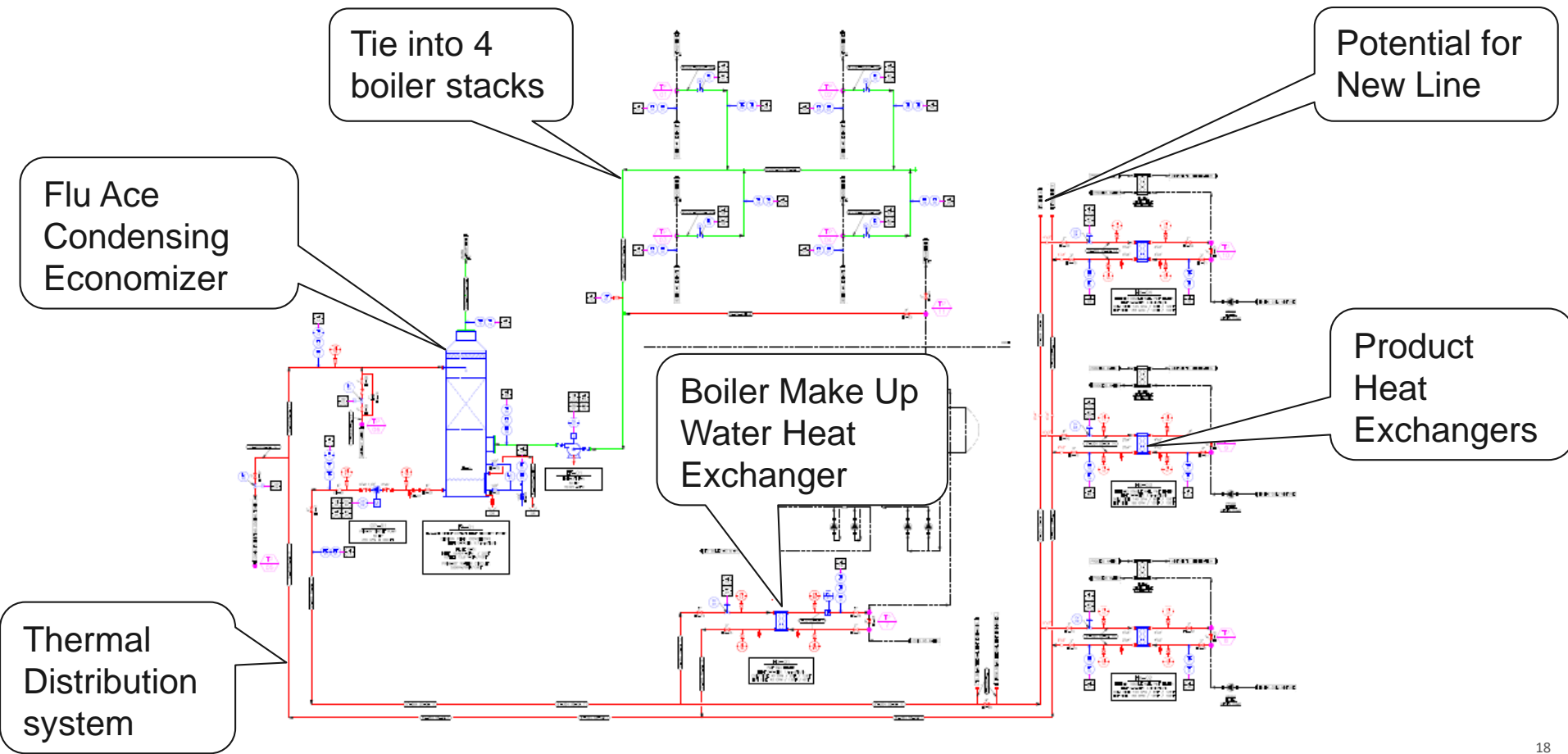
# Innovative Heat Recovery Systems



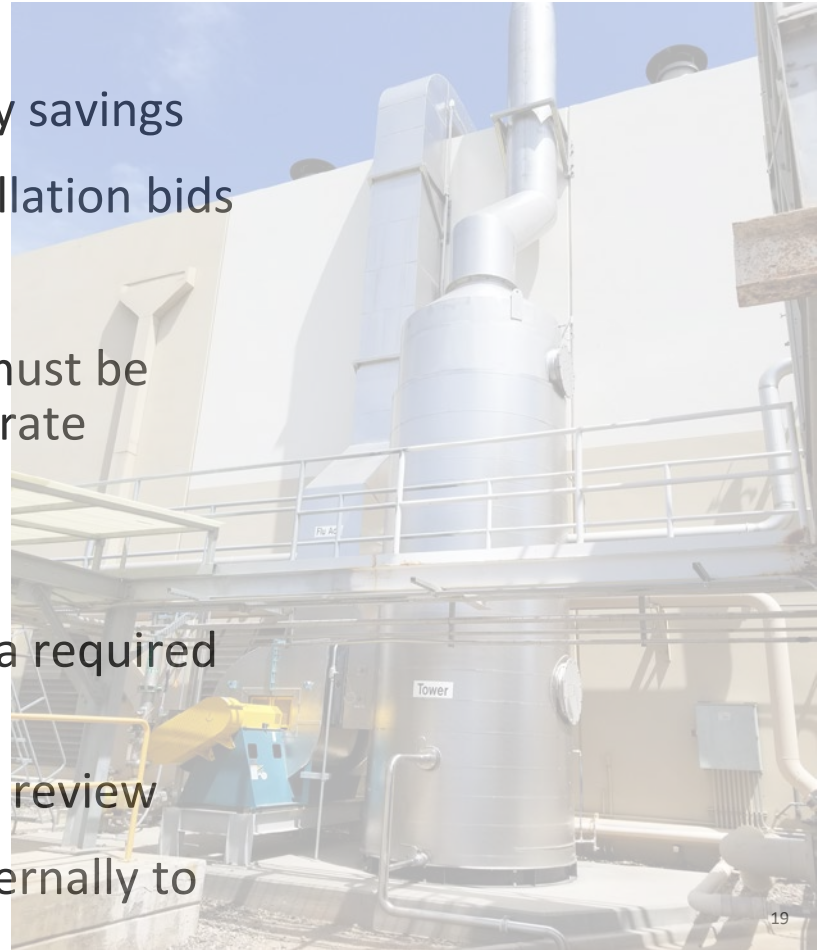
- Product Heating Recovery System
  - Increased costs do to higher temperature and product heating and controls
  - Significantly increased savings – operate continuously
  - New project along with utility incentive met minimum return to get funded

- Collaboration with other functions were needed to move forward with the revised plan
  - Utility – to revise the incentive
  - Consulting and internal engineering – update all the modifications
  - Quality Control – work within allowable specifications
  - Operations – must be robust in operation

# Product Heat Recovery System P&ID



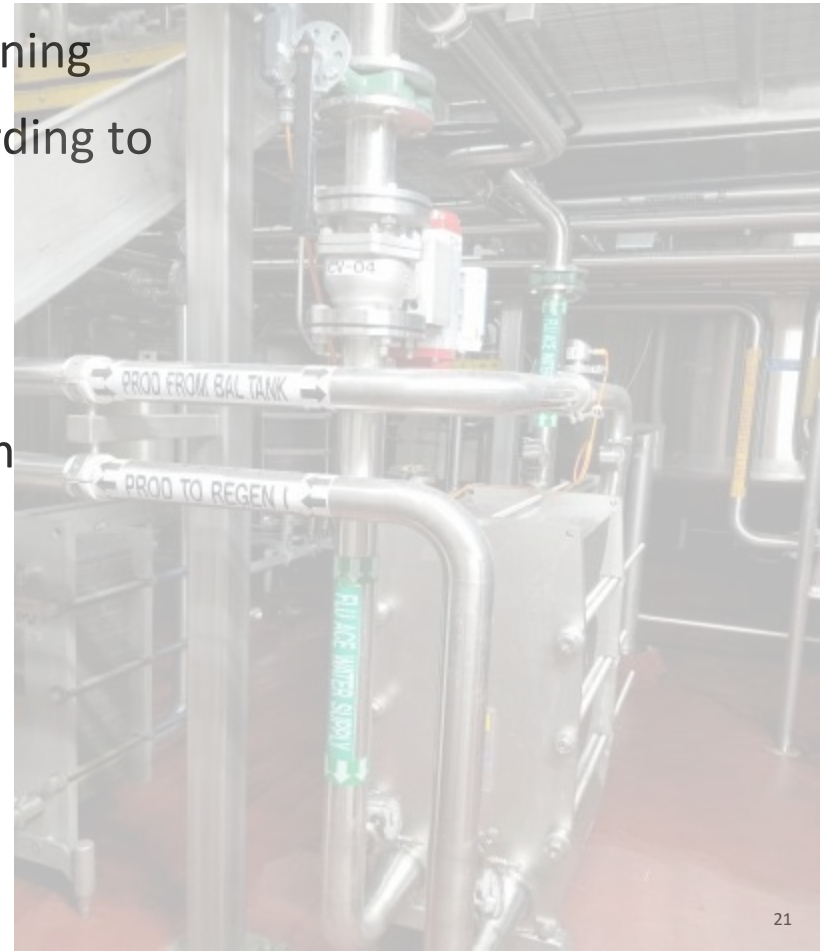
- Completing an application
  - Engineering calculations are needed to verify savings
  - Design must be close to complete with installation bids
  - Commissioning plan must be completed
  - Measurement and verification (M&V) plan must be completed and proper metering to demonstrate savings
    - Simple M&V or **Full M&V**
    - One continuous month of operational data required to demonstrate annual savings
  - Meet with local utility providing incentive to review
  - Utility then takes information and meets internally to decide to approve



- Incentive Timeline
  - Maximum amount is communicated
  - Project execution
  - Commissioning
  - M&V
  - Final acceptance and payment



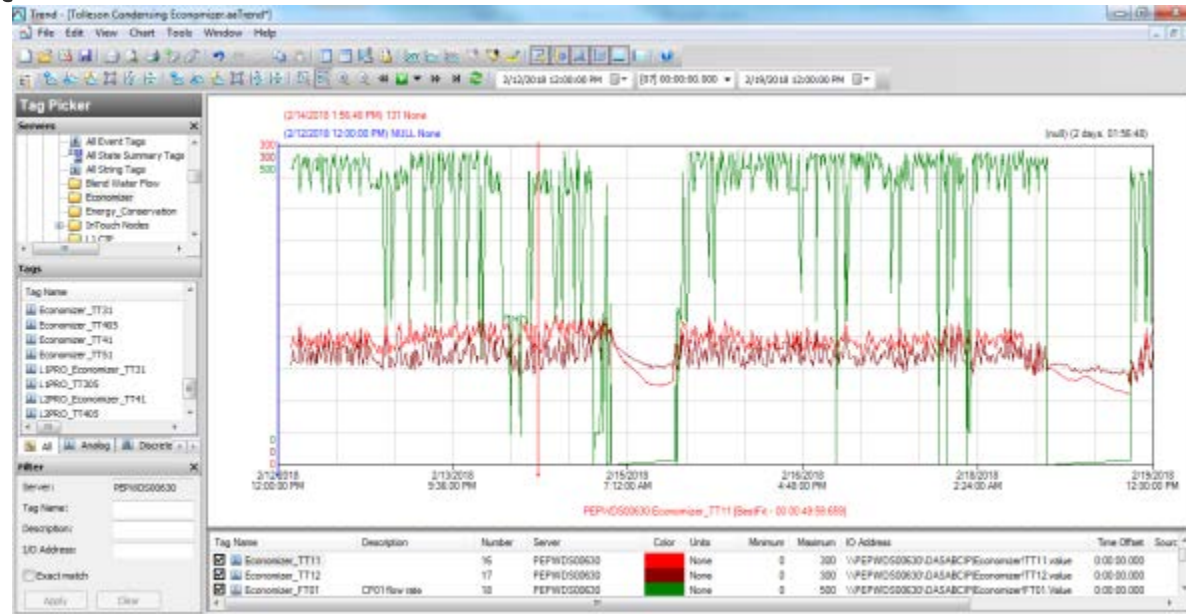
- Support form general contractor on commissioning
  - Report indicating project is completed according to design
    - Includes I/O verification
    - Balance combustion ducting system
    - Balance water thermal distribution system
    - Submitting report

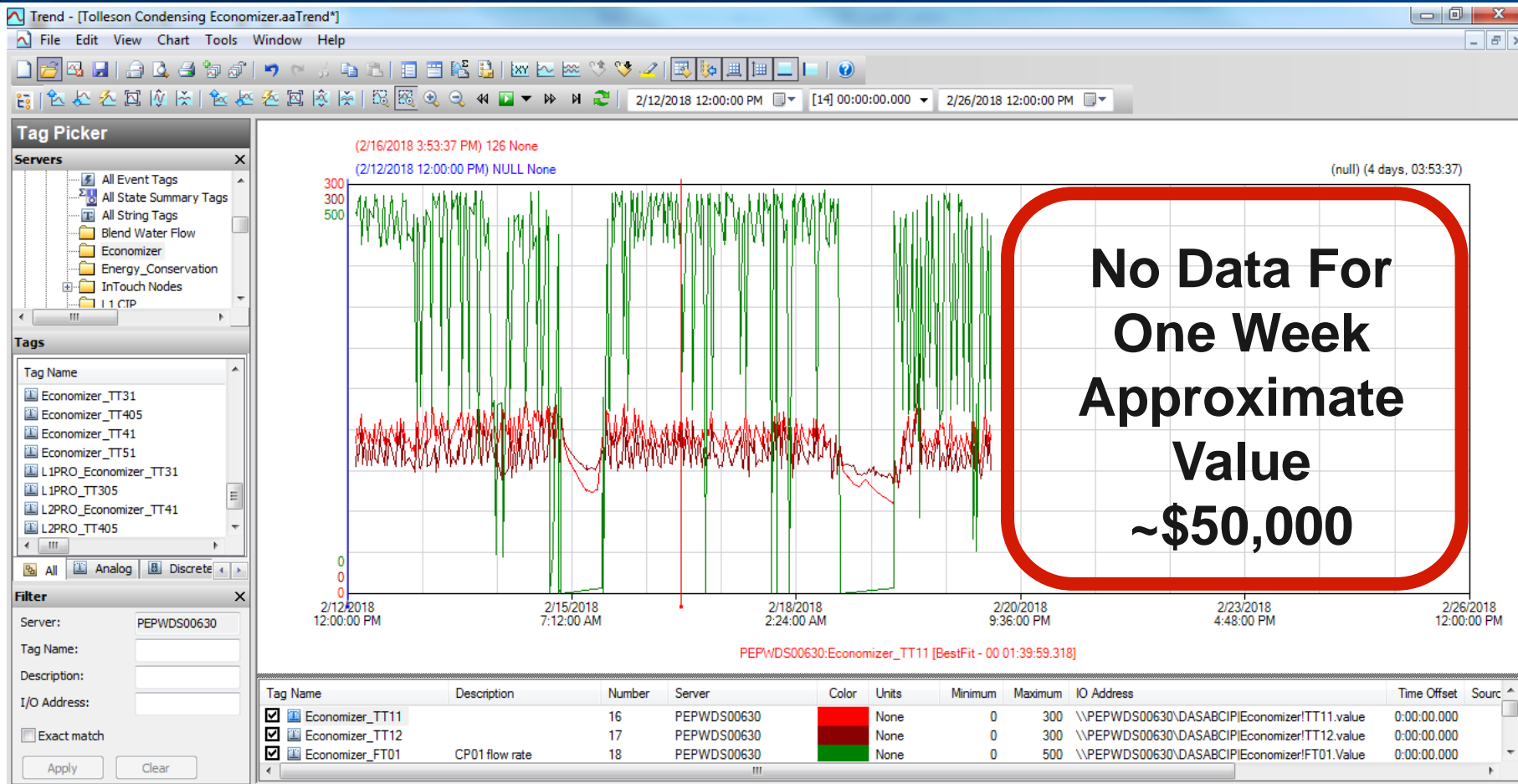


- Instrumentation selection
  - Verify it's accuracy and range to provide acceptable information
  - Verify its communication protocol with data collection system
- Data collection system
  - Must be robust to gather and store the amount of information required in the M&V



- Incentive amount is based on actual operation and data collection
- It can be reduced if meters not functioning, heat recovery system is down, or data can not be collected
- This project was one continuous month M&V
  - Actual M&V savings are multiplied by 12 to calculate annual incentive
  - If the hourly incentive is \$40-\$50/hour then incentive is \$480-\$600 per hour of M&V



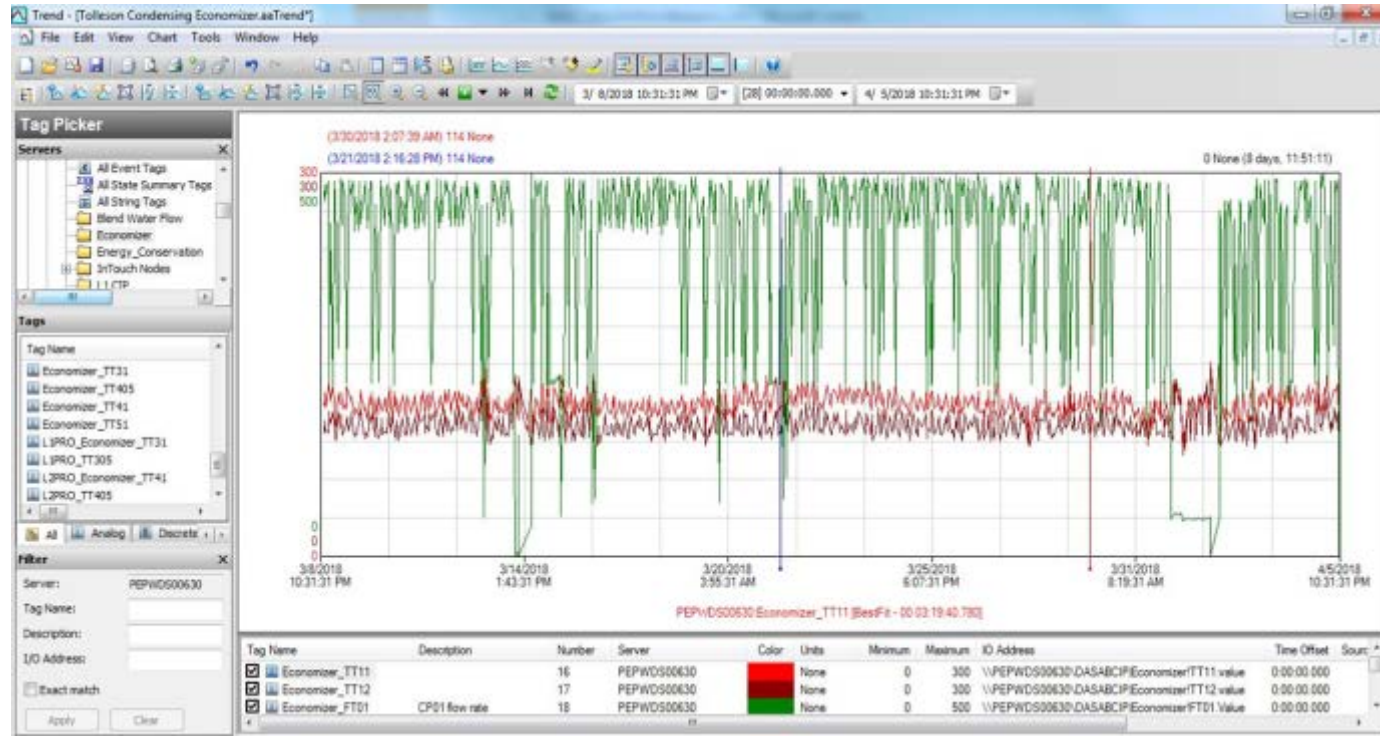


- Investigation
  - Industrial Historian went off line and stopped collecting data
  - No way to retrieve lost data
- Communication with Utility
  - Open and honest
  - They were willing to extend the M&V period by one month



- Collaboration and Partnership with manufacturing site
  - With the knowledge of the value of the M&V
    - Secured plant senior level support
    - Historian put on line
    - A spare second backup historian was installed
    - Mechanics were scheduled to stop and investigate system on each shift
    - A visual alarm was installed in a common location as the plant
    - Controls team continuously monitored the historian

- Perfect operation for monitoring period
- Receive full incentive
- Other benefit
  - All these tactics remain in place to maintain reliability and savings of the system





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- Successful sustainability results in corporation are attained through partnerships and teamwork throughout the organization
  - Senior management level support to create goals and provide resources to be successful
  - Engineering to develop and implement projects
  - Plant managers to provide resources to implement best practices
  - Maintenance to keep systems operating flawlessly
  - Team members to utilize resources effectively during production

- Achieving goals also depend on relationships with external resources
  - Local utilities
    - Support identifying opportunities
    - Taking advantage of rate schedules
    - Training opportunities
    - Utility incentive support on sustainability projects
  - External professional organizations
    - Provide expertise for complex projects
    - An external reference will open ideas

**QUESTIONS?**