



50001 Ready Overview

September 2018

Advanced Manufacturing Office
Training for End Users

EnMS – What & Why?

- An **energy management system (EnMS)** integrates active energy management into everyday business systems and procedures.
 - This enables organizations to better manage energy usage, to achieve operating cost savings, and to continuously improve energy efficiency.
 - Active management results in the continued implementation of **energy actions**.



A management system is:

- ✓ Say what you do
- ✓ Do what you say
- ✓ Prove it
- ✓ Improve it

ISO 50001 Energy Management Standard

- How it was developed:
 - UNIDO requested ISO to develop an EMS standard in 2007
 - 44 ISO member countries and 14 observer countries participated
 - ISO 50001 was published in 2011 with revisions expected in 2018
- What it is:
 - An **Energy Management System framework**
 - A management model for continual improvement similar to existing models for quality (ISO 9001) and environmental management (ISO 14001)
 - A **requirements specification** for establishing, implementing, maintaining and improving an energy management system.
 - It does not prescribe specific energy performance improvement criteria.
- What it does:
 - Enables an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy security, energy use and consumption.
 - Aims to help organizations continually reduce their energy use, and therefore their energy costs and greenhouse gas emissions.



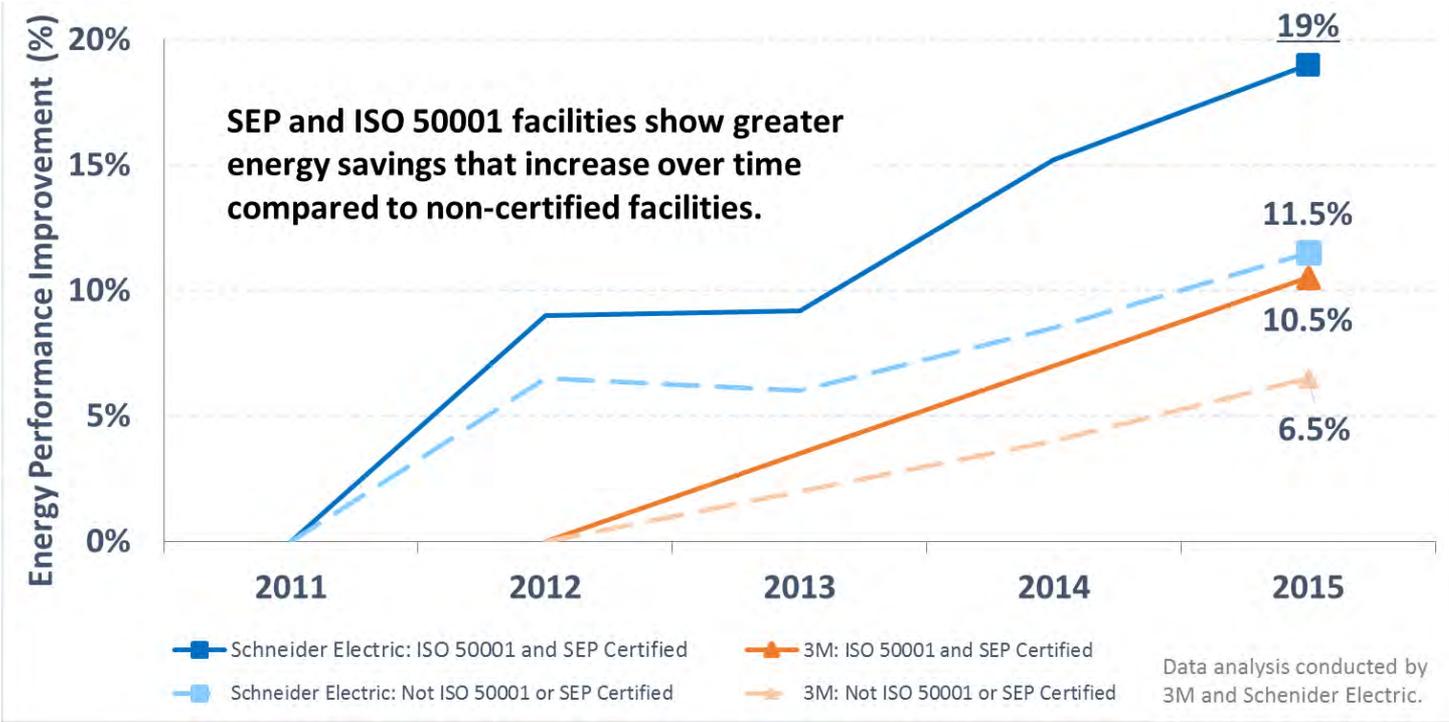
Value of ISO 50001?

- 50001 Supports Resiliency
 - Staff turnover is eased by having written practice in place with roles and responsibilities
 - Top management turnover is managed as new manager inherits the practice as part of job
 - Established 50001 practice **increases facility resiliency** to energy disruptions
 - Allows trained staff to walk into any facility and instantly pick up the energy practice
- 50001 Supports Efficiency
 - Establishes a continuous improvement practice across part or many facilities
 - DOE data shows savings persistent through the life of the 50001 practice
 - Follows proven plan-do-check-act cycle for continuous improvement
 - Identifies a list of energy opportunities to be evaluated over time

“We have found that both ISO 50001 and SEP are very beneficial for our company. We’ve seen energy savings of over \$3.5 million with a program implementation payback period of about 12 months. This is a good investment with really strong returns.”

—Mark Dhennin, **Cummins**

Multi-sites in 3M & Schneider-Electric showed a 2x improvement vs internal BAU



- US DOE Partners in 50001**
- Industrial**
- 3M
 - Arcelor Mittal Steel
 - Bridgestone
 - Cummins
 - Detroit Diesel
 - General Motors
 - HARBEC Inc.
 - Intertape Polymer Group
 - Johnson Controls
 - Mack Trucks
 - MedImmune
 - NewGold
 - Nissan North America
 - Schneider Electric
 - Titan America
 - Volvo
- Other Sectors**
- Des Moines Wastewater
 - Hilton Worldwide
 - Marriott International, Inc.
 - Tinker Air Force Base
- Other Partners**
- American Chemistry Council
 - American Forestry and Paper Association
 - Council for Industrial Boiler Owners

“ISO 50001 is a standard that drives results directly to the bottom line. ISO 50001 systematically drives down energy costs and improves competitiveness through the assignment of responsibilities and raising the visibility of energy management within the organization.”

—Andrew Hejnar, 3M

Compatibility with other ISO management system standards

Leverage Common & Similar Elements

ISO 50001

ENERGY POLICY

Energy review
Energy performance indicators
Energy baseline
Energy management

Unique Elements:
data-driven
approach

ISO 14001

ENVIRONMENTAL POLICY

Environmental aspects
Emergency preparedness
Environmental
management program

Energy baseline
Energy management

MANAGEMENT COMMITMENT

ROLES, RESPONSIBILITY & AUTHORITY
COMPETENCE, TRAINING & AWARENESS
COMMUNICATION
OPERATIONAL CONTROL
MONITORING & MEASUREMENT
DOCUMENTATION
INTERNAL AUDIT
CORRECTIVE & PREVENTATIVE ACTION
MANAGEMENT REVIEW
DESIGN
PROCUREMENT

ISO 9001

QUALITY POLICY

Customer focus
Planning of product realization
Customer-related processes
Control of nonconforming

What U.S. Business says about the value of ISO 50001



“ISO 50001 helped us nearly double our ENERGY STAR Portfolio Manager score over the years.”

- **Alfred Blackmar**, Aflac Vice President, Facilities Support



“At Marriott, ISO 50001 helped us save over one million kWh of electricity and improve guest satisfaction—our top priority. Using the standard helped us identify and correct a room thermostat malfunction to enhance guest comfort.”

- **Rajaram Srinivasan**, Director of Engineering
JW Marriott, Washington DC



“The ISO 50001 framework not only builds upon our energy management systems, but also help us drive consistency and performance improvements across our locations.”

- **Steve Sacco**, Schneider Electric
Vice Pres., Safety, Environment & Real Estate

50001 Ready as DOE Tool to Drive ISO 50001

The Objective

- Create a readily adoptable, easily transferable, cross-sectoral platform for creating, maintaining and quantifying a continuous energy improvement culture

50001 Ready is

- Recognition for self-attesting to conformance to ISO 50001
- Process with no certification requirement from third parties
- Open source software tools, designed to be adopted by implementers
- Suite of resources to support continuous improvement in institutional, commercial, and industrial facilities
- Ability to support 'enterprise' or multi-facility adoption

50001 Ready Prime Customers

- 50001 is not just industrial!
- Prime candidates:
 - Government facilities
 - Water/Wastewater facilities
 - Hospitals and healthcare
 - K-12 School Districts as an Enterprise
 - Universities
 - Data Centers
 - Distilleries, wineries, breweries
 - Multi-family

How 50001 Ready Works

1. Implement ISO 50001 principles

Complete 25 Tasks in US DOE's 50001 Ready Navigator free, self-guided online tool

2. Present energy performance

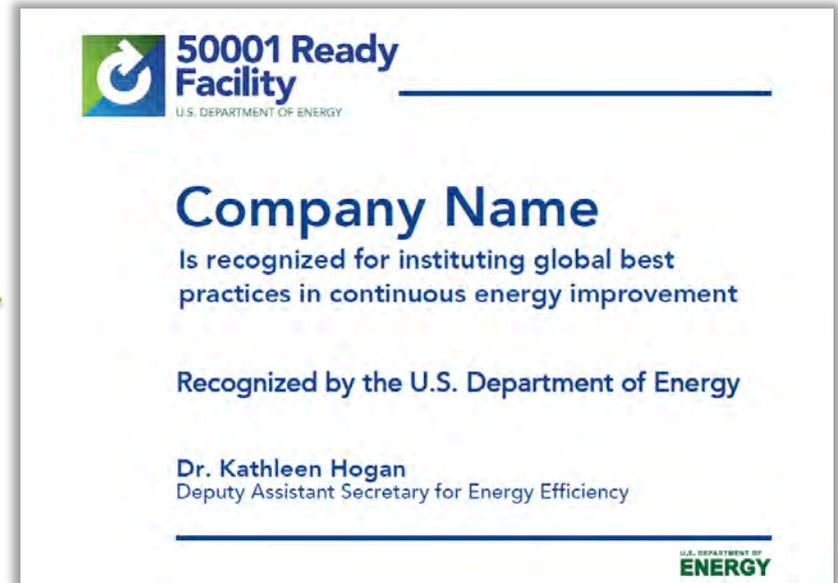
Submit energy performance data. DOE provides a tool for this, other tools or methodologies are fine.*

3. Self-attest to 50001 Ready

Sign-off by management of 50001 Ready implementation and commitment

energy.gov/50001Ready

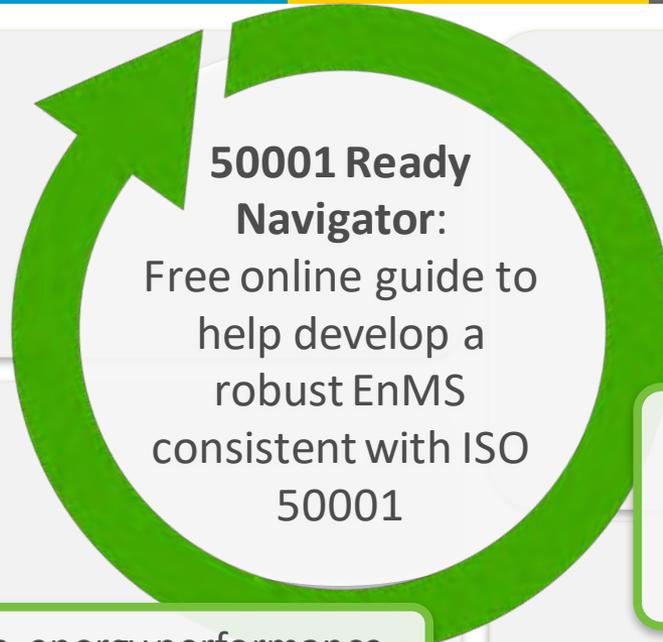
*Performance data that is submitted is never posted, uploaded or shared.



DOE and others recognize
50001 Ready achievement

Key U.S. DOE Tools for ISO 50001

ACT



PLAN

Energy Footprint Tool:
Track energy consumption and determine significant energy end-uses

Automated Register of Implemented Actions:
Organize & track actions to implement an EnMS

CHECK

M&V Tools:

Top-down regression:

- **EnPI Lite:** Establish baseline, energy performance indicators, track progress and savings
- **EnPI Tool:** Added functionality for accounting for variables and more robust regression analysis

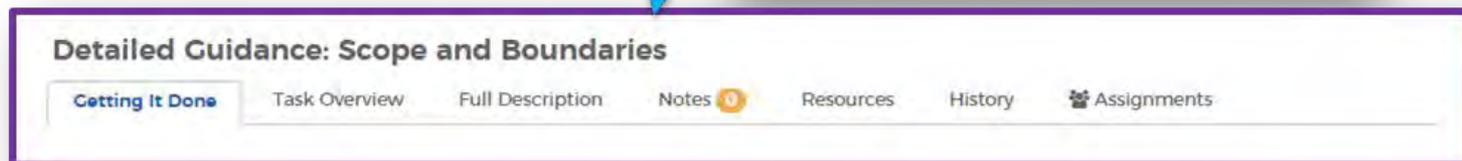
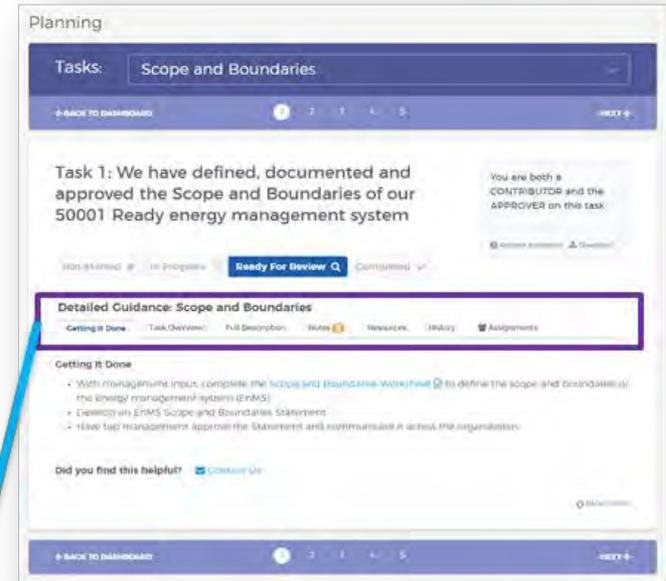
Bottom-up check:

- **Automated Register of Implemented Actions**

DO

50001 Ready Navigator – Overview

- Free online ‘Turbo Tax-like’ tool, with step-by-step approach to ISO 50001 implementation
- Guidance broken into straight forward sections, including:
 - Getting It Done – what specifically needs to be accomplished
 - Task Overview – how does this task connect with ISO 50001
 - Full Guidance – comprehensive guidance about the task
 - Transition Tips – from other ISO management systems or ENERGY STAR
- Form teams and assign tasks
- Download guidance
- Create multiple projects
- Access over 100 related resources
- **In English, Spanish and French**



50001 Ready Navigator — Dashboard

Dashboard

OVERALL PROGRESS: **0% Completed**

0% PLANNING 0% ENERGY REVIEW 0% CONTINUAL IMPROVEMENT 0% SYSTEM MANAGEMENT

Task Assignments

Planning Energy Review Continual Improvement System Management

Planning

Task	Assigned To	Approver	Status	Status Date
1 Scope and Boundaries	none	Log in to track progress		
2 Energy Policy	none	Log in to track progress		
3 Management Commitment	none	Log in to track progress		
4 Energy Team	none	Log in to track progress		
5 Legal Requirements	none	Log in to track progress		

Follow guidance through 25 tasks to be 50001 Ready.

All guidance fully available even without login.

50001 Ready Navigator — Task Guidance

The screenshot displays the 50001 Ready Navigator interface. The top navigation bar includes the 50001 Ready logo, the word 'Navigator', and links for 'Log In', 'Contact', 'FAQs', and 'Explore'. Below this is a secondary navigation bar with 'Create New Project' and menu items for 'Dashboard', 'Planning', 'Energy Review', 'Continual Improvement', and 'System Management'. The main content area is titled 'Planning' and features a dropdown menu for 'Tasks' currently set to 'Scope and Boundaries'. A progress indicator shows five steps, with the first step '1' highlighted. The main task description reads: 'Task 1: We have defined, documented and approved the Scope and Boundaries of our 50001 Ready energy management system'. A callout box on the right asks 'Looking for more guidance to complete this task?' and provides a link to 'Ask the EnMS experts at the 50001 Ready Help Desk' with a 'View Learning Module' button. Below the task description is a 'Detailed Guidance: Scope and Boundaries' section with tabs for 'Getting It Done', 'Task Overview', 'Full Description', 'Notes', 'Resources', 'History', and 'Assignments'. The 'Getting It Done' tab is active, showing a list of steps: 'With management input, complete the Scope and Boundaries Worksheet to define the scope and boundaries of the energy management system (EnMS).', 'Develop an EnMS Scope and Boundaries Statement.', and 'Have top management approve the Statement and communicate it across the organization.' At the bottom, there is a 'Need assistance?' section with links to 'Contact the 50001 Ready Help Desk' and 'Download as PDF', and a 'BACK TO TOP' link.

Guidance translated into actionable steps with links to templates, worksheets, and helpful guides

50001 Ready Navigator — Task Guidance

The screenshot shows a web browser window with the URL <https://navigator.industrialenergytools.com/guidance/detail/planning/1>. The page title is "Task 1: Scope and Boundaries". The main heading reads: "Task 1: We have defined, documented and approved the Scope and Boundaries of our 50001 Ready energy management system". Below this is a link to "Log in to track progress". A sidebar on the right contains a call to action: "Looking for more guidance to complete this task?" with a link to "Ask the EnMS experts at the 50001 Ready Help Desk" and a "View Learning Module" button. The main content area has a tabbed interface with "Full Description" selected. The "Full Description" section includes a heading "Identify the extent of activities, facilities, and decision structures to be included in your EnMS", a paragraph of introductory text, a bulleted list of questions, and a list of resources. A "Close Topic" button is located at the bottom right of the content area.

Task 1: We have defined, documented and approved the Scope and Boundaries of our 50001 Ready energy management system

[Log in to track progress](#)

Looking for more guidance to complete this task?

[Ask the EnMS experts at the 50001 Ready Help Desk](#)

[View Learning Module](#)

Detailed Guidance: Scope and Boundaries

Getting It Done | Task Overview | **Full Description** | Notes | Resources | History | Assignments

Full Description

▶ **Identify the extent of activities, facilities, and decision structures to be included in your EnMS**

Consider these questions when defining the extent of activities, facilities and decisions to be included in the scope and boundaries of your energy management system (EnMS). The [Scope and Boundaries Worksheet](#) can be used to help formulate the scope.

- Is there an area for which you do not have energy information?
- Is there an area where you cannot obtain employee involvement or participation?
- Are there areas that have a different management team or decision structure?
- Do you have a building or location that you are not including?
 - Can you isolate the energy consumption of those locations?

Resources within your organization that can be useful in identifying the scope and boundaries of the EnMS include the following:

- Organization chart
- Site map or site plan
- Site photographs
- List of on-site contractors and related operations
- Facility/building layout
- Process layouts/maps
- Process flow diagrams
- Utilities drawings
- Facility/building energy consumption data
- Equipment energy consumption data

[Close Topic](#)

▶ **Define site limits and/or organizational limits of your EnMS**

See the “Full Description” tab for detailed, hands-on guidance to accomplish each task, according to the best practices of ISO 50001.

50001 Ready Navigator — Resources

The screenshot shows a web browser window with the URL <https://navigator.industrialenergytools.com/guidance/detail/planning/1>. The page is titled "Planning" and features a navigation bar with "Tasks: Scope and Boundaries" and a progress indicator with steps 1 through 5. The main content area displays "Task 1: We have defined, documented and approved the Scope and Boundaries of our 50001 Ready energy management system" and includes a "Log in to track progress" link. A callout box asks if the user is looking for more guidance and offers to "Ask the EnMS experts at the 50001 Ready Help Desk" with a "View Learning Module" button. Below this is a "Detailed Guidance: Scope and Boundaries" section with tabs for "Getting It Done", "Task Overview", "Full Description", "Notes", "Resources", "History", and "Assignments". The "Resources" tab is active, showing a table of resources:

Name	Type	Description
Energy Manual Guidelines	pdf	This resource provides information on using an energy manual to document the elements of the EnMS.
ENERGY STAR Guidelines for Energy Management	pdf	ENERGY STAR Guidelines for Energy Management guidance document.
Scope and Boundaries Worksheet	docx	This worksheet is helpful in defining the scope and boundaries of an energy management system.

At the bottom, there is a "Need assistance?" section with links to "Contact the 50001 Ready Help Desk" and "Download as PDF", and a "BACK TO TOP" link.

See a comprehensive list of resources for each task.

Over 100+ total resources include templates, worksheets, sample documents, tools and calculators.

50001 Ready Navigator — Team Management

The screenshot displays the 'Planning' interface for 'Task 1: Scope and Boundaries'. The task is marked as 'Completed'. The user's role is 'Approver'. The 'Assigned To' section lists Pete Langlois and Pamela de los Reyes, both with 'REMOVE' options. The 'Approver' section lists Christine Wu with a 'Select a Different Approver' dropdown. A 'View Learning Module' button is visible in a callout box. The bottom of the page includes a 'Need assistance?' section with links to 'Contact the 50001 Ready Help Desk' and 'Download as PDF', and a 'BACK TO TOP' link.

Log in to:

- Track progress on each task
- Assign team members to complete or approve each task
- Add progress notes (e.g., meeting notes, file locations) for team members

50001 Ready Navigator — Transition Tips

The screenshot shows a web browser window with the URL <https://navigator.industrialenergytools.com/project/12/detail/planning/1>. The main heading is "Task 1: We have defined, documented and approved the Scope and Boundaries of our 50001 Ready energy management system". Below this is a progress bar with four stages: "Not Started", "In Progress", "Ready For Review", and "Completed" (which is selected). A callout box on the right asks "Looking for more guidance to complete this task?" and provides a link to "Ask the EnMS experts at the 50001 Ready Help Desk" and a "View Learning Module" button. The user's role is listed as "Approver". The "Detailed Guidance: Scope and Boundaries" section has tabs for "Getting It Done", "Task Overview", "Full Description" (selected), "Notes", "Resources", "History", and "Assignments". Under "Full Description", there are two expandable sections: "ISO 9001 and/or ISO 14001 transition tips" and "ENERGY STAR Energy Management transition tips". The first section explains that organizations conforming to ISO 14001:2015 or ISO 9001:2015 have determined and documented the scope of their management system(s), and that the same process can be used to define and document the scope and boundaries of the EnMS. The second section explains that the scope determined in Step 3.1 of the ENERGY STAR Guidelines for Energy Management is not the same as the scope and boundaries of the EnMS, and that the EnMS scope and boundaries define the activities, facilities, decisions and physical or site limits that are covered in the EnMS. There are also "Close Topic" buttons for each section.

Log in to:

- See transition tips for ISO 9001/14001 and ENERGY STAR
- Additional transition tips to be added in the future

50001 Ready Navigator — Track Projects

My Projects Overview

Hide Test Projects

Create New Project

Create Project for Others

SHOW 50 ENTRIES

SEARCH:

Project Name	Task Progress	Status/Next Action	Last Activity	Action
Berkeley Lab	4%	Team Completing Tasks	11/15/2017	...
Associated with: [test] FEMP Building 90	0%	Team Completing Tasks	02/05/2018	...
Headquarters	76%	Team Completing Tasks	11/13/2017	...
Associated with: [test] Better Buildings Lawrence Berkeley Laboratory	100%	Request DOE Recognition	11/13/2017	...
[test] Pete's townhouse	24%	Team Completing Tasks	01/18/2018	...
[test] San Francisco facility	100%	Request DOE Recognition	08/28/2017	...
[test] Test Project Created with PSHEAFFER@lbl.gov	100%	100% Complete	03/27/2017	...

Showing 1 to 7 of 7 entries

PREVIOUS 1 NEXT

Log in to:

- Track multiple projects and manage multiple teams
- Request DOE recognition for projects that have completed all 25 tasks
 - Upload Attestation Form and Energy Report directly in the Navigator

50001 Ready Navigator — Getting Started & Help Desk



Getting Started: Navigator

50001 Ready

The 50001 Ready Navigator is a free resource provided by the U.S. Department of Energy to help you implement and maintain an energy management system according to the best practices of ISO 50001, the global standard to achieve continuous energy improvement. [Here's how to get started.](#)



Homepage

Step 1: Explore the 50001 Ready Navigator

Visit navigator.industrialenergytools.com

- View all guidance, resources, and FAQs
- Access the Help Desk

Step 2: Create an account

- Contribute to projects and track progress
- Collaborate with team members



Create a Project

Step 3A: Create your own project

Create your own project if you are a facility manager or directly responsible for one or several facilities.

- Build your project team
- Maintain full administrator control over your projects

Step 3B: Create a project for somebody else

Create a project for somebody else if you are a portfolio manager or indirectly responsible for multiple facilities. Examples include:

- Headquarters for an organization with multiple facilities
- Corporate membership coalitions or affiliations
- Energy efficiency or utility programs

By creating a project for somebody else, you can:

- Assign a project administrator with hands-on control
- Receive notifications for project status and recognition alerts
- Access portfolio overview of all projects



Project Overview

Step 4: Start managing energy!

Track your progress through 25 easy-to-follow tasks to implement your 50001 Ready energy management system.

- Experts are available through the online Help Desk to provide additional guidance and answer all of your questions!



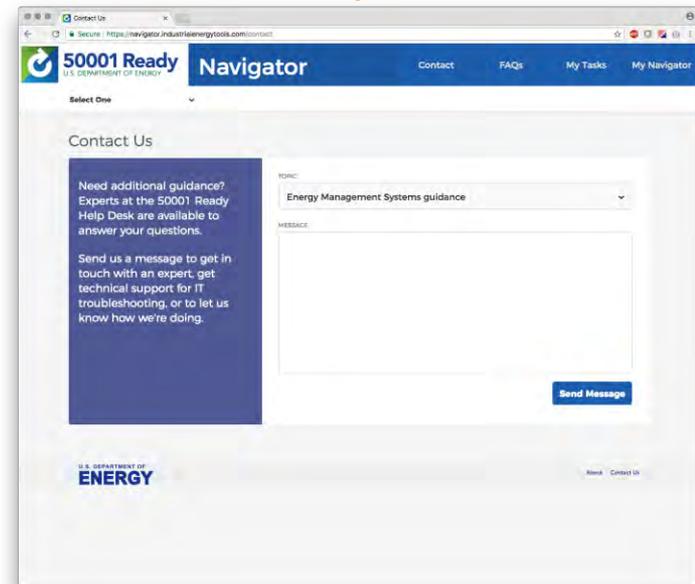
Help Desk

Learn more at energy.gov/50001Ready



Get started by creating an account and starting your first project!

- Create a test project to view transition tips and tracking capabilities
- Invite team members to test Notes and Task Management capabilities
- Send questions to the Help Desk!



50001 Ready Navigator | Multisite

Functionality

- Create and manage multiple projects under one umbrella project administered by a Central Office
- Complete, participate in, and review tasks for multiple sites at once
- Work with teams across multiple facilities
- Reduce time and effort for implementing 50001 Ready
- Individual sites are recognized for 50001 Ready success



Benefits

- Allows corporate and organizational energy managers to drive implementation at multiple sites simultaneously
- Reduces internal staff time at sites for implementing 50001 Ready
- Standardizes 50001 Ready system across facilities
- Creates a centralized repository for understanding how your facilities manage energy

50001 Ready Navigator | Playbook

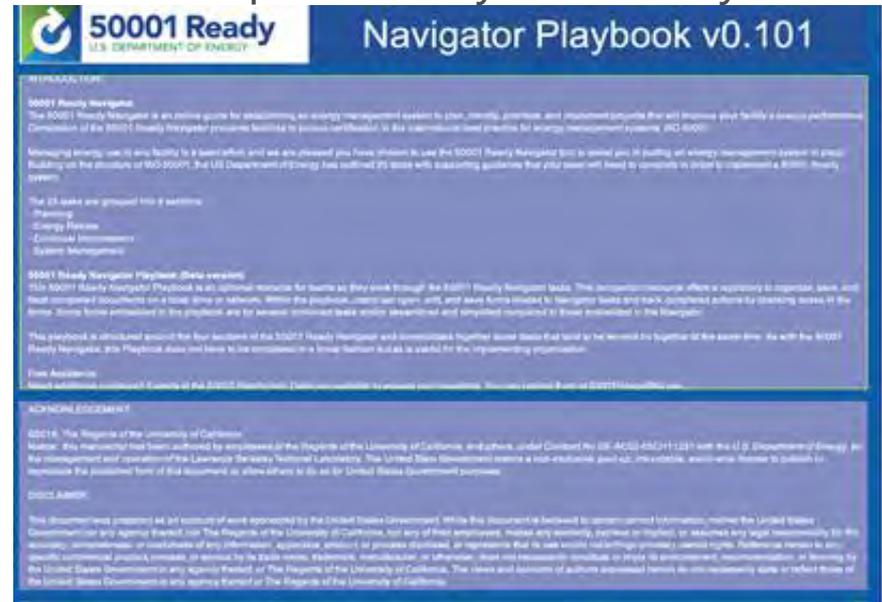
50001 Ready Navigator is an online energy management system development tool

- ✓ Bring in energy team and consultants
- ✓ Assign Tasks to individuals and track feedback
- ✓ Leave notes and Sharepoint locations for the needed deliverables
- ✓ Use documentation that works for your organization - templates provided as a reference only

Companion Playbook with Task worksheets
- *An option for Ready documentation*

- ✓ Fill out the worksheets for each Task
- ✓ Living document (spreadsheet) containing energy and system data
- ✓ Step-by-step guide to establishing and improving energy use
- ✓ On boarding tool for new energy personnel (management or staff)
- ✓ Will contain sample completed forms to show end product example

Download your 50001 Ready Companion Playbook today!



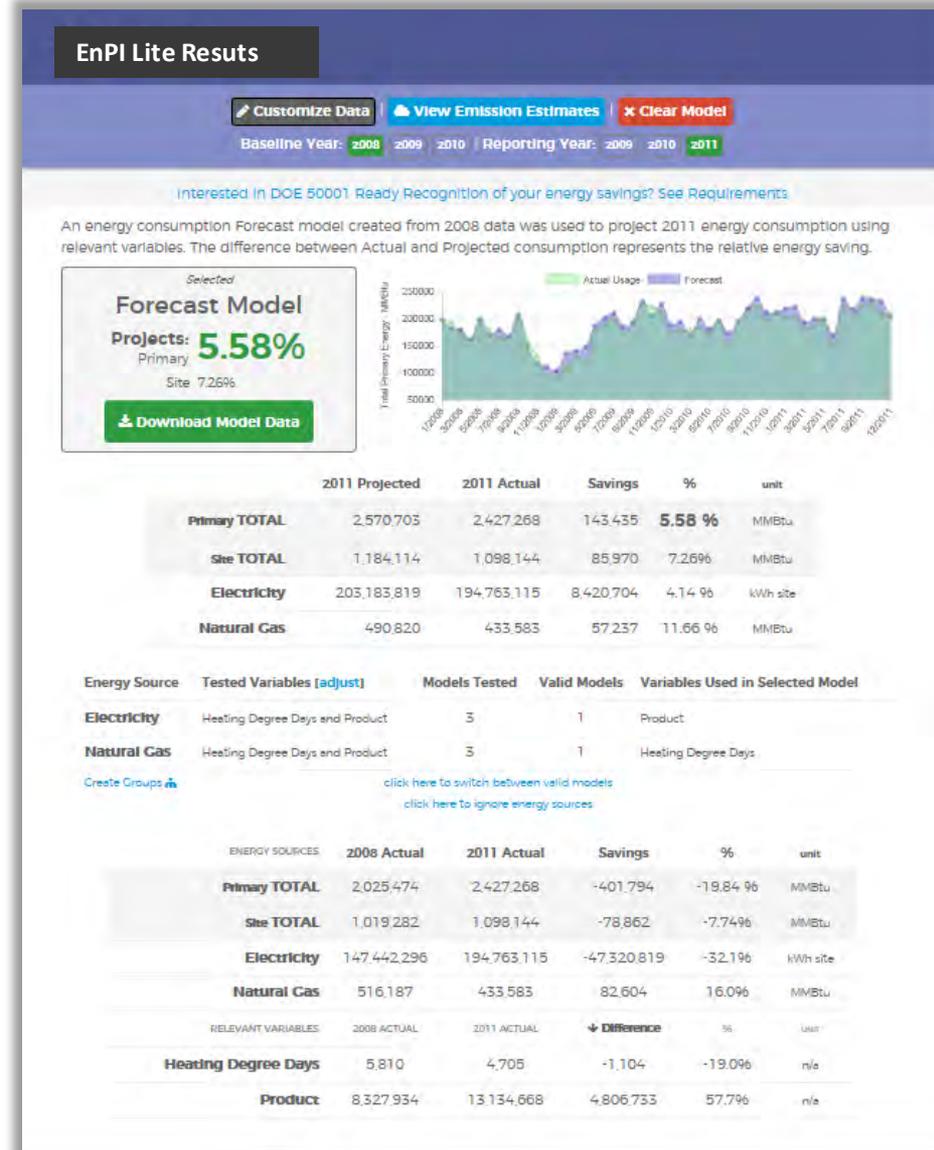
<https://navigator.lbl.gov/resourceIndex>

EnPI Lite Tool

EnPI Lite: Navigator's companion tool for facility-level energy performance

- Enter or upload energy use data and account for mitigating factors (e.g., production levels, occupancy changes, weather)
- Top-down regression analysis calculates energy change from baseline year
- Accepts input from DOE Energy Footprint tool and ENERGY STAR Portfolio Manager
- The EnPI Lite Output file is one option for reporting energy performance for DOE recognition

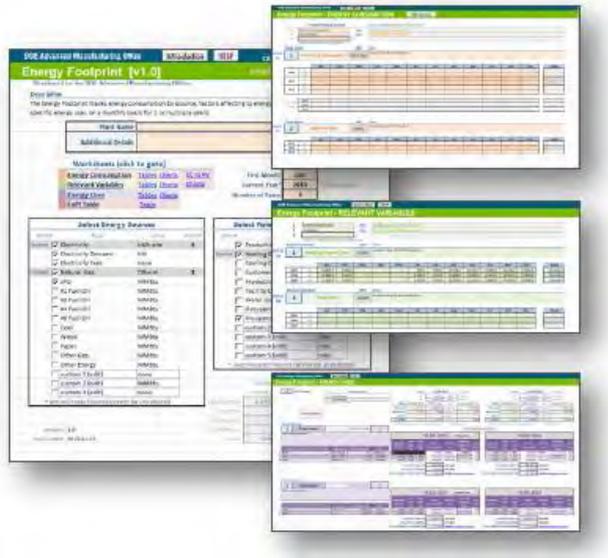
<https://enpi.industrialenergytools.com/>



DOE Energy Footprint Tool

Gather Data

Use the DOE Energy Footprint Tool



Easily track and analyze:

- Energy consumption
Electricity, natural gas, etc.
- Relevant variables
Production levels, degree days, operating hours, occupancy rates, etc.
- Energy Uses
i.e., Application of energy
- Calculates energy-related greenhouse gas emissions

<https://ecenter.ee.doe.gov/EM/tools/Pages/EnergyFootprint.aspx>

MEASUR Software Suite

Manufacturing Energy Assessment Software for Utility Reduction

- An energy management software tool to help manufactures improve the efficiency of specific systems and pieces of equipment within a plant
- Model common energy systems and evaluate unlimited “What-if” Scenarios
 - Perform full assessments for Steam, Process Heating, Pumps, Fans, and Compressed Air
 - Evaluate system efficiency
 - Identify major areas of energy use and savings
 - Easily quantify energy and cost savings potential
 - Dynamically create and save custom reports
 - Includes extensive help text and built-in guidance
- 40+ simple standalone calculators
 - Quantify savings for common basic opportunities
 - Perform your own facility Treasure Hunt

The image displays three screenshots of the MEASUR software interface. The top screenshot is the home page, featuring the U.S. Department of Energy logo and the MEASUR logo. It includes a navigation menu on the left and a central area with options to 'Create Assessment' and 'Properties & Equipment Calculators'. The middle screenshot shows the 'Reheat Furnace Case Study' configuration screen, with a table of 'SELECT POTENTIAL ADJUSTMENT PROJECTS' and various input fields for system parameters. The bottom screenshot is a results dashboard with two pie charts and a bar chart, showing energy usage breakdowns for different systems.

<https://www.energy.gov/eere/amo/measur> (Available for Windows, Mac & Linux)

Conclusions

- **ISO 50001 is a set of best practices that:**
 - Help you organize your existing energy management system around industry best practice.
 - Give you a better ability to continuously achieve your energy management goals.
 - Align your company with industry best practice and international standards.
- **50001 Ready Navigator is a free DOE supported & managed tool that:**
 - Provides a step by step process to evaluate your current energy management system (EnMS).
 - Provides a gap analysis of your existing management system versus industry best practice
 - Helps you organize the management system you have around industry best practice
 - Allows self-attestation to an ISO 50001 structure without third-party audits or verification.
 - Gives you recognition as a responsible industry leader without the certification process.
 - Provides a way to familiarize your company with 50001 requirements for certification.

Summary of ISO 50001 Tools & Resources from DOE

[DOE 50001 Website](#) for all information on ISO 50001 & 50001 Ready

- Visit the [50001 Ready Navigator](#)
- Download the [Getting Started Guide \(PDF\)](#)
- Read our [Frequently Asked Questions](#)
- More questions? Contact the [50001 Ready Help Desk](#)
- Energy management and energy system [Software Tools](#)

Better Building/Better Plant sites

- [50001 Ready for Utility Program Administrators & Implementers](#)
- [50001 for Facilities & End Users](#)

Find Out More!



Visit the 50001 Ready website at energy.gov/50001Ready

- Download infosheets and FAQs
- Find links to the Navigator and EnPI Lite
- See 50001 Ready facilities
- Read case studies and additional resources
- Read more about ISO 50001 and related programs

The Ease or “E’s” of Back-up Systems!

Back-up system maintenance, requirements, and recommendations for dual fuel systems

Boyd KNEEN

**Your Back-up System
ChEERleader!**

May 2019



Remember High School...



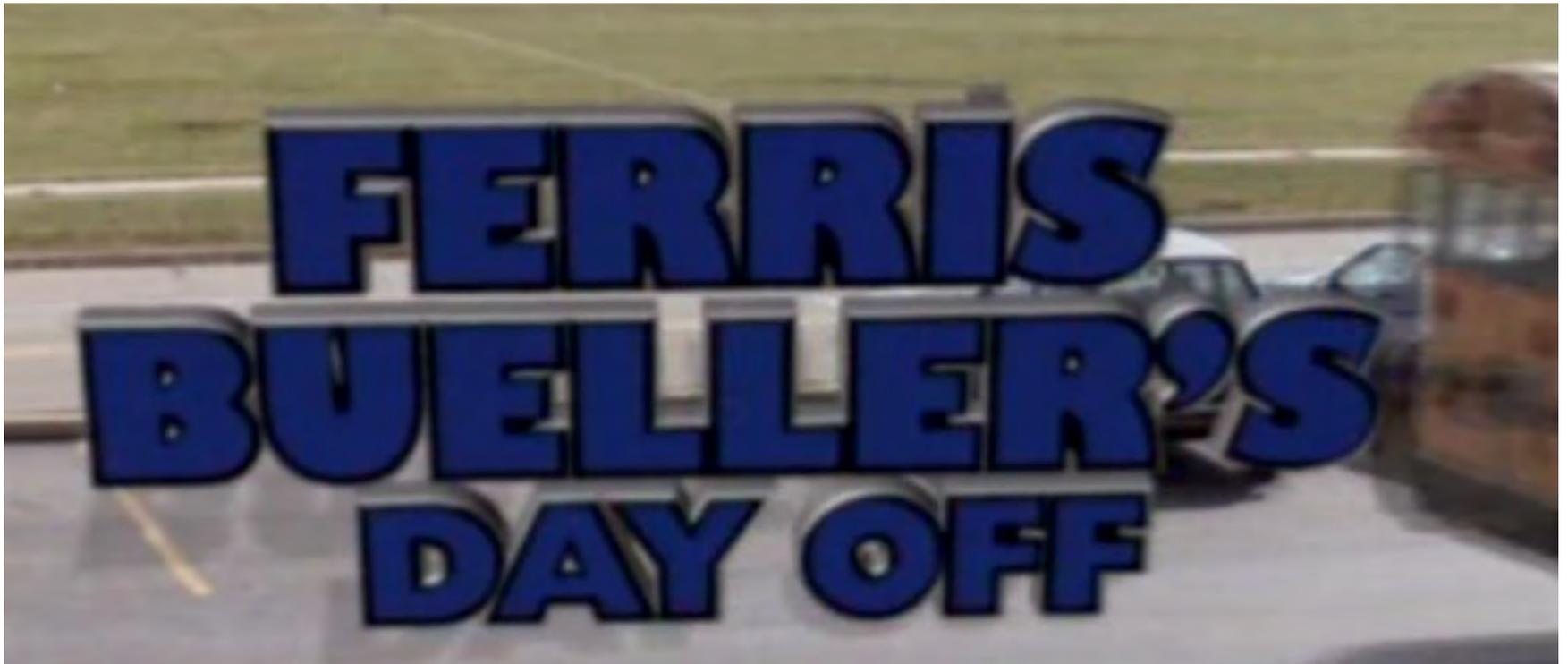
- Give me an “E”, Give me an “X” We’re not going to go there but let’s go to school!
- We do **cheer** for back-up systems & we **cheer** for keeping your back-up system safe and reliable for you and CenterPoint!

**Back in High School our Band
was ...
let's just say
memorable!**



May 2019

**But Remember - Most High Schools don't skip
on Back-up Systems or maintenance!**



Back up Systems are there for great reasons -



They're on a Mission from CenterPoint! & your bottom line.

May 2019

Did you Exalt or Exasperate about your back-up system performance?

Expectations of this presentation...

- We want to Encourage you to make your job Easier and more Effortless with Examples.
- Exert a little time Early to Examine what worked and Extract lessons to Eliminate what Excrement happened... sorry.



Overview of Backup System

- Propane or Propane-air System “SNG”



- Fuel Oil System



“The Plan”

Every Company needs to...

- Know WHY – reinforce why the System is there and why it’s important to the facility.
- “Make a Service Friend” who is an **Expert** to pull up alongside and train your in-house personnel
- Start up and PM in the fall does not Emulate Extreme conditions in January - Do a double start.
- Get your internal team together including contacts and numbers reviewed and how they get access.
- Fuel pricing and timing – fill R up!

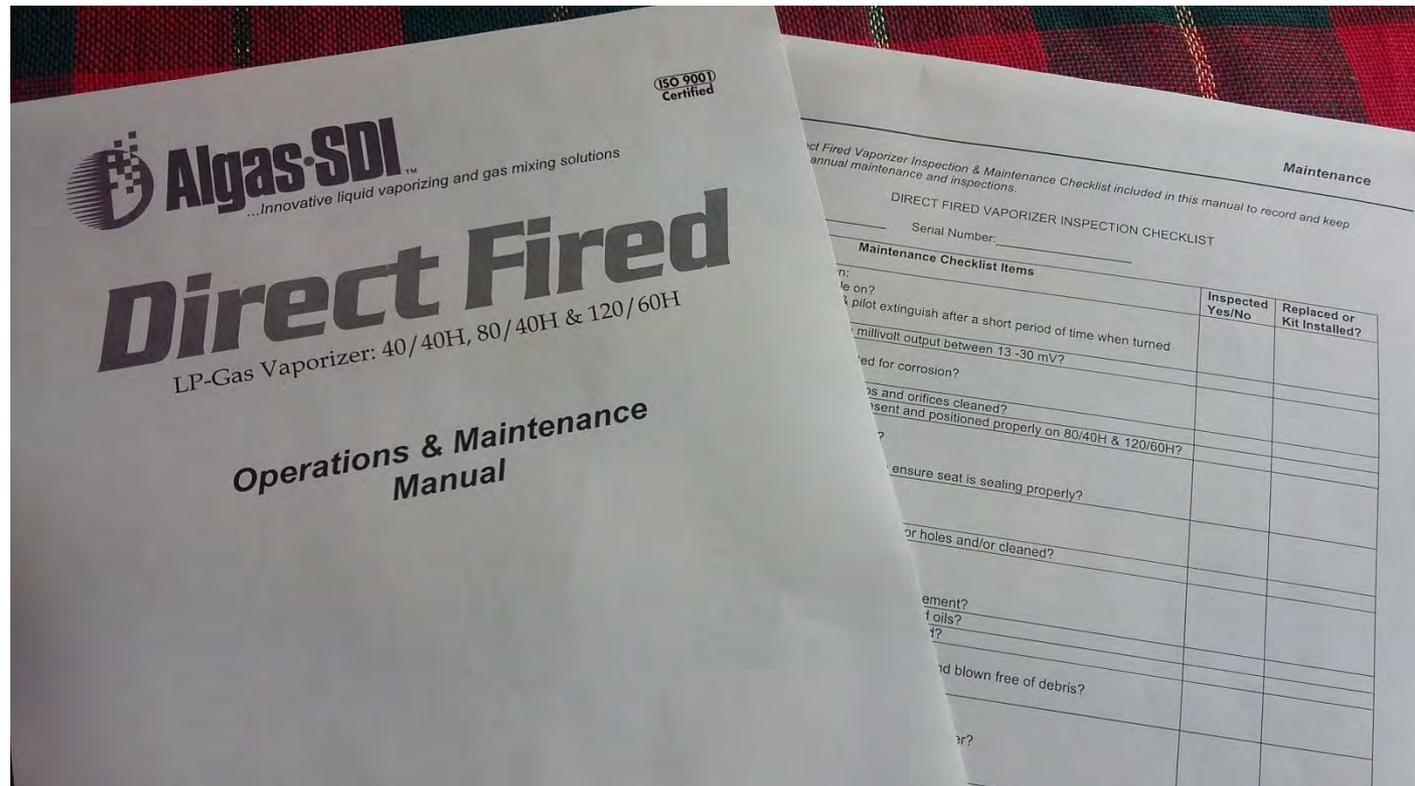
Let's start with Entire Propane-air System Overview

- Unload Delivery Station
- Tank
- Pump
- Piping
- Vaporizer
- Blender/mixer
- Controls
- Performance Alarms ?????



Follow Maintenance Manual Procedures—Don't Eenie, meenie, minie moe!

*And Clarence retired – get Clem and Clarice up to speed!
If you don't have it - let me know at the end.*



Unload Delivery Station

- Valves
- Pull cable
- Paint
- Signage
- Protection



Tank(s)

- Gauges
- Valves/cable
- ESV check
- Relief stacks
- Cathodic Protection
- Paint
- Signage



Pump(s)

- Condition
- Pump operation
- Motor operation
- Belts
- Gauges



Piping

- Leak check
- Line valve operation
- Standoffs & Flex
- Paint



Vaporizer

- Indicator lights
- Pilot flame
- Burner flame
- Pressure
- Flame fail
- Glycol PH
- Glycol level
- Glycol Protection
- Glycol sample taken



UES EZ Check™

- Corrosion prevention



- Expansion Tank and Sight Glass Level



Blender/Mixer

- Overall Condition
- Venturi solenoid check
- Pressures
- Specific gravity
- Gauges



Controls

- Inlet solenoid
- Low water switch
- High temperature switch
- Operating temp switch
- High mixed gas pressure
- Low mixed gas pressure
- Low input gas pressure
- High high mixed gas
- Vaporizer off line
- Gas detector & beacon
- **Additional alarm indicator**
 - *Ask me after if you don't have one*



Each system needs to be gone through thoroughly!

Controls ✓
Inlet solenoid _____
Low water switch _____
High temperature switch _____
Operating temp switch _____
High mixed gas pressure _____
Low mixed gas pressure _____
Low input gas pressure _____
High high mixed gas _____
Vaporizer off line _____
Gas detector & beacon _____
Additional alarm indicator _____

Mixer ✓
Overall Condition _____
Venturi solenoid check _____
Pressures _____
Specific gravity _____
Gauges _____

Vaporizer(s) ✓
Indicator lights _____
Pilot flame _____
Burner flame _____
Burner tune _____
ADD EXP TANK!! _____
Pressure check _____
Glycol PH _____
Glycol level _____
Glycol Protection _____
Glycol sample taken _____

Tank(s) ✓
Gauges _____
Valves/cable/pneumatics _____
ESV check (NFPA 2011?) _____
Reliefs changed (10 yrs) _____
Cathodic protection Rdg _____
Paint (rust/pitting) _____
Signage per NFPA 58 _____

Piping ✓
Leak check _____
SO valve operation _____
Swing joints & Flex _____
Paint _____

Pump Set ✓
Condition _____
Pump operation _____
Motor operation _____
Belts _____
Gauges _____

Delivery Station ✓
Valves _____
Pull cable _____
Paint _____
Signage _____

Last winter was hard on Back-up Systems even though you were ready in the fall!

- Extended curtailment periods we haven't seen in years.
- Excess snow load on Equipment
- Extreme low temperatures
- Extraordinary Spring flooding

A surprise confession?!

- Guess who created a dance move known in the industry as the “Fuel Oil Switch!”
- This was after he mastered the “High School Skip.”
- Ask Paul about it, he’ll probably change the subject to something helpful like Boiler Tune-Up Rebates to assist in making you more reliable:
 - 25% of tune-up cost; up to \$300/boiler; eligible every other year -
 - See more at: <https://www.centerpointenergy.com>





Before we start If anyone is making the Fuel (Oil to Propane) Switch?

- Timing is best for switching to SNG **now** using propane/air blend or adding a separate propane burner train
- Eliminates the UST issue with the MPCA
- Use a low-carbon alternative fuel that produces significantly fewer greenhouse gas emissions **than oil.**

Fuel Oil System – General

- Store fuel in dark, dry and clean area.
- Keep tank full to **Eliminate Excess Exchanges** of air which causes fuel degradation
- Monitor fuel level and check for leaks, missing covers, vents, paint, and piping.
- One more time, is your company culture into the **Environment**

Fuel Oil System – Tank

- Double walled tank or containment
- Location may dictate gelling prevention
- Know tank size, and fill location. Keep clear from snow to find easily, label.



Sludge Buildup

Good germs & bad germs.

- Fuels in storage can develop pools of sludge, sediment and water caused by microbial contamination. Especially in the dormant, warm, months.
- Untreated levels can damage machinery like pumps and engines.
- Condensation, atmospheric absorption, and a faulty tank are usually the main causes during tank filling.



Fuel Oil System – Fuel

- Fuel testing services available
- Check fuel condition and if water in fuel
- Prevent potential of gelling up
- Know fuel types delivered depending upon time of year– B5, B10, #1 and #2
- **Establish** supply account before season



Fuel Oil System – Filter

- Filter
 - Relatively low cost so do it annually!
 - Paraffin or wax dropout plug filters at lower temperatures



Fuel Oil System – Burner

- Separate burner train for oil versus NG
- Use an ANALYZER!!! Can't tell by looking!
- Check for scaling and leaks of all types
 - 1/16" of soot degrades efficiency up to 25%
- Adjustments on one fuel affect the other



Periodic Oil Burner Check list ✓

- Safe operation requires doing more than the mandated requirements
- Helps detect problems before they develop
- Inspect and test all safety and interlocks for proper operation
- Test boiler control system over a range of loads
- Check all shutoff valves annually to confirm closing and if leaks.
- Check all interior surfaces to ensure no overheating, erosion, or corrosion formation occurs.
- Using wrong type or quantity of chemicals can result in accelerated corrosion or inadequate protection.
- Remember to enter data in the boiler log and review regularly.

Item	Frequency	Checked By	Remarks
Gages, monitors, and indicators	Daily	Operator	Make visual inspection and record readings in log
Instrument and equipment settings	Daily	Operator	Make visual check against heat exchanger manufacturer's recommended specifications
Firing rate control	Weekly Semiannually Annually	Operator Service Technician Service Technician	Verify heat exchanger manufacturer's settings Verify heat exchanger manufacturer's settings Check with combustion test
Flue, vent, stack, or outlet damper	Monthly	Operator	Make visual inspection of linkage, check for proper operation
Combustion air	Monthly	Operator	All sources remain clean and open
Ignition System	Weekly	Operator	Make visual inspection, check flame signal strength if meter-fitted (see <i>Combustion safety controls</i>)
Fuel Valves			
Pilot and main	Weekly	Operator	Open limit switch-make aural and visual check-check valve position indicators and check fuel meters if so fitted
Pilot and main gas or main oil	Annually	Service Technician	Perform leakage tests-refer to valve manufacturer's instructions
Combustion safety controls			
Flame failure	Weekly	Operator	Close manual fuel supply for (1) pilot, (2) main fuel cock, and/or valves(s); check safety shutdown timing; log
Flame signal strength	Weekly	Operator	If flame signal meter installed, read and log; for both pilot and main flames, notify service organization if readings are very high, very low, or fluctuating; refer to flame safeguard manufacturer's instructions
Pilot turndown tests	As required/annually	Service Technician	Required after any adjustments to flame scanner mount or pilot burner; verify annually-refer to flame safeguard manufacturer's instructions
Refractory hold in	As required/annually	Service Technician	See <i>Pilot turndown tests</i>
High limit safety control	Annually	Service Technician	Refer to heat exchanger manufacturer's instructions
Operating control	Annually	Service Technician	Refer to heat exchanger manufacturer's instructions
Low draft, fan, air pressure, and damper	Monthly	Operator	Refer to this manual and control manufacturer's instructions
High and low gas pressure interlocks	Monthly	Operator	Refer to instructions in this manual
Low oil pressure interlocks	Monthly	Operator	Refer to instructions in this manual
Fuel valve interlock switch	Annually	Service Technician	Refer to valve manufacturer's instructions
Purge switch	Annually	Service Technician	Refer to fuel/air control motor manufacturer's instructions
Low fire start interlock	Annually	Service Technician	Refer to fuel/air control motor manufacturer's instructions
Automatic changeover control (dual fuel)	At least annually	Service Technician	Under supervision of gas utility
Inspect burner components		Service Technician	Refer to this manual and control component manufacturer's instructions
Remove oil drawer assembly	Annually	Service Technician	Remove and clean
Check blower motor and blower wheel for cleanliness. Remove and clean as necessary	Annually	Service Technician	Remove and clean
Remove, inspect and clean gas pilot assembly	Annually	Service Technician	Remove and clean

See handout

Preventive Maintenance Contract Advantages are Easy to identify!

- Trained personnel keeping your system running smoothly
- Priority response during those 20 below curtailments
- Often discount on labor and critical phone support



Don't get stuck out in the cold!

Call CenterPoint at:
(612) 321-4330

If you are unsure you want to remain in the dual fuel program or you think you are not a reliable participant.

AND

If you see 2020 20/20 ... to become or remain Dual Fuel, no time like the present to start your plan, call your Partner and ensure you're ready when the hour ... comes.

THANKS FOR YOUR TIME & QUESTIONS!



(763) 263-3331
new number
(763) COF-FEE1



DUAL FUEL VS. FIRM

Tom Dolan, Key Account Manager, CenterPoint Energy

MAY 2019



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WHAT IS A DUAL FUEL CUSTOMER?



- To qualify as a Dual Fuel customer, you must be able to tolerate an interruption- by either switching to a back-up fuel or process interrupt
- Dual fuel customers do not pay for interstate pipeline system capacity for agreeing to be curtailed when necessary
- We can serve firm customer demand above our pipeline entitlements using our local peak shaving storage and production
- A dual fuel customer typically saves 15-22% of natural gas cost in operating costs by avoiding the firm demand charge

WHEN DOES CENTERPOINT ENERGY CURTAIL?



- When customer demand exceeds contracted pipeline capacity
 - Pressure problems on the distribution system
 - Physical disruption on the distribution system
 - Supply limitations
- Curtailment generally occurs in the winter, but customers should be prepared to curtail anytime
- When curtailment is in effect, CenterPoint Energy monitors *current* weather conditions and total pipeline volumes along with *expected* weather conditions and adjusts as necessary

WHY DOES CENTERPOINT ENERGY CURTAIL?



- CenterPoint Energy contracts with interstate pipeline providers for a certain amount of pipeline capacity and builds peak shaving systems to serve firm customers only. Dual fuel customers do not pay for this capacity.
- To maintain minimum acceptable distribution system pressures
 - CenterPoint Energy does not build the distribution system to serve interruptible customers under peak conditions.

DUAL FUEL CLASS DEFINITION



Dual Fuel Customer Class	Volume of Natural Gas Use
Small Volume Dual Fuel – A	Peak day is less than 200 Dth and less than 12,000 Dth/year
Small Volume Dual Fuel – B	Peak day is less than 200 Dth and 12,000 or more Dth/year
Large Volume Dual Fuel	200 Dth or greater peak day

If you anticipate large changes in your natural gas usage, contact your Account Manager to ensure CenterPoint Energy can adequately serve you.

NEW OFFERINGS- FIRM/INTERRUPTIBLE TARIFF



- Combined Best of Both Firm & Interruptible Services for Small Volume & Large Volume, Sales & Transport
- Elect a Base Level of Firm Service before Sept 1 each year
 - All excess volume is Interruptible
 - Required to curtail to your Base Level
 - Dual Fuel Unauthorized Charges apply to non-compliance
- Pricing consistent with applicable Firm & Interruptible classes.
- Remain either Sales Service, or Transportation Service
 - Monthly switching, or combinations of Sales & Transport not allowed
- Requires CenterPoint Energy's approval for Base Level of Firm which is subject to availability.
- Requires a new Agreement
- See your Key Account Manager for details & availability

SWITCHING FROM DUAL FUEL TO FIRM



- In many cases, CenterPoint Energy does not have enough firm capacity or may have distribution system constraints to allow existing DF customers to be on firm gas
- Approval to switch to firm is required for DF customers. Customers can request firm service through the following:
 1. Contact your Account Manager – Please do not remove any backup systems without first contacting your Account Manager
 2. Your Account Manager will work with you in obtaining all of the pertinent information – Timeline, connected load, peak day, whether it needs to be firm or if it can be firm/interruptible, etc.
 3. A request will be made to our engineering and gas supply departments for approval
 4. If approved, DF customers can switch to firm gas between April 1st and November 1st.

SWITCHING FROM DF TO FIRM - CONT.



5. If denied, Account Manager will work with the customer on the various costs to switch to firm. Depending on the size of the connected load and location, this can at times be very expensive.

6. This procedure is similar to any new customers/additions looking for firm gas and will typically involve our New Market Development group also.

CONTACT INFO



GAS LEAK EMERGENCIES

612-372-5050 • 800-722-9326

CURTAILMENT INFOLINE

612-321-4998 • 800-234-5800 x4998

CenterPointEnergy.com/CurtailmentForecast

All other services, including:

- Adding load
- Equipment changes
- Pressure problems
- Efficiency improvements
- Any other non-emergency natural gas issues

Call your account manager or 612-321-4330 800-234-5800 x4330

Energy Efficiency & Technology Conference

May 21st 2019

Ryan Kerr, Senior Manager, Emerging Technologies | GTI
rkerr@gti.energy | 847.768.0941

GTI- Independent and Not-for-Profit



FOR A BETTER ECONOMY AND A BETTER ENVIROMENT

World-class R&D laboratories headquartered in Chicago area



Supply



Conversion



Delivery



End Use



RESEARCH & DEVELOPMENT



PROGRAM MANAGEMENT



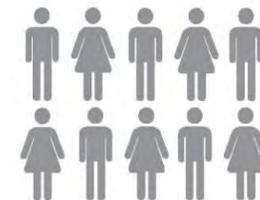
TECHNICAL/ ANALYTICAL



CONSULTING

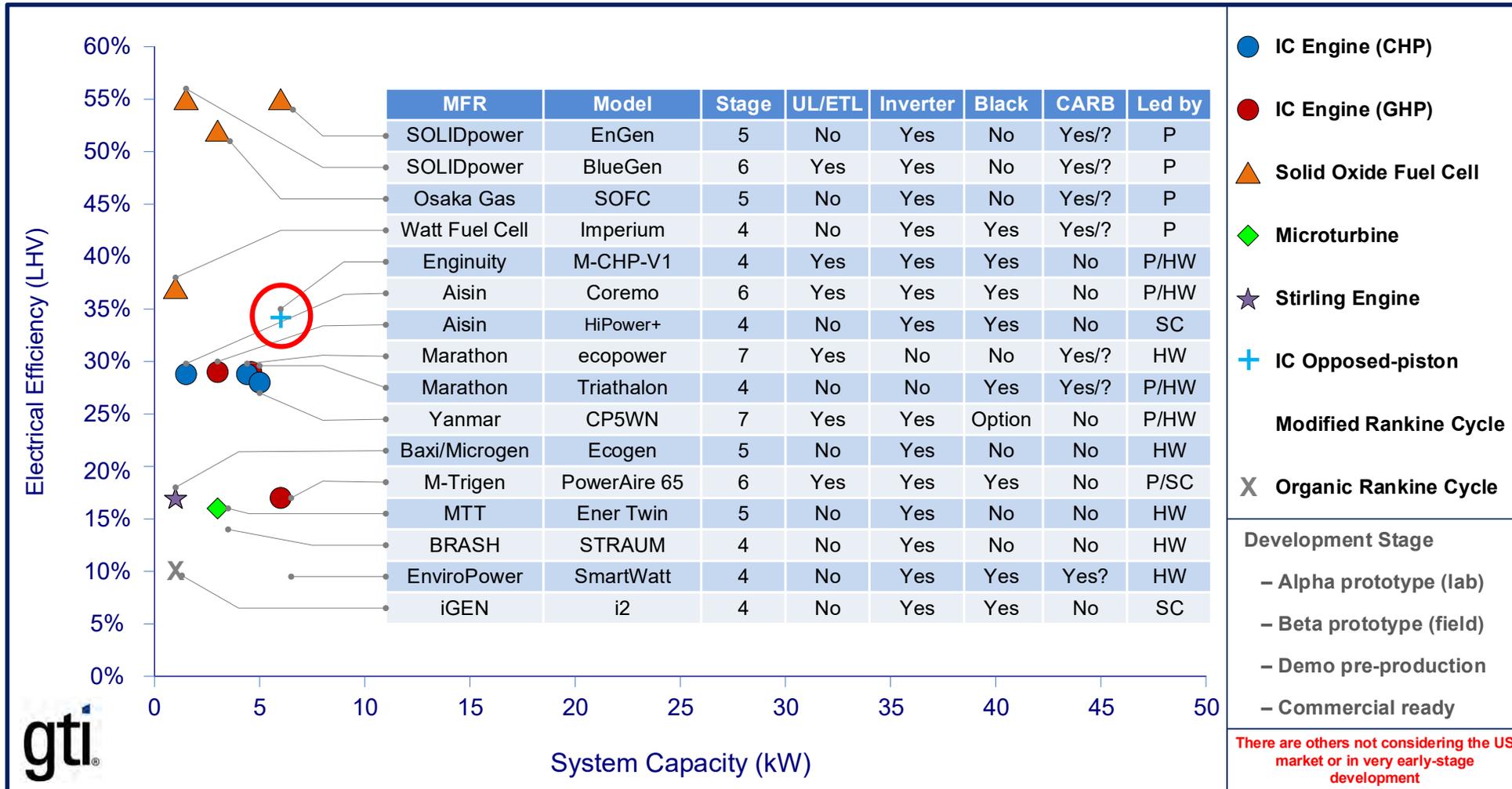


TRAINING

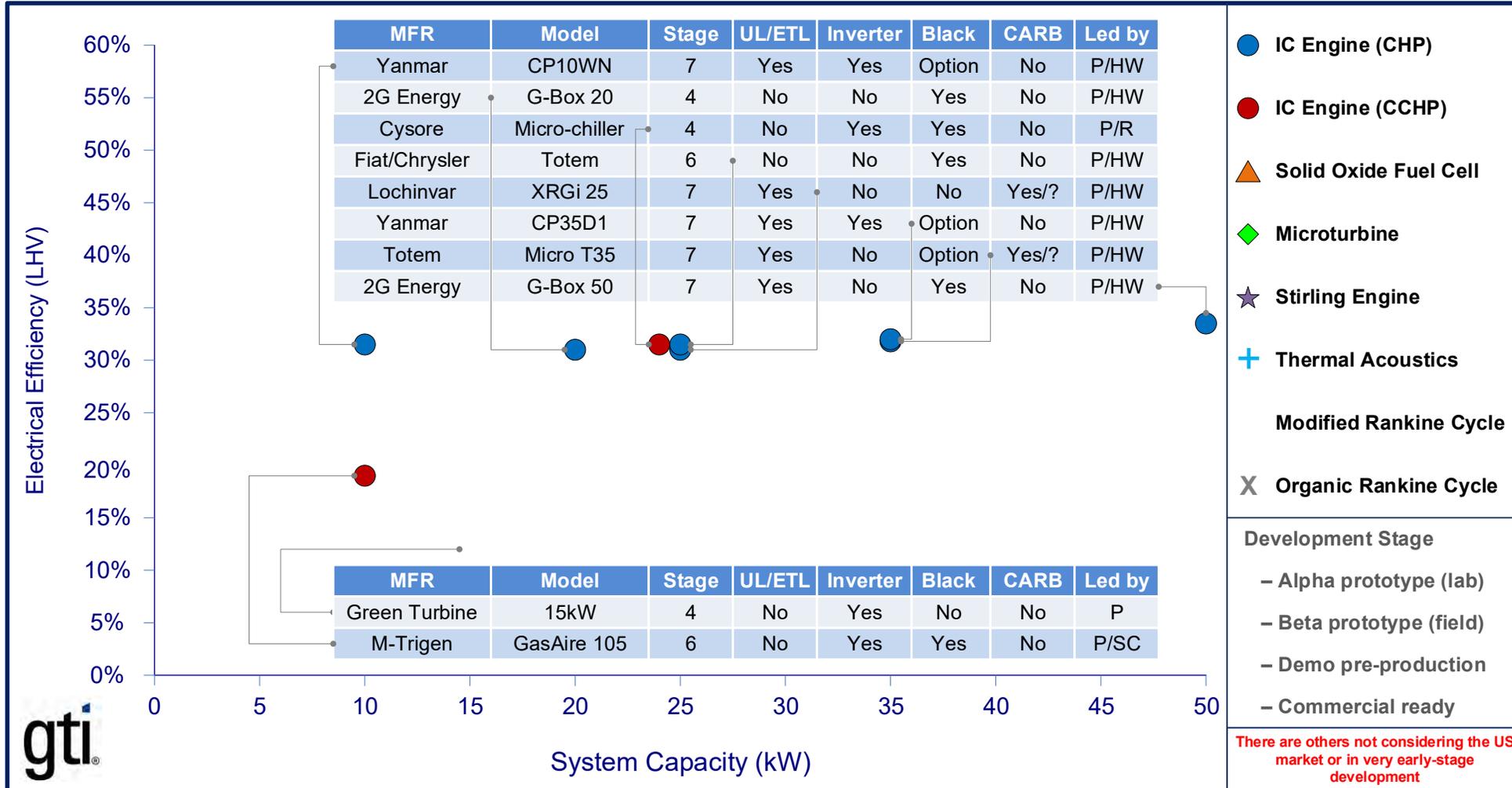


360+ EMPLOYEES

Micro-CHP Market Landscape <10kW



Micro-CHP Market Landscape 10kW to 50kW



Lochinvar XRGi 25 micro-CHP

> Commercial Ready System

- 24kWe, 163 MBH thermal, 480V 3 Φ
- ETL certified
- Grid-parallel only (no black-start)

> GTI-EC Power/Lochinvar history

- GTI lab-evaluated in 2016 – CEC
- Back in lab now - CARB DG cert
- Field deployment in CA (Lifetime)



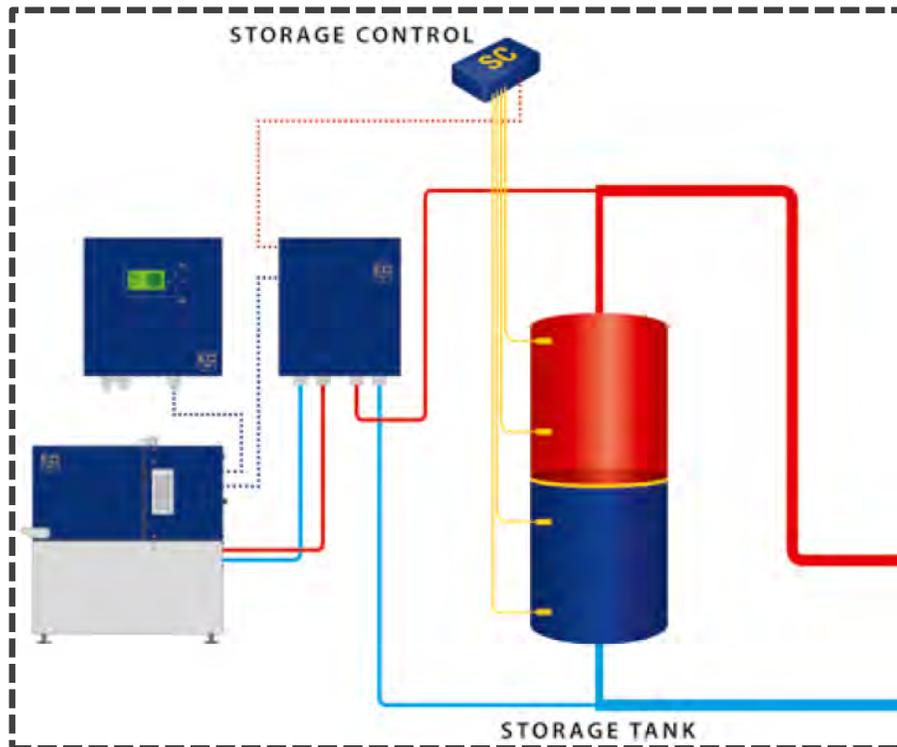
First CARB DG-Certified micro-CHP?

- NOX, CO, VOC < 0.01 lb/MW_{hr}
- GTI lab: new + aged catalyst
- 15,000 hrs proof
- GTI periodic field monitoring

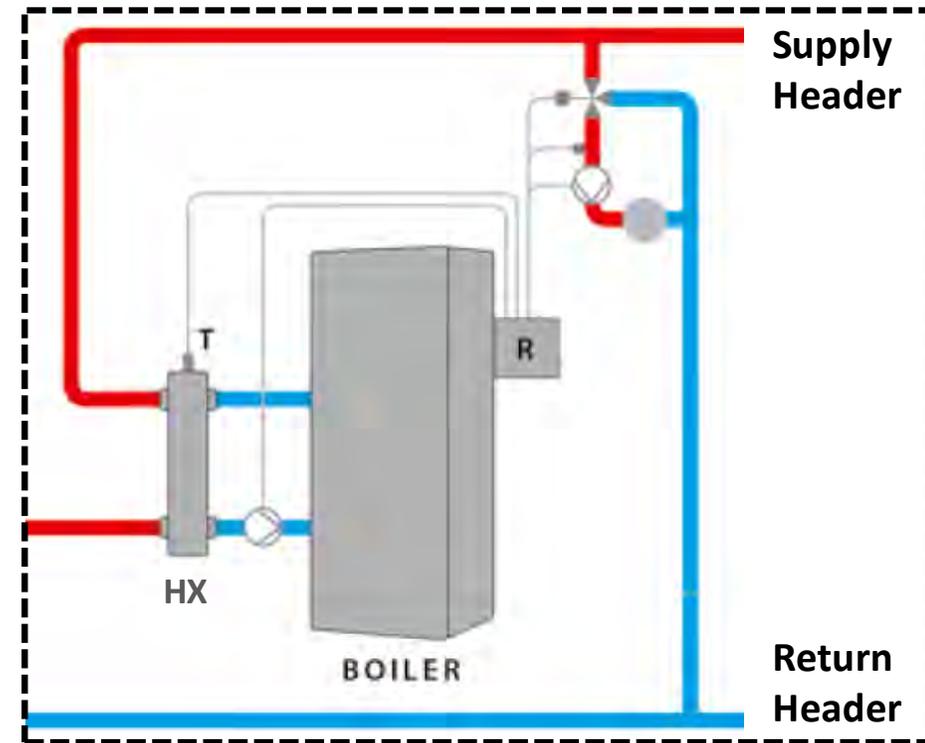
Lochinvar XRGi 25 micro-CHP Boiler Integration

[Parallel] Redundant Hot Water and Power

Lochinvar System



Commercial Facility Boiler



Lochinvar XRGi 25 micro-CHP Application



> Typical Commercial Applications

- At least 24kWe electric demand
- >4,000 gallons per day of hot water
- Look for facilities with 800MBH+ boilers

> Rough Economics

- \$60,000 for Lochinvar system (+\$20k install)
- 10% tax incentive, bonus depreciation
- \$2,000 per year maintenance
- 6,000 hours runtime
- Alternative equipment \$5,000
- Displaces thermal load from 85% boiler

Primary targets

- 200-room+ hotels
- 40-unit multifamily
- Any commercial pool heating
- Microbreweries
- Manufacturing processes

Secondary targets

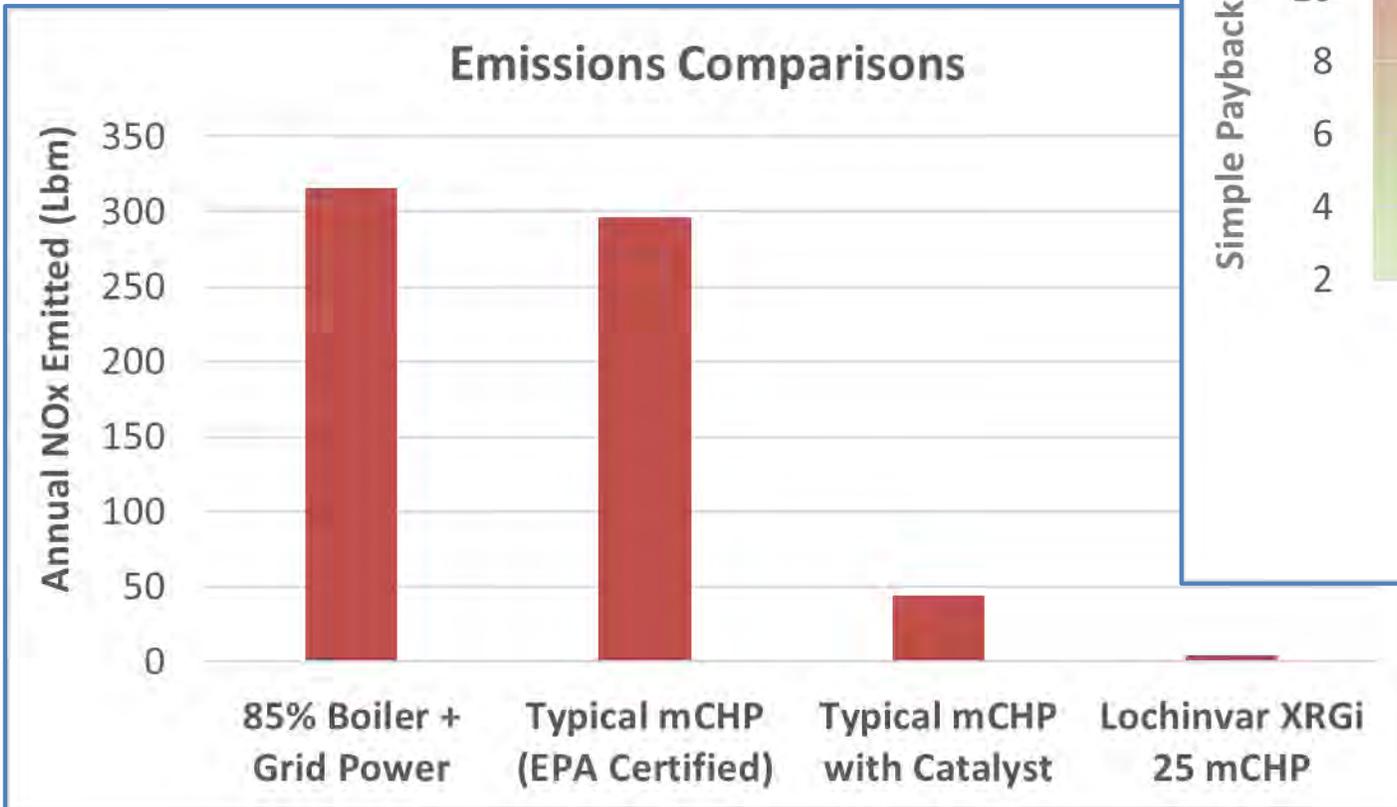
- Vertical farming and greenhouse
- Full service restaurants
- Laundromats
- Car washes

Lochinvar XRGi 25 micro-CHP Application Benefits

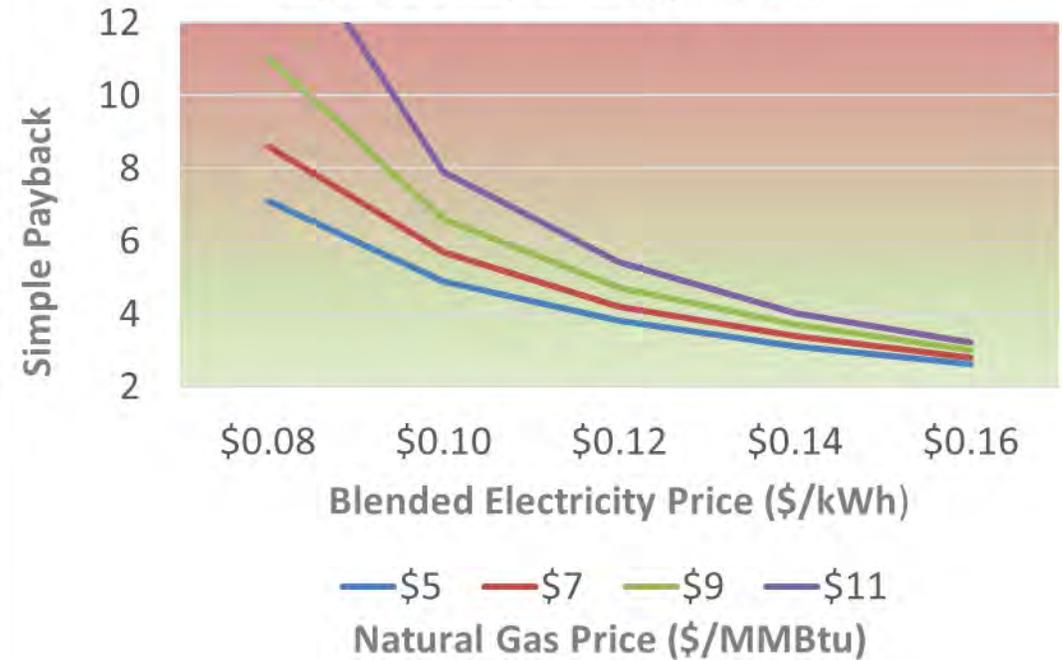


Environment

Emissions Comparisons



Paybacks by Energy Rates



Customer

Natural Gas Standby & Emergency Power

Reliable, Resilient

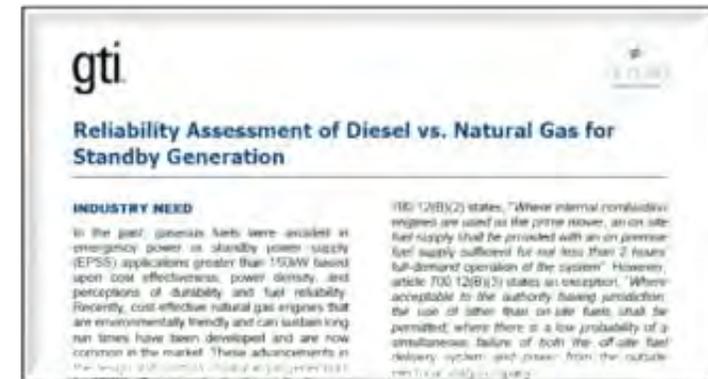


> GTI working with industry partners such as Generac to document benefits of natural gas for emergency power supply systems (EPSS)

- Benefits of natural gas over diesel
- Reliability white paper
- Calculators comparing lifecycle costs for natural gas and diesel
- Work with NFPA 70, AHJs to permit pipeline natural gas as alternative to onsite diesel storage



For more information: <http://www.natgasgen.com>



Types of Emergency Power Supply Systems (EPSS)

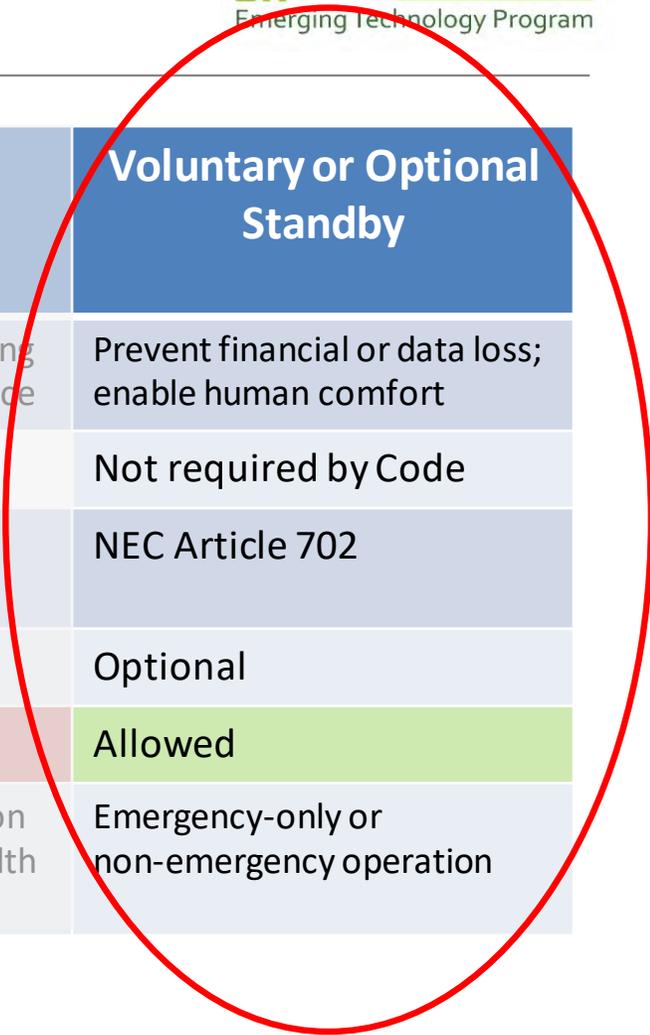


	Life-safety or Emergency Power Systems	Legally Required Standby	Critical Operations Power	Voluntary or Optional Standby
Focus:	Protect occupant lives; focus on paths of egress	Enhance egress, but not critical for life safety	Maintaining operations during disasters or defending in place	Prevent financial or data loss; enable human comfort
Code:	Required by Code	Required by Code	Required by Code	Not required by Code
	NEC Article 700 NFPA 110 Level 1	NEC Article 701 NFPA 110 Level 2	NEC Article 708	NEC Article 702
Storage	2 hrs full load	2 hrs full load	72 hrs full load DCOA	Optional
Natural Gas?	AHJ approval	AHJ approval	Not allowed	Allowed
Issues	Separate conduit runs, panels and transfer stations	Can use same raceway as optional or normal loads; can share system components	Designated Critical Operation Areas (DCOA) for public health and safety per AHJ	Emergency-only or non-emergency operation

Types of Emergency Power Supply Systems (EPSS)

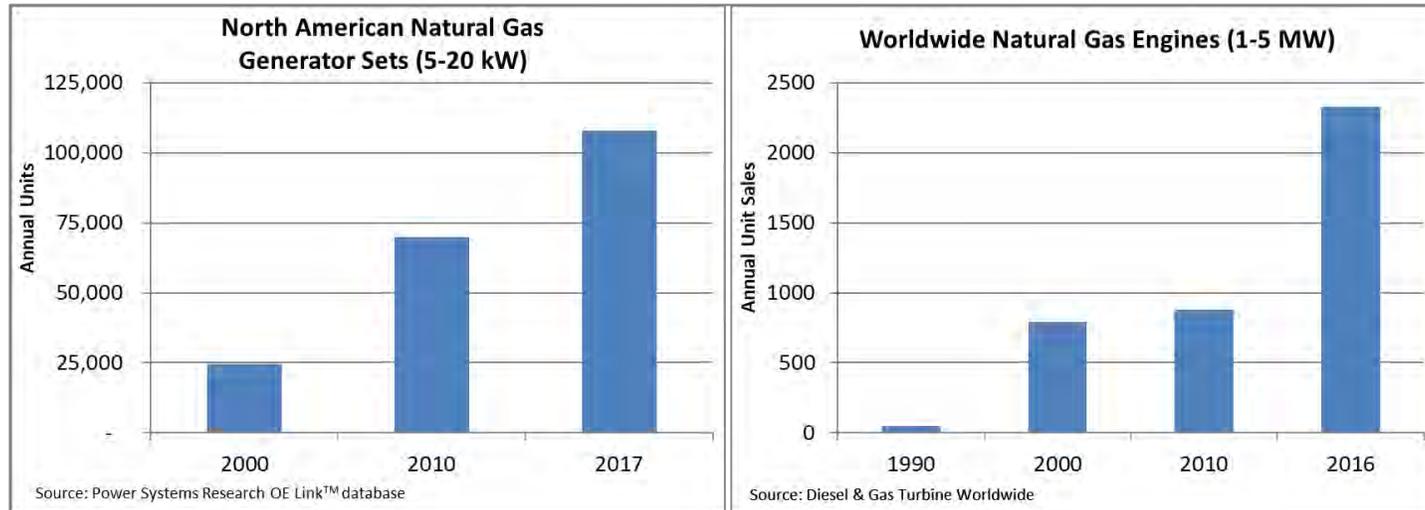


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Natural Gas Standby & Emergency Power

Reliable, Resilient



- > Voluntary EPSS are a growing market due to concerns with electric grid reliability and extreme weather events
 - Gasoline, diesel, propane, and natural gas
 - Diesel gen-sets are established practice, primarily due to codes requiring on-site storage

The graphic displays four fuel options with corresponding flame icons: Diesel (orange), Propane (yellow), Natural Gas (blue), and Bi-Fuel (green). Below the icons is the heading 'FUEL CHOICES' and a paragraph explaining that while diesel is traditional, other fuels are viable. A button labeled 'Explore Fuel Choices' is at the bottom.

FUEL CHOICES

Diesel might be the traditional fuel choice for standby power systems, but it's hardly the only choice. Generac specializes in standby power systems driven by a variety of fuel types.

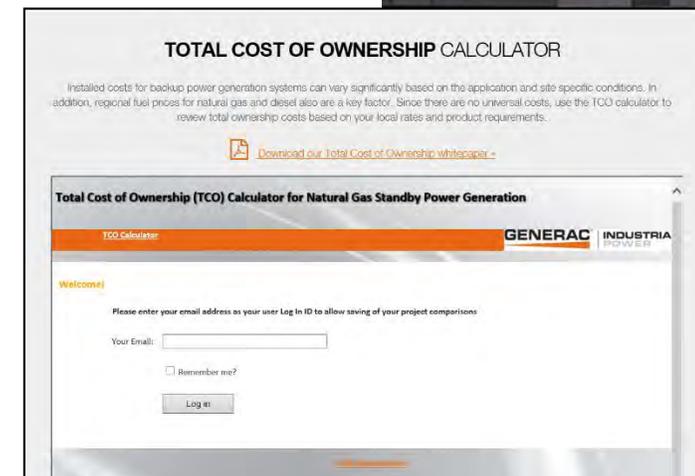
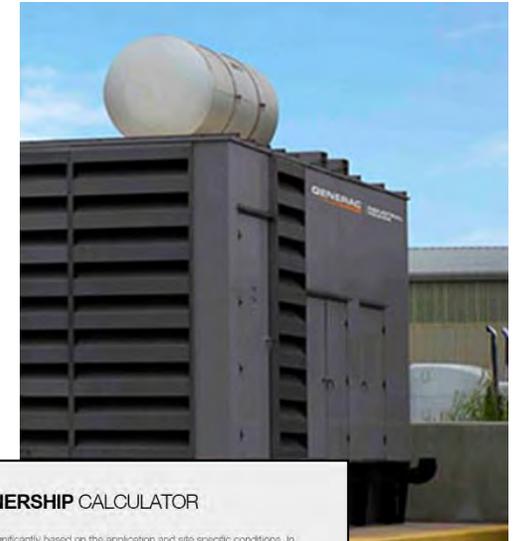
[Explore Fuel Choices](#)

Natural Gas Standby & Emergency Power

Reliable, Resilient



- > Diesel gen-sets are the established technology but recent events highlight vulnerability of diesel gensets
 - Typically 2-3 day supply; inadequate for extended outages
 - Ultra-low sulfur diesel (ULSD) requires rigorous maintenance; can impact reliability
 - Higher O&M costs
- > Natural gen-sets are a growing market for residential, commercial and industrial use
 - Increased resilience; natural gas infrastructure can provide fuel for weeks or months
 - Potential lower lifecycle costs (www.generatorTCO.com)
 - Environmental benefits



Natural Gas Standby & Emergency Power

Reliable, Resilient

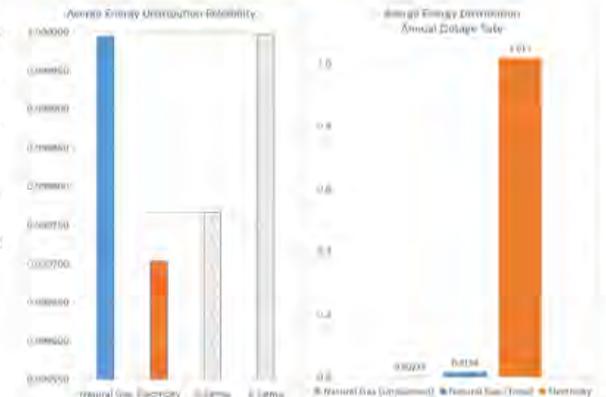


> GTI topical report: *Assessment of Natural Gas and Electric Distribution Service Reliability*

- Substantiates the high level of reliability of natural gas utility supply using natural gas utility data
- Natural gas service an order of magnitude more reliable than electric grid
- Supports the use of natural gas for standby generators
- Public distribution:
 - Full report: www.gastechnology.org/reliableNGservice
 - Press release and two-page summary: <http://www.gastechnology.org/news/Pages/GTI-Report-Delivers-Quantitative-Data-Supporting-Natural-Gas-Standby-and-Emergency-Generators.aspx>
 - Generac technical resources website: <http://www.generac.com/Industrial/professional-resources/news-whitepapers/whitepapers>

Quantitative Safety and Reliability Metrics

To gather data for the report, GTI conducted a survey of twelve North American natural gas distribution companies, who provided statistics on the number of planned and unplanned service outages and the number of service hours lost to outages. The survey data was combined with information from the U.S. Department of Transportation (USDOT) and the Common Ground Alliance (CGA) regarding safety incidents or unplanned outage events. Researchers applied the six sigma approach to quantify reliability of the natural gas distribution service.



For comparison, GTI assembled a representative set of distribution service reliability statistics from nine electric companies, culled from reporting data required by state public utility organizations.

Energy Distribution Reliability and Outage Rate Comparison

Results from the comparison show that natural gas distribution service exhibits six-sigma-level availability performance, while electric distribution service has availability performance near the five-sigma level. Translated into nominal outage time per year, on average natural gas customers could expect to be without service for 3 minutes (and 1.2 minutes based on unplanned downtime) and electric customers could expect to be without service for 156 minutes.



Natural Gas Delivery Reliability & Resilience



> Extreme Cold / Peak Consumption:

— 2019 Polar Vortex:

> Minnesota natural gas distribution reached supply limit at **unprecedented low temperatures of -30F**; Xcel Energy already planning to add pipelines

> **Fire** at a Michigan compressor station led Consumers Energy to implement the curtailment plan for commercial/industrial customers; **no curtailments to residential gas service**

— 2017/18 Bomb Cyclone (Winter Storm Grayson)

> **Firm service** customers experienced **no curtailments**; also shielded from elevated spot prices

> **Spot market customers** faced high prices due to interruptible contracts; New England and PJM generators switched to oil/coal for **economic reasons**



Source: Latestly.com

Opportunities to Use CHP/DG for Electric Demand Response

- > **Objective:** Technical and economic assessment of current market landscape for electric demand response (DR);
- > Identify technologies or applications for most cost-effective:
 - Equipment configurations:
Standby gensets; CHP; DG; Micro-grids
 - Codes & standards
 - Economics
- > Review DR options for lifecycle cost savings
 - DSM credits and incentives vary by utility, state, and application
 - Utility price structures
- > **Drivers:** Growing market due to concerns with power reliability and resilience



Natural Gas Standby & Emergency Power

Reliable, Resilient



- > Demand response (DR) operation of natural gas standby systems can reduce lifecycle costs
 - Requires EPA non-emergency emission certification to operate >100 hrs
 - Typically installed for standby; offered DR as the next step
 - DR programs offered by regional electric utilities, independent system operators (ISO) or third-party providers; some utilities offer DSM credits and incentives
- > Growing number of non-emergency natural gas gensets
 - In 2017, Generac introduced 16kW, 22kW gensets for residential or small commercial; larger units (625 kW, 750 kW) added in 2018
 - Caterpillar offers non-emergency gensets (750kW, 1000kW); with plans for larger systems (2000kW, 2500kW)
 - Cummins non-emergency gensets 13 kW to 150kW; RS125 and RS150 introduced in Jan. 2018



Demand Response/DSM Options



	Emergency-only EPSS	Utility/Curtailment Service Providers (CSP)	Non-Emergency DSM (Peak shaving)	Combined Heat & Power	Distributed Generation or Micro-grid
Utility directed	n/a	Yes	No	No	No
Incentives	n/a	Utility or CSP	Possible DSM credit	EE programs	
Requirements	n/a	Minimum capacity	n/a	n/a	n/a
Runtime	Up to 100 hrs for testing and maintenance	Multiple programs; from <2 hrs up to 80 hrs	Up to 500 hrs (warranty)	Up to 8760	Up to 8760
Est. First Cost	\$	\$\$	\$\$	\$\$\$	\$\$\$

Illinois National Guard EPSS Demonstrations



- > Develop representative configurations which can be applied across a wide range of IL National Guard sites
- > Demonstrate resilience benefits of NG EPSS
- > On-site storage options, if required:
 - Dual fuel: natural gas and propane
 - Parallel natural gas and diesel gensets
- > Identify cost-effective configurations: DSM, DR, or Micro-Grid
- > Identify approaches to quantify resilience benefits



US Army Corps of Engineers



Technology Evolution of Natural Gas Heating for Commercial Buildings



Reznor Condensing DOAS



Yanmar GEHP



SMTI GAHP



boostHEAT



Thermolift

Up to 83% TE
Non-condensing
RTUs / Boilers

90-95% TE
Condensing
RTUs / Boilers

COP 1.0-1.4

Available:

- Engine Heat Pump (GEHP): VRF, RTU
- Absorption Heat Pumps (Robur)

COP up to 1.5
Near-term:

- Next Gen GEHP
- Next Gen Absorption Heat Pumps (GAHP)

Potential COP>2
Long-term:

- Adsorption, Ejector
- External Combustion Engines (Vuilleumier, Stirling, etc.)
- Others

ETP / UTD Activities: Gas-fired Heat Pumps for Commercial HVAC



> Currently Available GHPs:

- VRF Gas Engine-driven HPs Demonstrations
 - > Yanmar 3-pipe VRF
- Packaged Gas Engine-driven HP
 - > 11-ton PGHP New York Demonstration
- Gas Absorption Heat Pump
 - > Robur Technology Snapshot



Yanmar 3-pipe GHP in Lawrenceville, GA



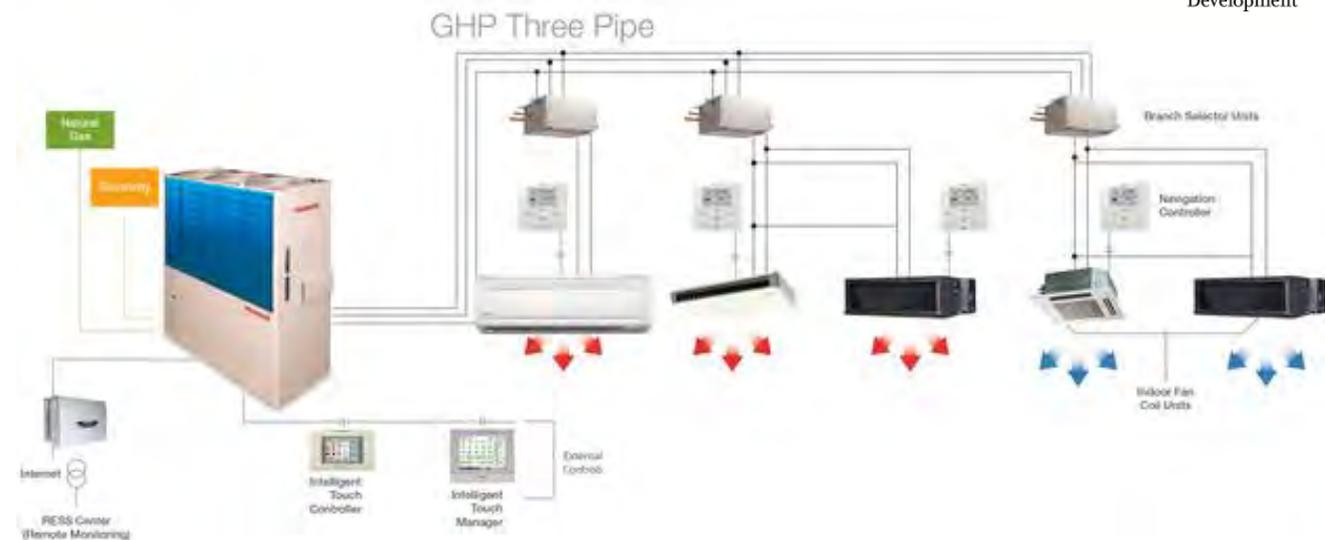
Image Source: Blue Mountain Energy (ICEGHP.com)



Robur GAHP-A (Source: Robur)

VRF Field Study: Yanmar 3-pipe GEHP

- > **Objective:** Evaluate installed performance of Yanmar's 3-pipe gas engine-driven heat pump (GEHP) with variable refrigerant flow (VRF)
 - > Yanmar GEHPs entered U.S. market in Jan 2016
 - > First 3-pipe model (14 RT); previously only electric VRF offered simultaneous heating and cooling
 - > Heat recovery adds design flexibility



Source: YANMAR America Corp

VRF Field Study: Yanmar 3-pipe GEHP

- > **Field site:** A new public works facility in Lawrenceville, Georgia (multi-zone offices)
 - 3-pipe VRF provides simultaneous heating/cooling
 - One of six 3-pipe VRF GEHPs installed
 - Recent incentives for GHPs and reduced peak electric demand (e.g. Municipal Gas Authority of Georgia)



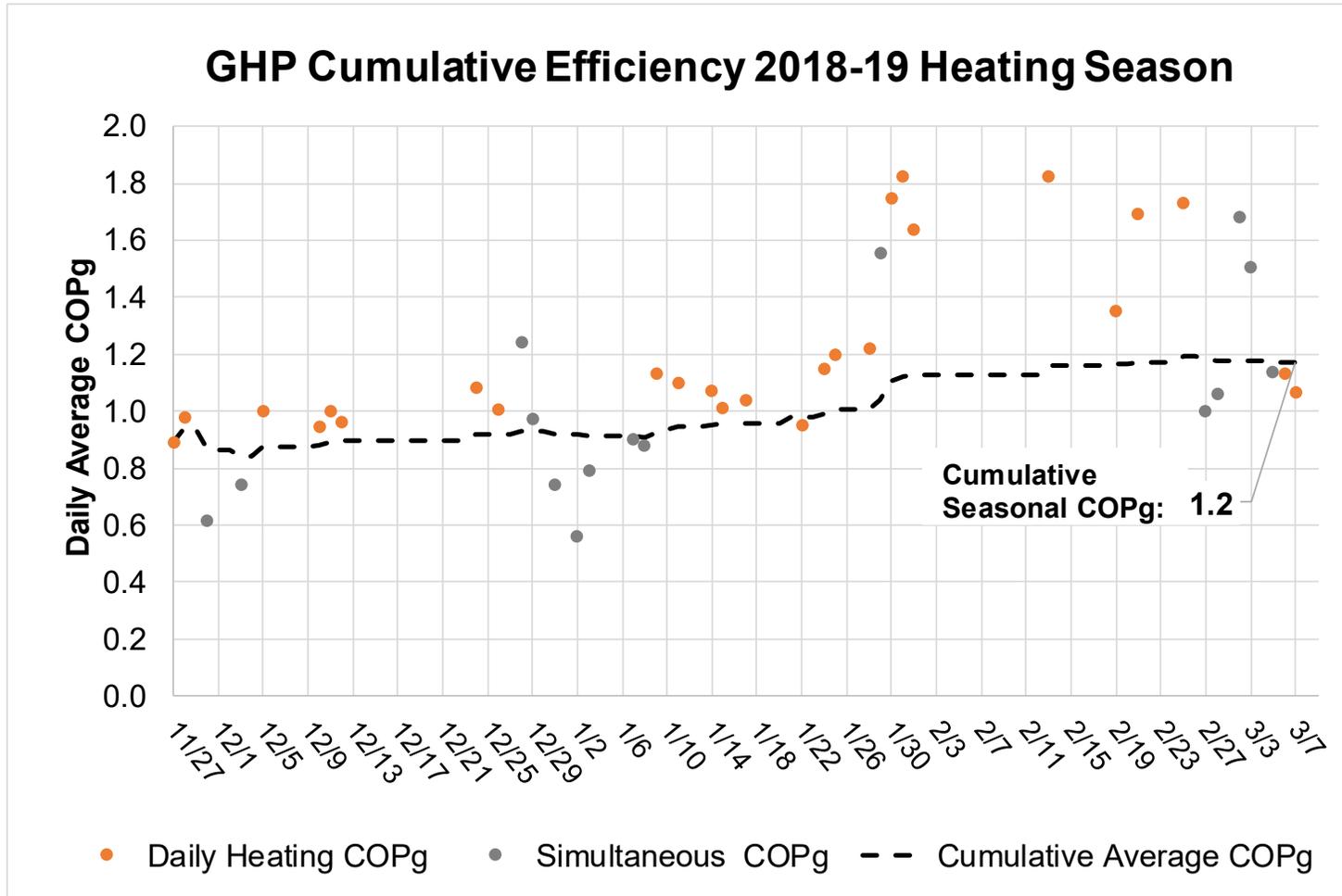
VRF Field Study: Yanmar 3-pipe GEHP

> Demonstration Equipment:

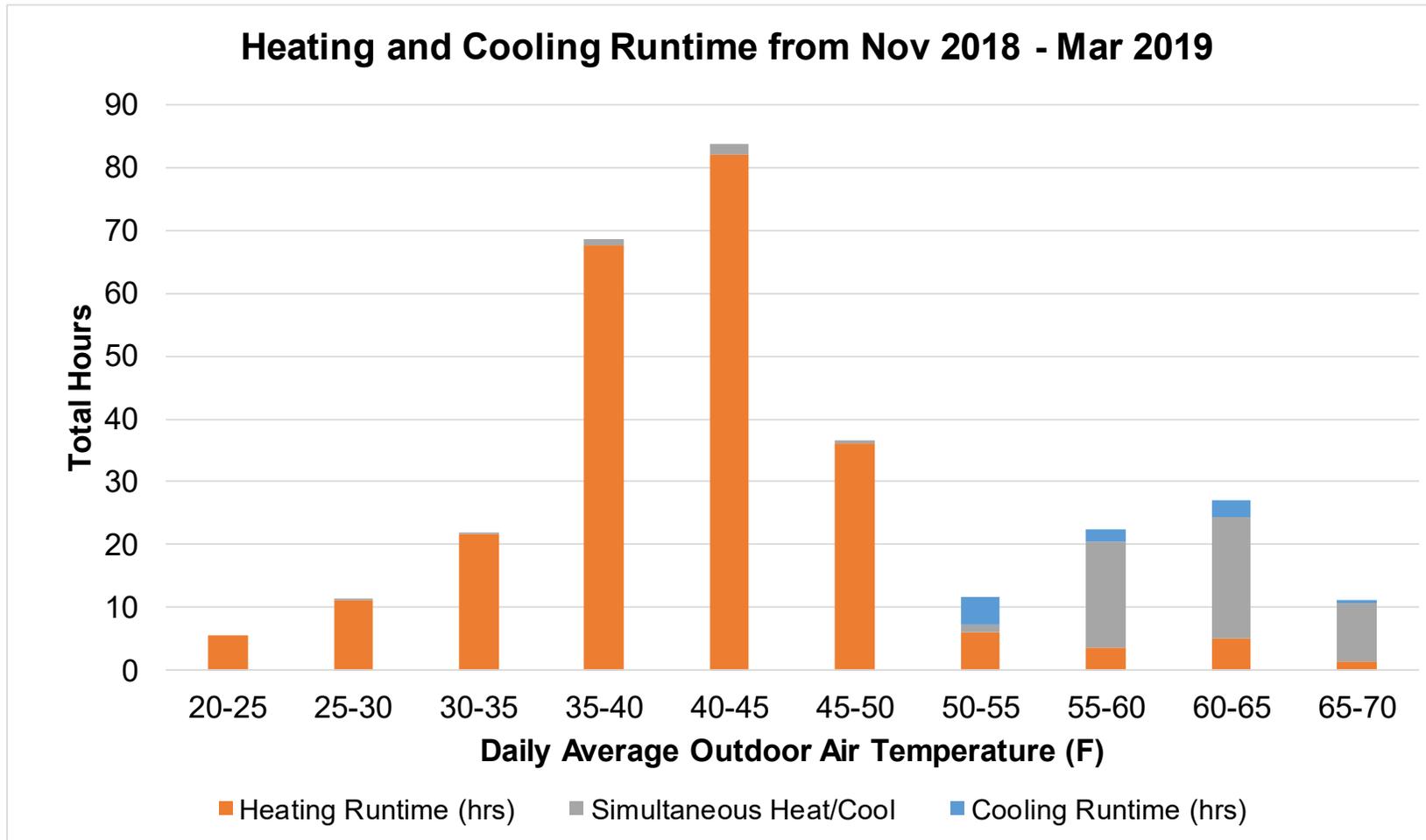
- Ducted indoor fan coils selected for more accurate air measurements
- Outside air conditioned by TERV (tempering energy recovery ventilator)
 - > Designed for space neutral conditions (70°F cooling, 72°F heating)
 - > Lower supply temperatures (55°F) to control humidity
 - > Supplemental heating at outdoor temperatures below 32°F



VRF Field Study: Yanmar 3-pipe GEHP



VRF Field Study: Yanmar 3-pipe GEHP



VRF Field Study: Yanmar 3-pipe GEHP



- > Completed heating monitoring (Nov 2018 - Mar 2019)
 - 1.2 COPg season heating efficiency with simultaneous heating/cooling at mild ambient temperatures
 - Heating load reduced by TERV supplemental heating
 - Efficiency impacted more by part-load operation than ambient conditions;
- > Currently monitoring 2019 cooling performance (Mar – Nov 2019)
 - Cooling performance
 - Simultaneous heating/cooling operation



Source: YANMAR America Corp

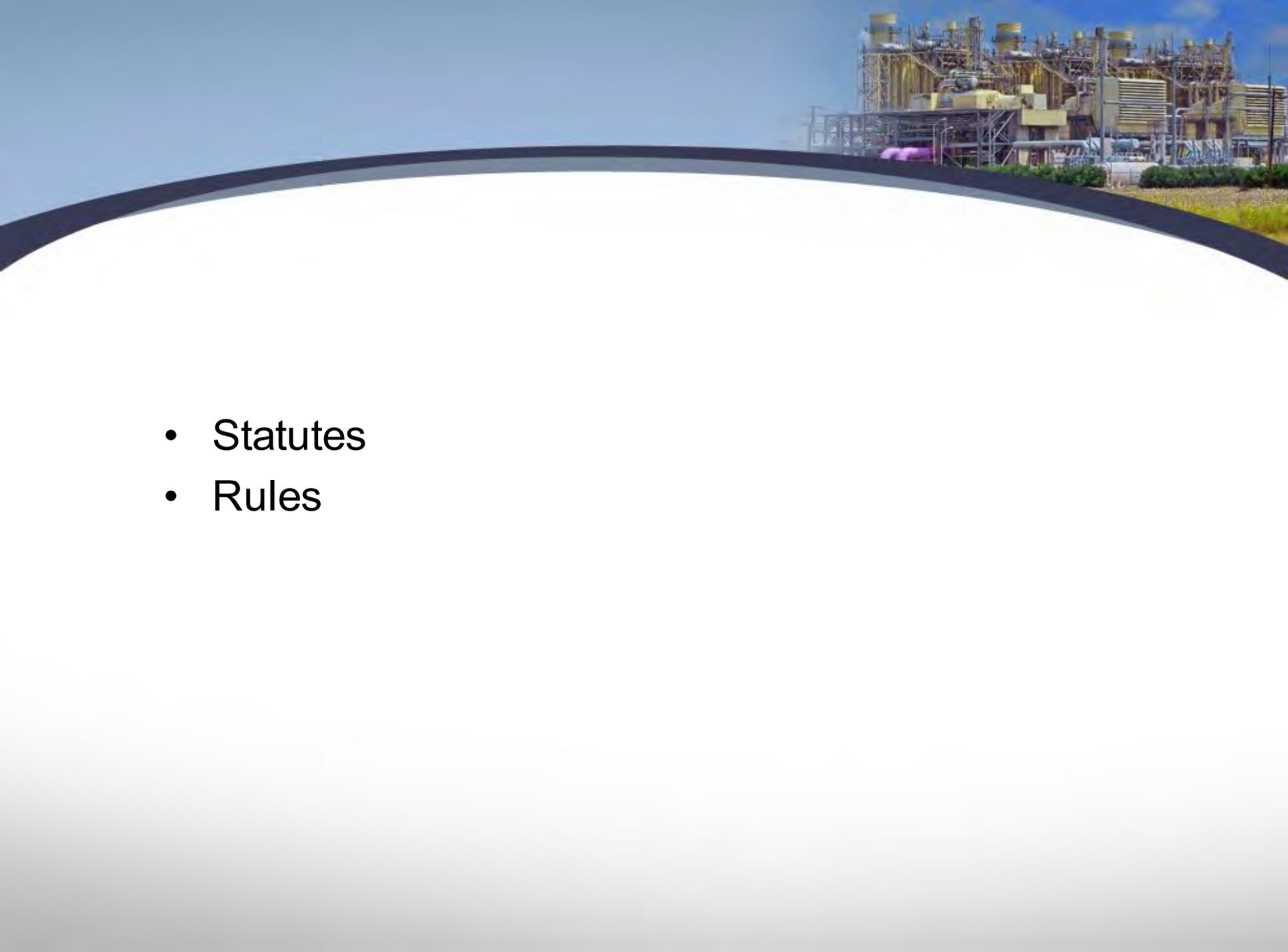


Getting Boiler Operators Started

Sprung Services



Definitions

- 
- Statutes
 - Rules

Definitions



- **Low-Pressure Boilers:** Steam boilers designed to operate at or below 15 psi. Liquid boilers are designed to operate at or below 160 psi and 250 degrees Fahrenheit are also considered low pressure boilers.
- **High-Pressure Boilers:** A boiler in which steam or other vapor is generated at a pressure of more than 15 psi, or water is heated to a temperature greater than 250°F and pressure greater than 160 psi for use external to itself.
- **Heating Surface:** The area of the boiler that is defined as heating surface is the surface that has water/liquid on one side and the heat source on the other.



Licensing

Types of Plants



- Grade “A” = High-pressure plants with steam engines/turbines
- Grade “B” = High-pressure plants
- Grade “C” = Low-pressure plants
- Special operators can operate all types of plants of very low horsepower or higher horsepower under direct supervision.

Special Engineers

- Can operate as a SHIFT ENGINEER in a plant of up to 100 horsepower
- Can TAKE CHARGE of a plant up to 50 horsepower
- Must be 18 years old, or 16 if enrolled in an approved training program

Second Class Engineers



- Can operate as a **SHIFT ENGINEER** in a plant up to 500 horsepower
- Can **TAKE CHARGE** of a plant up to 100 horsepower

First Class Engineers



- Can operate as a **SHIFT ENGINEER** in a plant of unlimited horsepower
- Can **TAKE CHARGE** of a plant of up to 500 horsepower

Boiler Horsepower



- For the purpose of rating boiler horsepower for engineer license classifications only, 10 square feet of heating surface is considered equivalent to one boiler horsepower for conventional boilers
- Actual boiler horsepower will normally be much higher than this
- If the square feet of heating surface cannot be determined, dividing the BTU input by 67,000 is used

Boiler Horsepower



- **MN Rule 5225.1000 States:** The total horsepower of all boilers connected to the header, whether all the boilers are in use or not will be used to determine the horsepower for licensing purposes

Experience Documentation

- When documenting experience, a notarized affidavit or a notarized letter from an employer may be used.
- Other documentation may be accepted at the sole discretion of the Chief Boiler Inspector
- One year of low-pressure experience is a 12-month season, including heating season and off-season maintenance

Licensing



Experience requirements to test for licenses

- Special = 0
- 2nd Class = 1 year
- 1st Class = 3 years
- Chief = 5 years- Also must have held a 1st class for at least a year

License Renewals



- Licenses are good for two years.
- There is a 30-day grace period. After this period there is a late fee.
- If the renewal is not received within one year, the license cannot be renewed and must be re-applied for and re-tested for.

Minnesota Code Basics



- The property owner is responsible for the safety and efficiency of a boiler
- It is required annually by the State of Minnesota that boilers be inspected by an insurance company or a State Boiler Inspector
- It is the Owner and/or Engineer responsibility to make sure the boiler is inspected as required

More Minnesota Code



- A boiler log book is required by statute, by the State of Minnesota, Boiler Inspection Division, for all boiler rooms



Advantages of Employing a Licensed Boiler Operator

Safety

- Checking safety devices
- Keeping up with water treatment
- It is the Owner and/or Engineer responsibility to make sure the boiler is inspected as required

Maintenance

- Preventative maintenance
- Keeping up with basic repairs

Operations

- Putting boiler on and offline
- Adjusting boiler while operating

Efficiency



- Keeping heating surfaces clean through water treatment
- Recognizing burner inefficiencies
- Insulated piping

Efficiency

- Adjusting blowdown properly
- Adjusting steam pressures
- Adjusting water temperature

Efficiency

- Minimizing blowdown
- Monitoring condensate
- Monitoring stack temperature



Overcoming Objections from an Employee



- More money
- Career advancement and stability
- Bonus for getting license
- New challenge

- 
- An industrial facility, possibly a refinery or chemical plant, is visible in the background. It features a complex network of pipes, scaffolding, and several large cylindrical storage tanks. The sky is clear and blue. The foreground is dominated by a large, white, curved shape that frames the text.
- Pay for test and wages
 - Pay for prep classes
 - Schedule prep classes and state exam for them

A photograph of a large industrial facility, likely a power plant or refinery, with numerous towers, pipes, and structures under a clear blue sky. The image is partially obscured by a large white curved shape that frames the text below.

Are they scared, uncertain or unfamiliar of boilers?

- Exam prep
- Mentoring by other licensed operators
- Mentoring by Sprung Services
- Come up with procedures and log readings



Reed Sprung

President/CEO

Sprung Services

151 Silver Lake Road Northwest

Suite 110

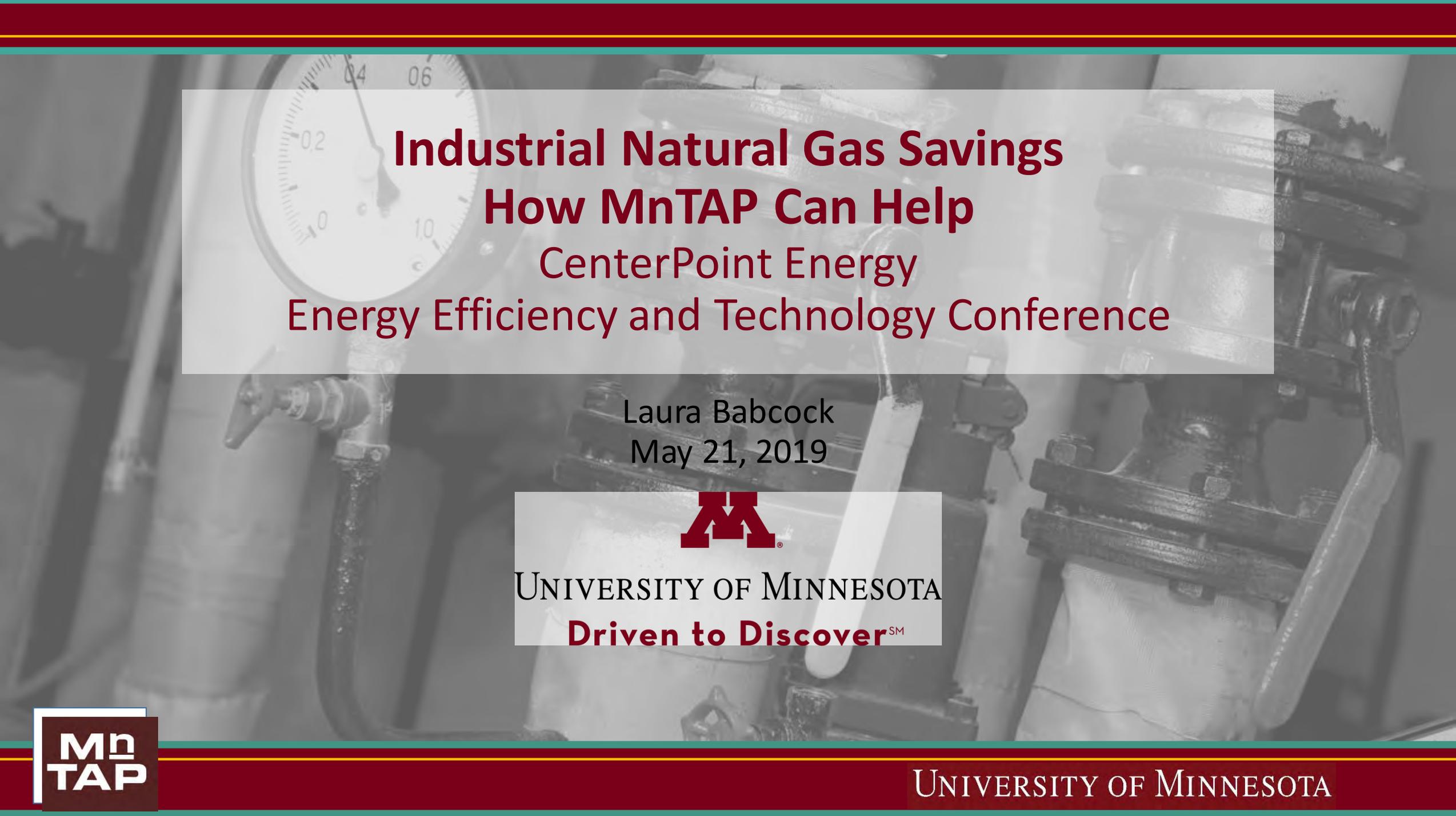
New Brighton, MN 55112

Office: 651-697-0334

Email: Reed@sprungservices.com

www.sprungservices.com





**Industrial Natural Gas Savings
How MnTAP Can Help**
CenterPoint Energy
Energy Efficiency and Technology Conference

Laura Babcock
May 21, 2019



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Outline

- **Introductions**
- **What does MnTAP do?**
 - Site Visits
 - Teams
 - Interns
- **Natural gas savings in your process!**
 - Steam/Boilers
 - Process Heat
 - Hot Water

MnWHAT? – Who Are We?

- **Minnesota Technical Assistance Program**
- **University of Minnesota**
 - Outreach and assistance unit
 - Grant and partner funded
- **Confidential, No Cost Engineering Technical Assistance for Minnesota Businesses**
- <http://www.mntap.umn.edu>



Minnesota Technical Assistance Program

Strengthening Minnesota businesses by improving efficiency while saving money through energy, water, and waste prevention.



MnTAP – What do we do?

- Practice Source Reduction
- Eliminate hazards, wastes and resource use at the source
 - Pollution Prevention
 - Energy Efficiency
 - Water Conservation
- Often Leads to Cost Savings



How we do it - Site Visits

On-Site Assessments

- **Site Visits - Confidential**
 - Staff lead, 2-8 hr time investment
 - Review issue, gather data
 - Report with recommendations
 - Follow up support
- **Best For**
 - Screening evaluation
 - Deeper dive into a few operations
 - Evaluating opportunity potential



<http://www.mntap.umn.edu/services/sitevisits/>

Assisting Minnesota Businesses Since 1984

Technical Areas

- Water use & wastewater
- Solid & hazardous waste
- Air emissions
- Packaging
- Raw material use
- Process energy
- Pump & fan efficiency
- Steam systems
- Compressed air
- Motor efficiency

Company Benefits

- Customize waste reduction and energy efficiency opportunities for your site
- Reduce your facility's environmental impact and improve public health
- Save money
- Gain access to further assistance
 - MnTAP intern projects
 - Grant and loan opportunities
 - MnTAP-facilitated internal teams

How we do it - Teams

Facilitated Teams

- **Energy Teams - Confidential**
 - Recurring 1-2 hr time investment
 - Site based effort, employee driven
 - Site leads/manages process
 - MnTAP can help scope, facilitate or generate ideas
- **Best For**
 - Deep dive into operational challenges
 - Multi-disciplinary or multi-departmental issues



<http://www.mntap.umn.edu/services/teams/>

Working Together to Realize Energy Savings

- **Motivation**
 - A partner wanted to achieve an aggressive energy use goal
- **Approach**
 - 9 month energy team to uncover opportunities
- **Opportunities**
 - Improve drying operation
 - cleaning heat exchanger
 - reconnecting drying agent dispenser
 - Improve boiler performance by fixing leaks
- **Results**
 - Natural gas, electricity, water and chemical savings
 - \$14,000/yr savings



http://www.mntap.umn.edu/wp-admin/admin-ajax.php?juwpfisadmin=false&action=wpfd&task=file.download&wpfd_category_id=159&wpfd_file_id=11800&token=6e825199290729e9cfe43133e8eb36fd&preview=1

How we do it – Intern Program

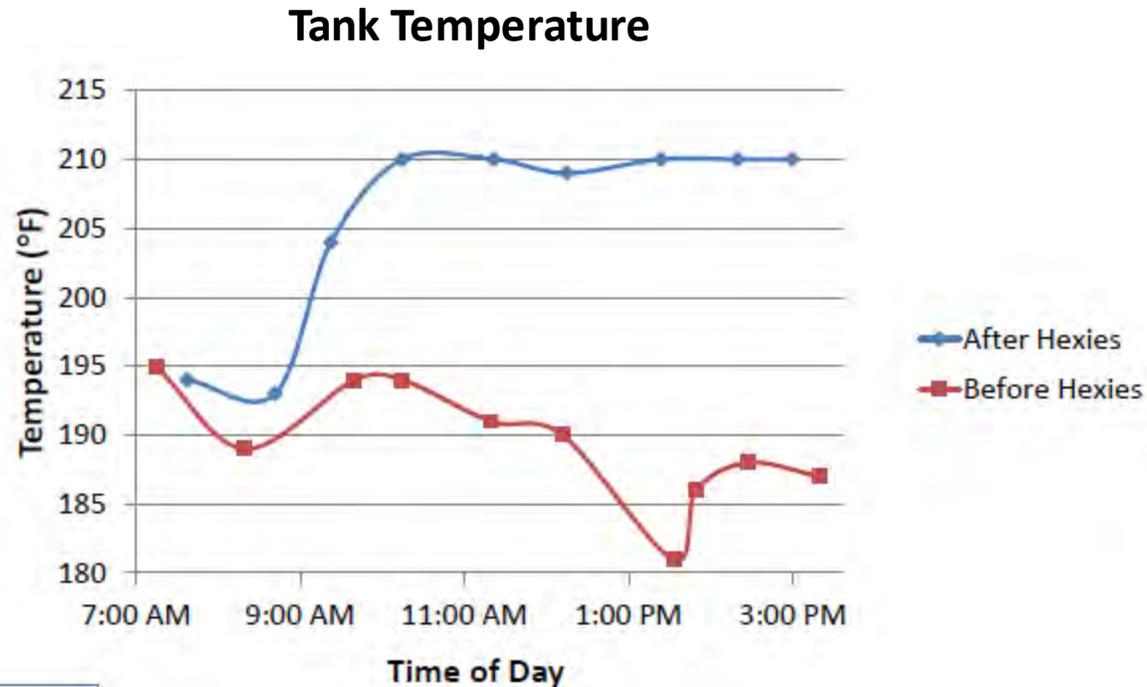
MnTAP Intern Program

- **Intern Project – Case Study**
 - 500 hr on-site intern at facility
 - Vetted project with plan
 - Shared supervision
 - Confidential technical information
 - Site approved case study/presentation
- **Best for**
 - Addressing multiple project areas
 - Launching implementation



<http://www.mntap.umn.edu/interns/>
<http://www.mntap.umn.edu/interns/business/>

Intern (un)Covers Novel Solution



- **Motivation**

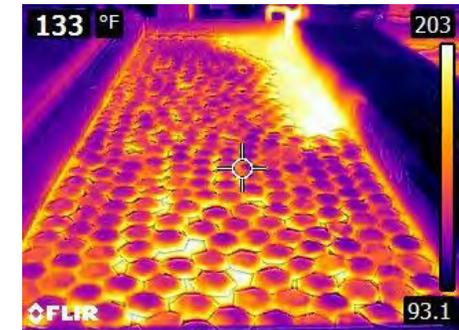
- Reduce heat and water loss from heated open tanks

- **Approach**

- Implement floating insulation

- **Results**

- 80% heat loss reduction
- 70% evaporation reduction



<http://www.mntap.umn.edu/download/139/2015/11608/jerico-sanchez-eco-finishing-summary.pdf>

Natural Gas Saving Examples

Boiler/Steam Systems



<http://www.mntap.umn.edu/focusareas/energy/steam/>

Process Heat



<http://www.mntap.umn.edu/focusareas/energy/heat/>

Hot Water



<http://www.mntap.umn.edu/focusareas/water/>

Boiler and Steam Systems

Facts

- 45% of fuel burned in manufacturing is for steam
- 15-30% of steam traps could be failing resulting in lost steam
- 70% reduction in water, chemical use and operating cost by recycling condensate for reuse

<http://www.mntap.umn.edu/focusareas/energy/steam/>
<http://www.mntap.umn.edu/focusareas/water/projects/#>

Consider

- Maintenance
- Insulation
- Steam trap operation
- Preheat water/air
- Recycle condensate
- Water quality to reduce blowdowns
- Right size boilers

Find and Fix Failed Steam Traps

St. Luke's Hospital - Duluth, MN



- **Motivation**
 - Reduce purchased steam costs
 - No regular trap inspection
- **Approach**
 - Conduct steam trap testing
 - Repair/replace failed traps
- **Results**
 - 13 traps broken, leaking, rapid cycling, plugged or flooded
 - \$3,500 to repair/replace
 - 14.8 million lbs steam saved
 - \$257,000 savings

<http://www.mntap.umn.edu/download/141/2013/11653/ben-wagener-st-lukes-hospital-summary.pdf>

Right Size that Boiler

Nordic Ware – St. Louis Park, MN



- **Motivation**

- Utilizing only 25% of boiler capacity

- **Considered**

- Building heat – cost prohibitive
- Retire boiler system

- **Results**

- Smaller hot water system
- Area heating units
- <5 month payback
- Reclaimed operations space
- Less regulatory reporting

Recover Heat and Fix Steam Traps

August Schell – New Ulm, MN



- **Motivation**
 - Manage energy use
- **Implemented**
 - Repaired 3 failed steam traps
 - Added insulation
 - Saved 6,000 therms, \$3,600
- **Additional Opportunity**
 - Heat recovery from boil off steam
 - 45,000 therms heat recovery potential
 - \$27,000 savings opportunity

Process Heat

Facts

- **17% of industrial energy use is for heating operations**
- **10-15% industrial energy efficiency opportunity by implementing BMPs**
- **Practices that reduce energy use often minimize waste and increase production**

Consider

- **Clean heat transfer surfaces**
- **Insulation**
- **Preheat combustion air**
- **Optimize burner oxygen levels**
- **Recover and use waste heat**
- **Improve process throughput**

Just in Time Heating

Consolidated Precision Products
Bloomington, MN



- **Motivation**
 - Reduce operating costs
 - Optimize equipment utilization
- **Opportunity 1**
 - Decrease hold time for high temp metal
 - 43,000 therms gas energy
 - \$19,000 potential savings
- **Opportunity 2**
 - Use waste exhaust heat for space heating
 - 39,000 therms
 - \$20,000 potential savings

Increase Production AND Save Energy

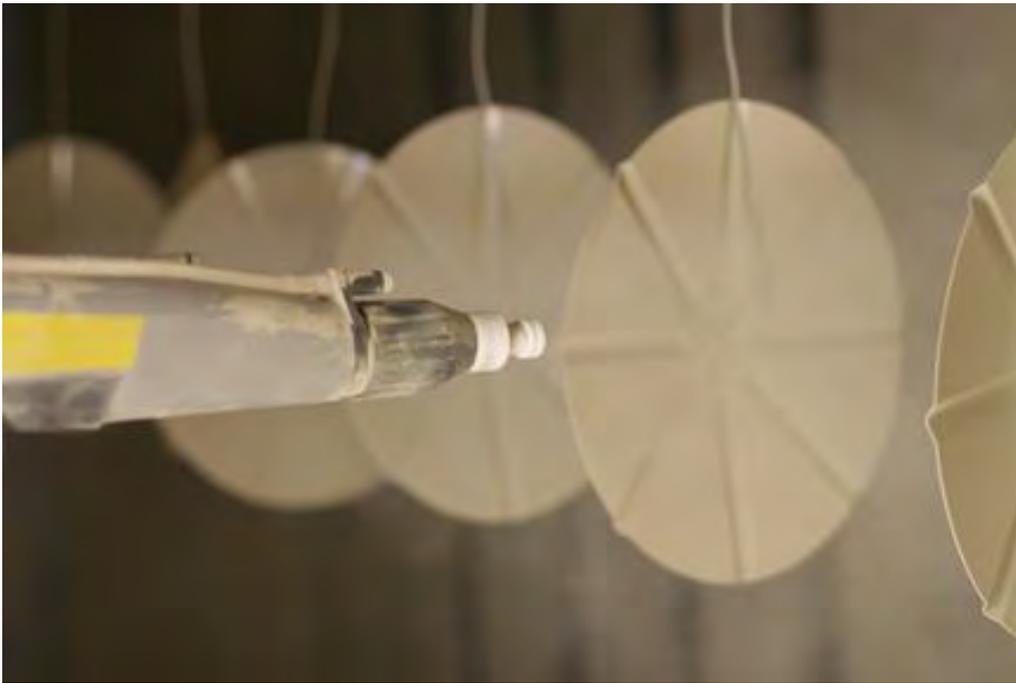
Firmenich – New Ulm, MN



- **Motivation**
 - Use Lean principles to reduce process waste
- **Approach**
 - Increase concentration of feed to spray driers
- **Results**
 - 2,200 therms evaporation energy
 - 75,000 lb production increase
 - \$337,000

Optimize Process Throughput

Schwing America Inc. St. Paul, MN



- **Motivation**
 - Use Lean principles to reduce process waste
- **Approach**
 - Increase production throughput by optimizing paint booth loading patterns
- **Results**
 - 2,500 therms oven heat
 - \$2,000/yr
 - Replication potential at other sites

<http://www.mntap.umn.edu/download/141/2013/11647/paul-senne-schwing-america-summary.pdf>

Manufacturing Lean and Energy

Program

- 2013 – 2016 CARD Project
- Add lean assessment to MnTAP Intern projects
- 7 Lean intern projects completed
- 25 Efficiency recommendations
 - 7 traditional energy efficiency
 - 7 lean changes – standard work, changeover reduction, work flow
 - 11 energy intensive process/equipment changes

Results

- Increased production for same/less energy investment
- Recommended twice the energy opportunity over traditional assessments
- Identified production opportunity
 - 2100 hours labor reduction
 - 128,000 lb additional product



<https://www.cards.commerce.state.mn.us/CARDS/security/search.do?method=showPoup&documentId={EB218288-D2E2-489D-9510-1A4BBB1EBB29}&documentTitle=327326&documentType=6>

Hot Water

Facts

- **131,000 gal/yr water lost through a 1/32" leak at 60psi pressure**
- **True cost of water accounts for**
 - Softening
 - Heating/cooling
 - Chemical treatment
 - Pumping
 - Sewer/disposal charges

Consider

- **Map your site water use**
- **Turn off water when not in use**
- **Prevent leaks**
- **Know the true cost of water**
- **Install high water efficiency equipment**
- **Review procedures for excessive water use**

<http://www.mntap.umn.edu/focusareas/water/projects/>

Strategies for Water Efficiency

Process for Technical Assistance

Map



- Measure
- Value
- Plan

Maintain



- Repair
- Prevent
- Repeat

Manage



- HP-LF
- High Eff.
- Automate

Modify



- Reduce
- Reuse
- Recycle

Maintain Operations

Diasorin Inc. - Stillwater, MN



- Motivation
 - Account for all site water
 - Avoid SAC increases
 - Reduce costs
- Approach
 - Close water balance
 - Repair leaking pump seal
 - Replace broken flow meter
 - Optimize flow rate
 - Replace check valves
- Results
 - 3.1 million gal water
 - \$23,000

<http://www.mntap.umn.edu/download/200/2017/14153/yohanes-agustinus-diasorin-summary-2017.pdf>

Manage Process

North Memorial Hospital, Golden Valley, MN



- Motivation
 - Soup kettle used 1.5 million gal 127°F water per year
 - Often left on when not needed
- Approach
 - Install solenoid and timer to replace hand valve
- Results
 - 1.3 million gal water/yr
 - 7000 therms/yr
 - \$13,000/yr

<http://www.mntap.umn.edu/download/245/2018/15172/christopher-leppla-north-memorial-health-summary-2018.pdf>

Modify Process

Gedney Foods Company, Chaska, MN



- Motivation
 - Maintain well supply
 - Reduce material costs
- Approach
 - Fix leaks
 - Reuse steam overflow
 - Reuse brine solutions
- Results
 - 5 million gal water
 - 213,000 lb salt
 - 22,000 therms heat energy
 - \$32,000

<http://www.mntap.umn.edu/download/141/2013/11648/ryan-venteicher-gedney-foods-summary.pdf>

Summary – Industrial Natural Gas Efficiency

- **MnTAP continues to find common gas efficiency opportunities**
 - Inspection
 - Maintenance
 - Repair
- **Investment in higher efficiency equipment cost justifiable**
- **Lean techniques may increase production without increasing energy**
- **Resources are available for assistance**
 - CenterPoint Energy – Efficiency Programs & Rebates
 - MnTAP
 - Many others

You Are Invited!!!

- 2019 MnTAP Intern Symposium and 35th Anniversary Celebration
 - Wednesday August 21, 2019 1:00pm
 - McNamara Alumni Center
 - Good technology and networking
 - Appetizers and Cake
- Thank-you

Laura M. Babcock, Ph.D.
lbabcock@umn.edu
612-624-4678





The US Energy Landscape

Matt Smith

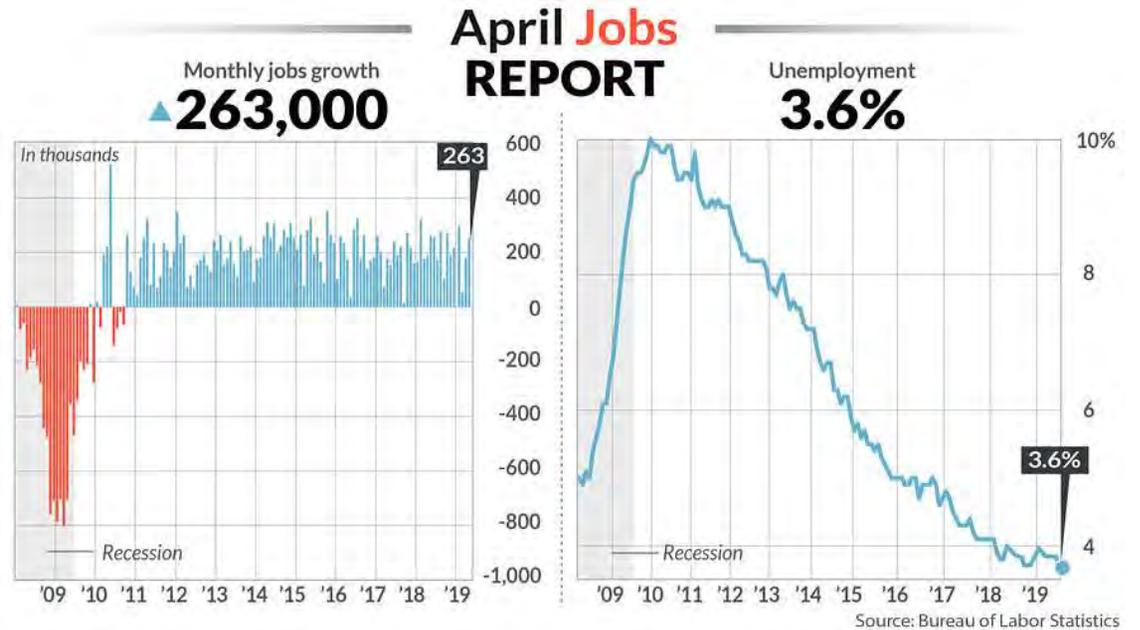
Director of Commodity Research



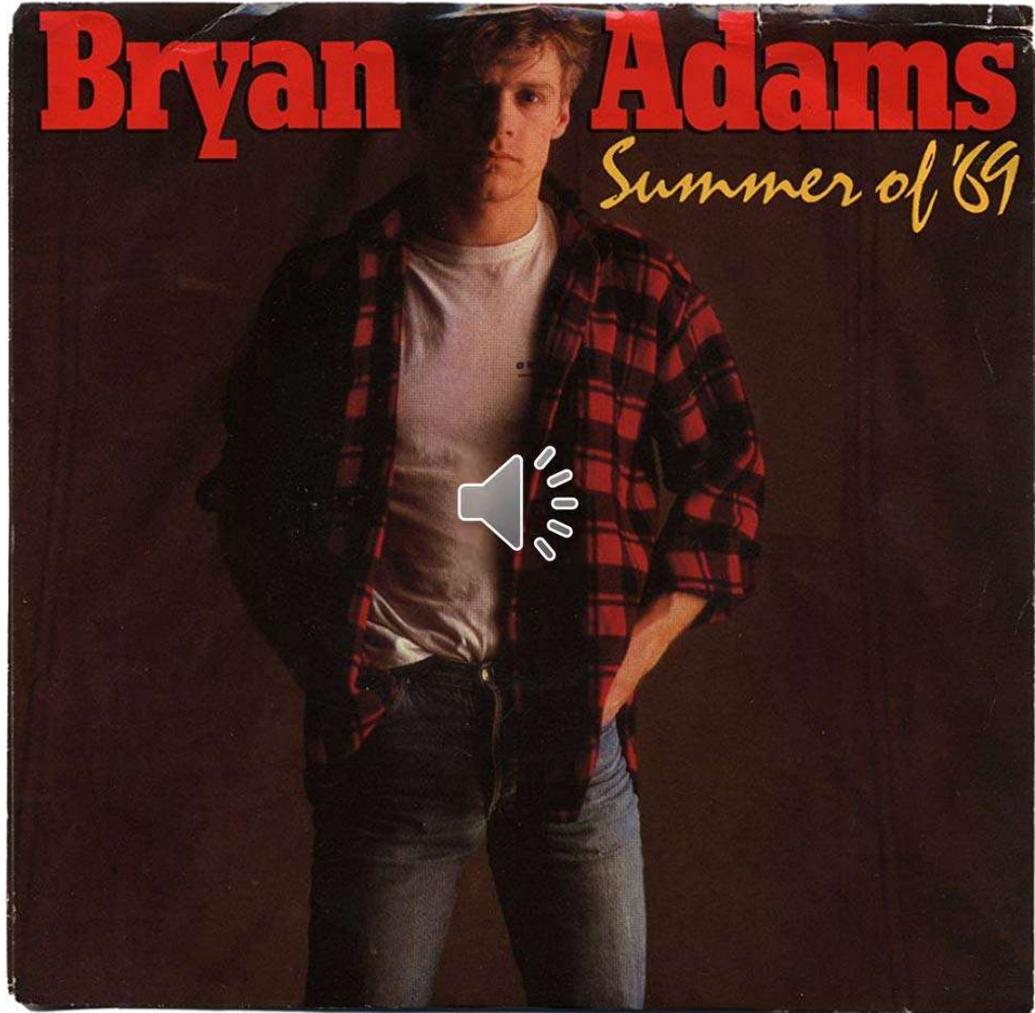
EVERYTHING

IS AWESOME

103 Consecutive Months of Job Creation

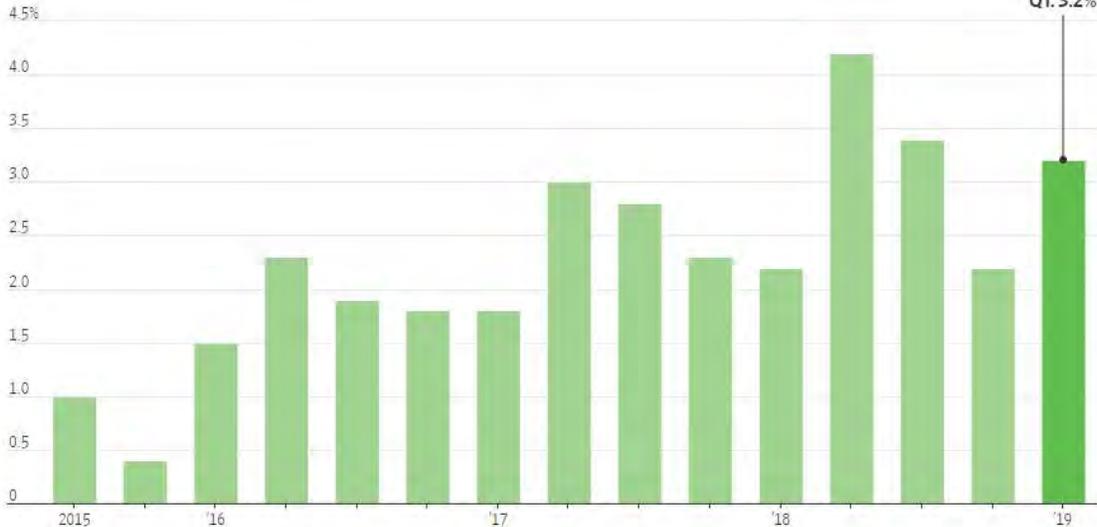


Source: BLS



US GDP

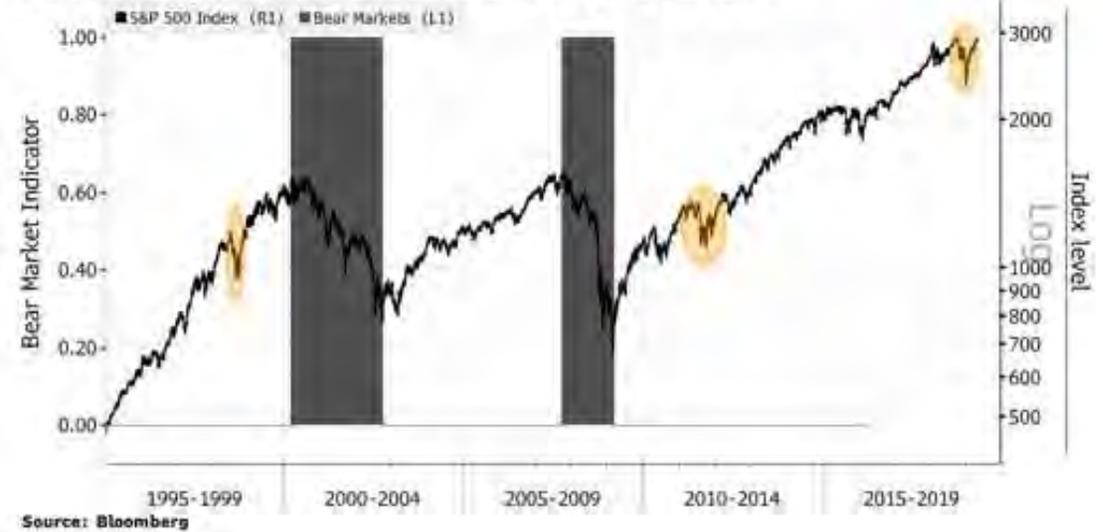
GDP, annualized quarterly change



Note: Adjusted for inflation and seasonality
Source: Commerce Department

Record Highs, Record Expansion?

Similar instances in 1999 and 2012 may be guide for now



Source: Bloomberg



**“A cynic is a man who,
when he smells flowers,
looks around for a coffin.”**

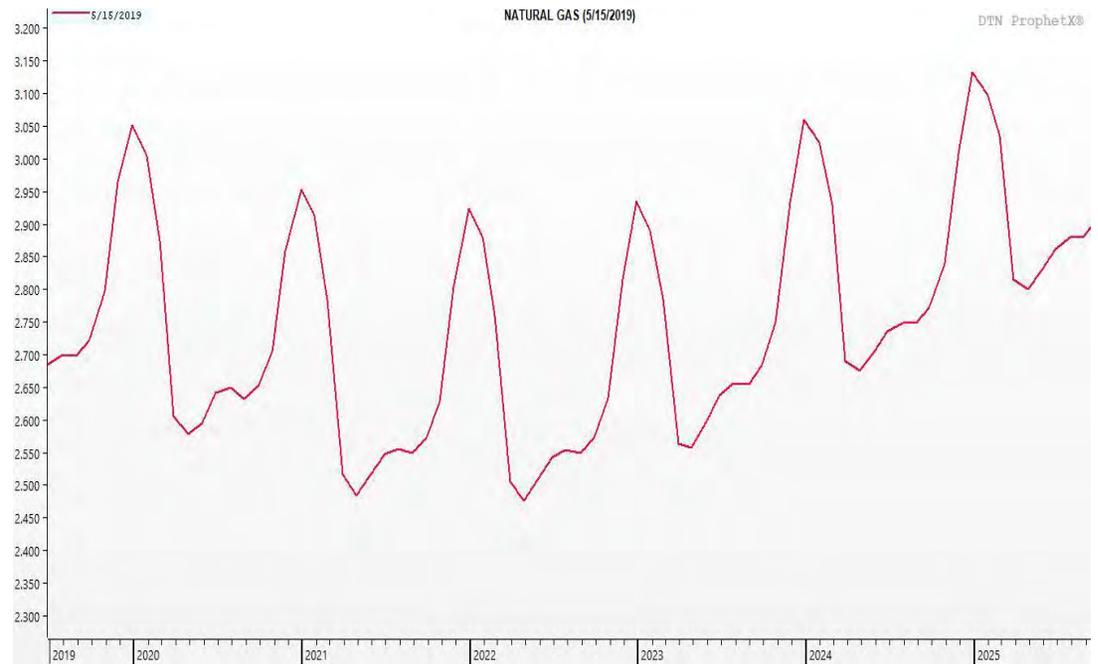
EVERYTHING

IS AWESOME





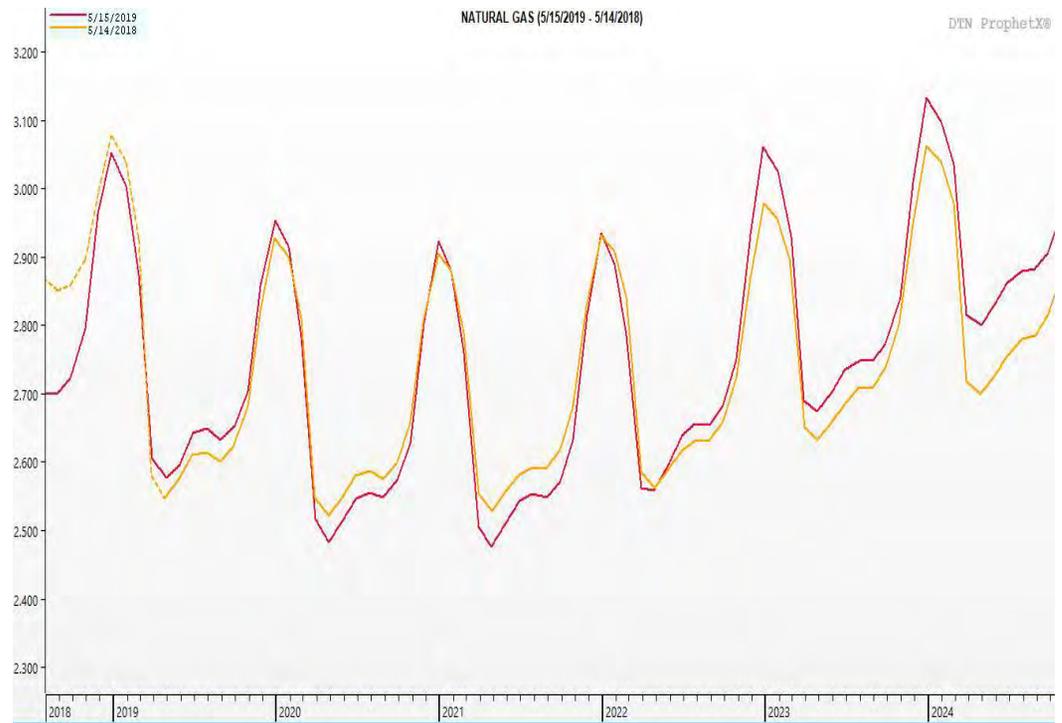
Bumpy Ride



Source: Nymex, ProphetX



**Yet the Same
Long and
Winding Road...**



Source: Nymex, ProphetX

© 006-04084 M

Apple

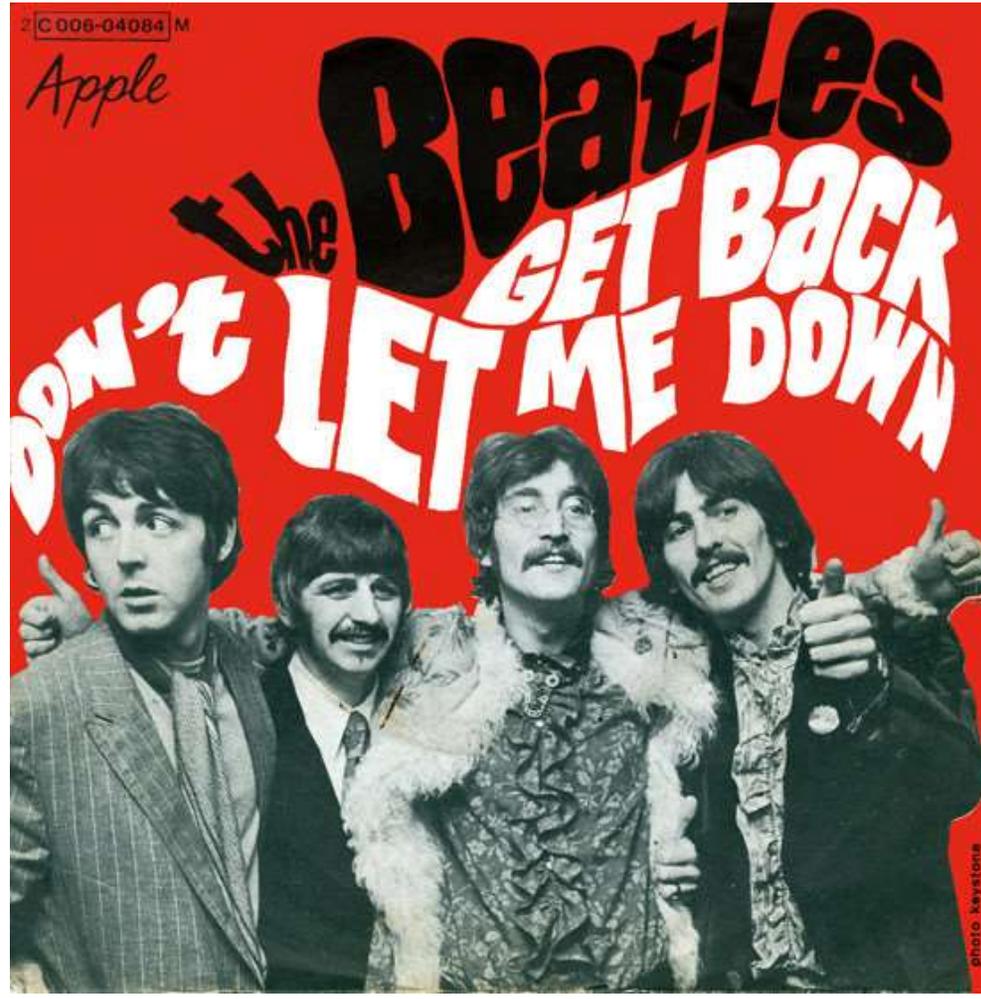


photo keystone

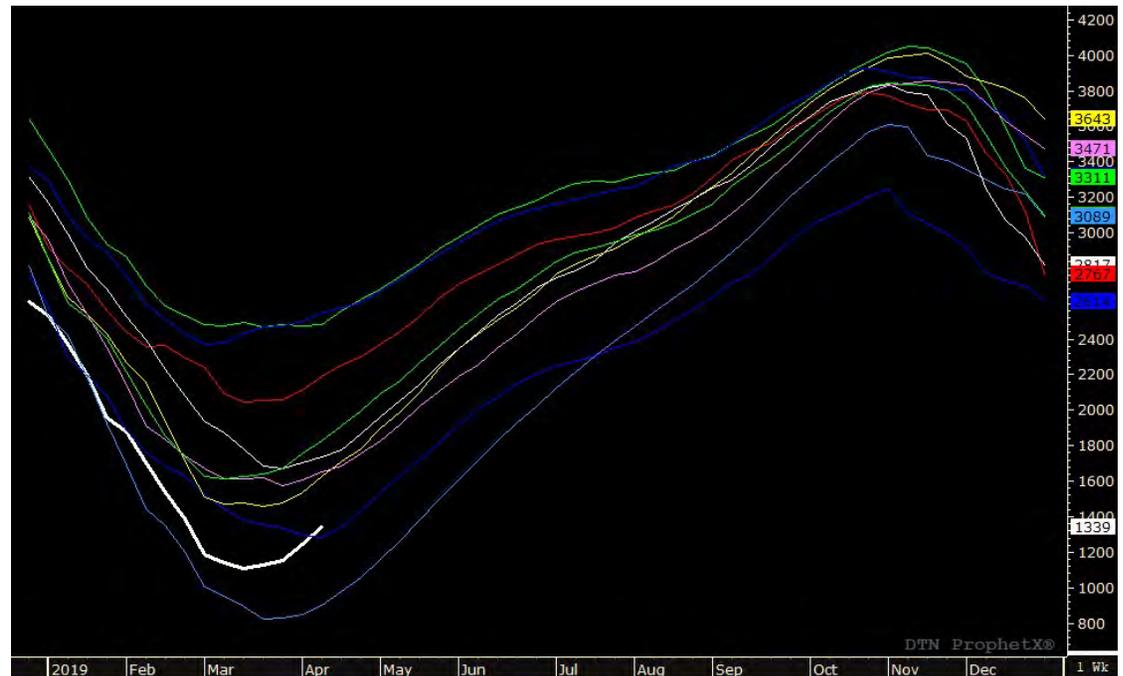


DON'T LET
ME DOWN

THE CHAINSMOKERS

FT. DAYA

Deeply Dippy...



Source: EIA / ProphetX

the
shangri-
la's

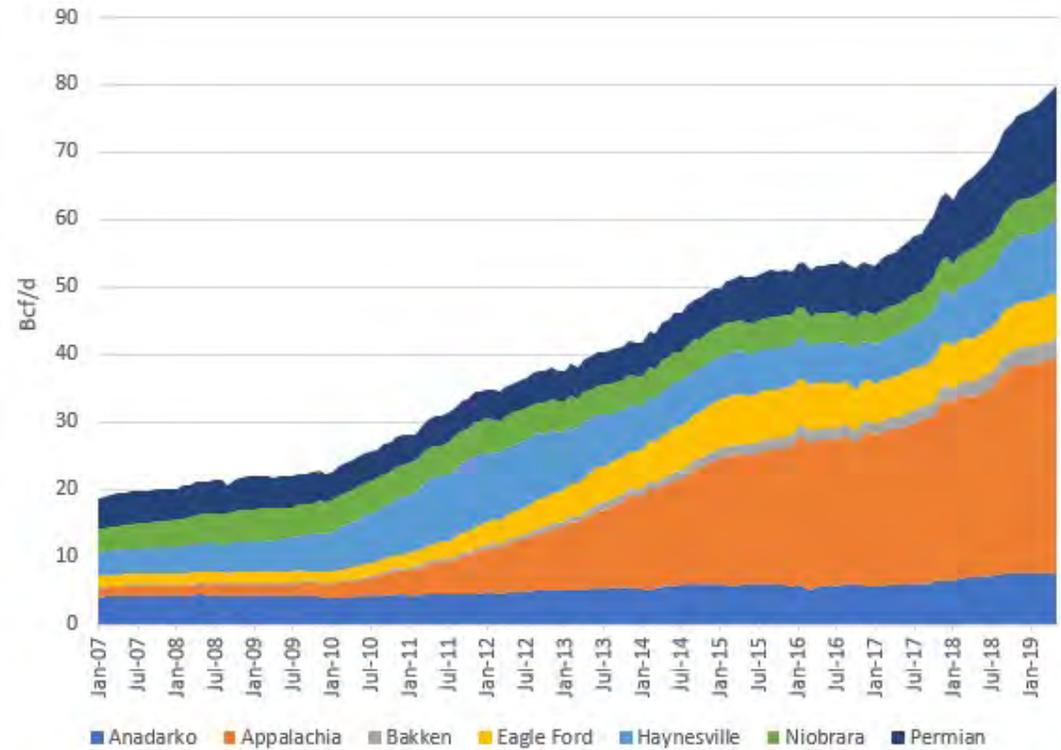


leader
of the pack





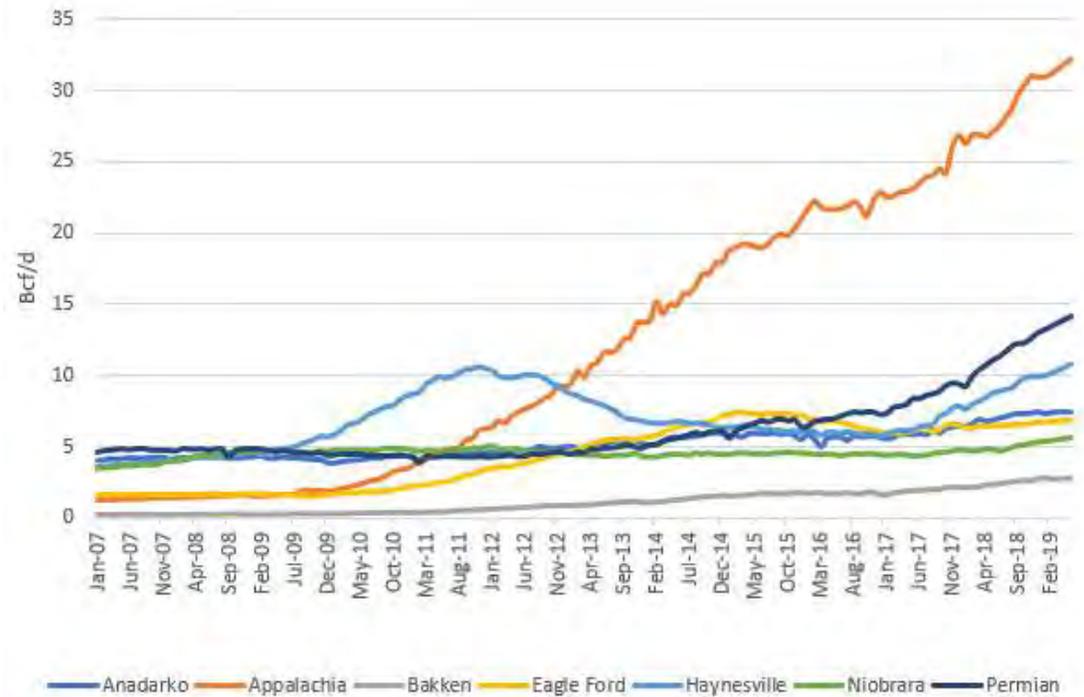
'Just in time' Production



Source: EIA



About Them Basins...



Source: EIA





**There Was No
Way to
Compromise...**



Source: Nymex, EIA

DNCE

CAKE BY THE OCEAN



**Waste Time
With a
Masterpiece...**

Old Way of Drilling

Jelly Donut

Conventional Drilling
Basic Vertical Penetration
Limited Formation Contact

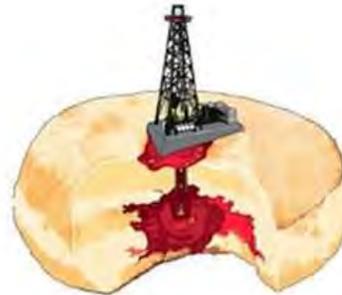


Illustration © James Scherrer 2014

New Way of Drilling

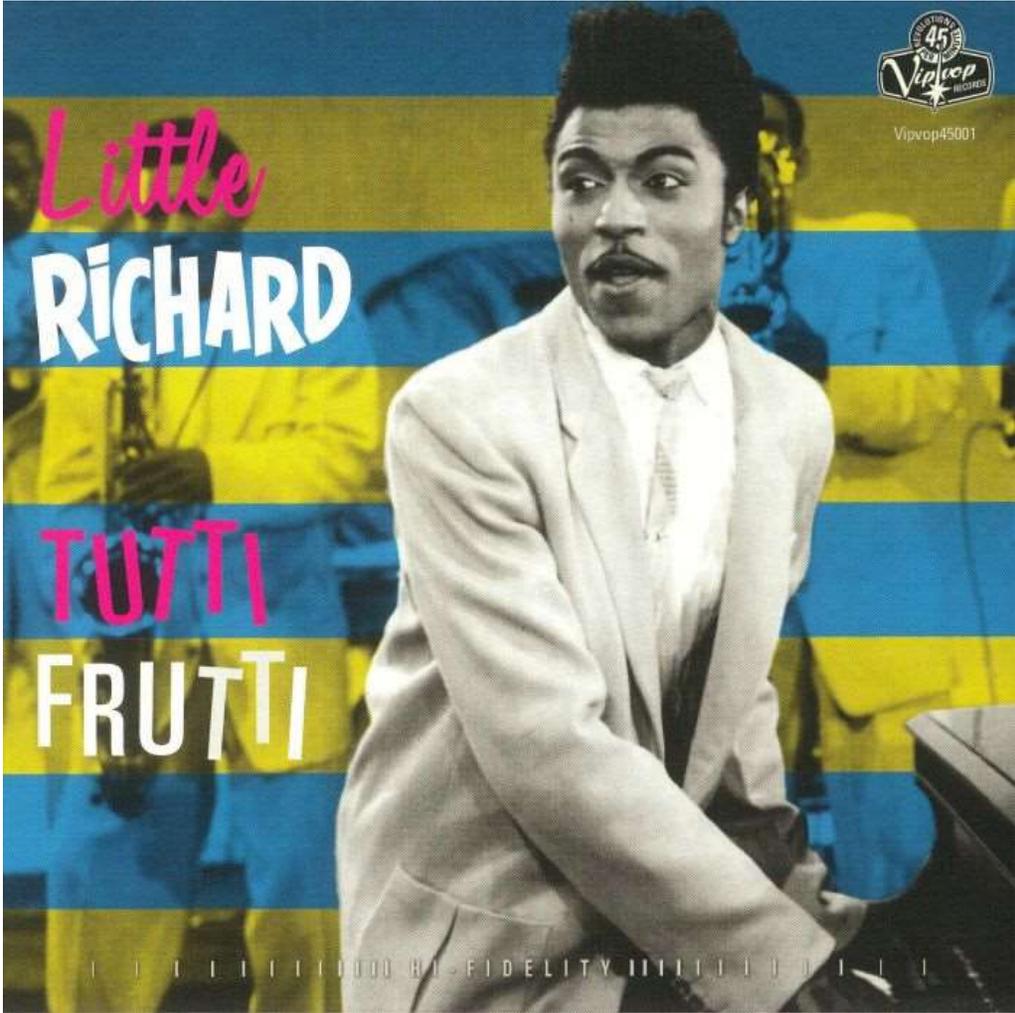
Tiramisu

Unconventional Drilling
More Sophisticated Horizontal Penetration
Extensive Formation Contact



Illustration © James Scherrer 2014

Source: James Scherrer / Twitter



Little
RICHARD

TUTTI
FRUTTI



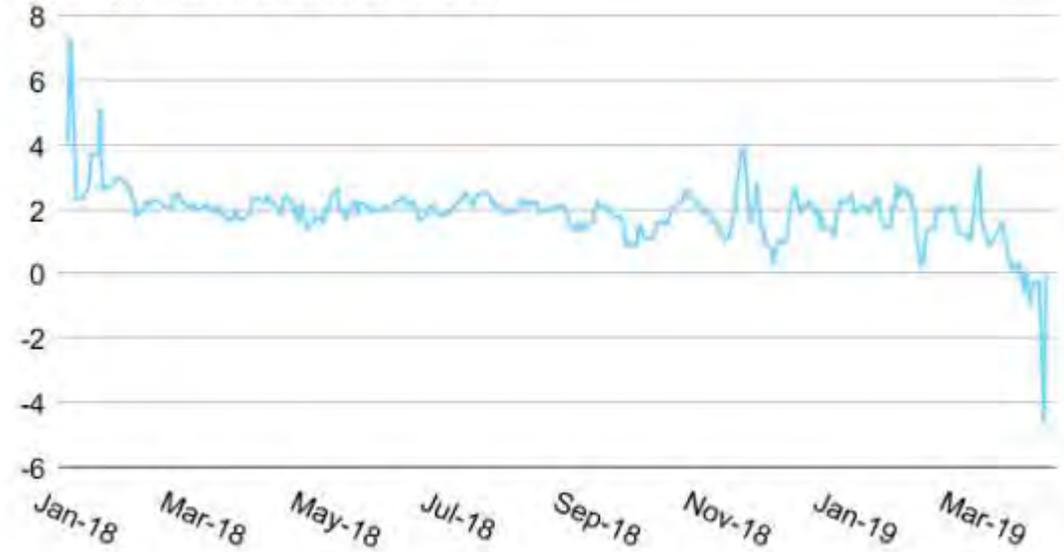
Vipop45001

HI-FIDELITY



**Waha Wop Bop A
Loo Bop A Lop
Bam Boom**

Figure 11. Waha Hub spot price
dollars per million British thermal units

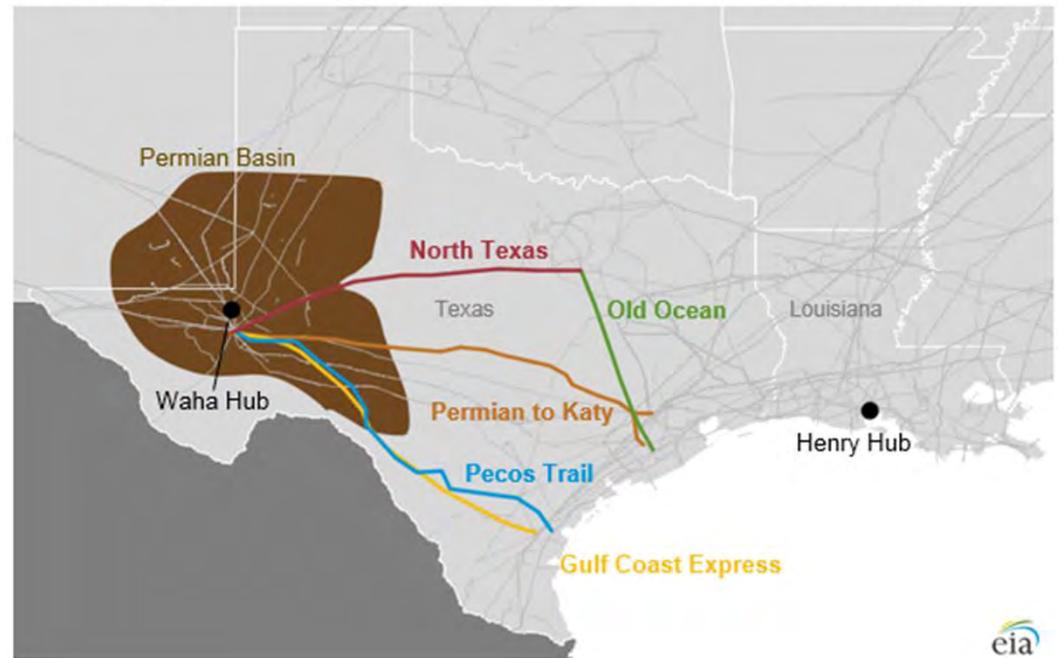


eia Bloomberg L.P.

Source: EIA, Bloomberg

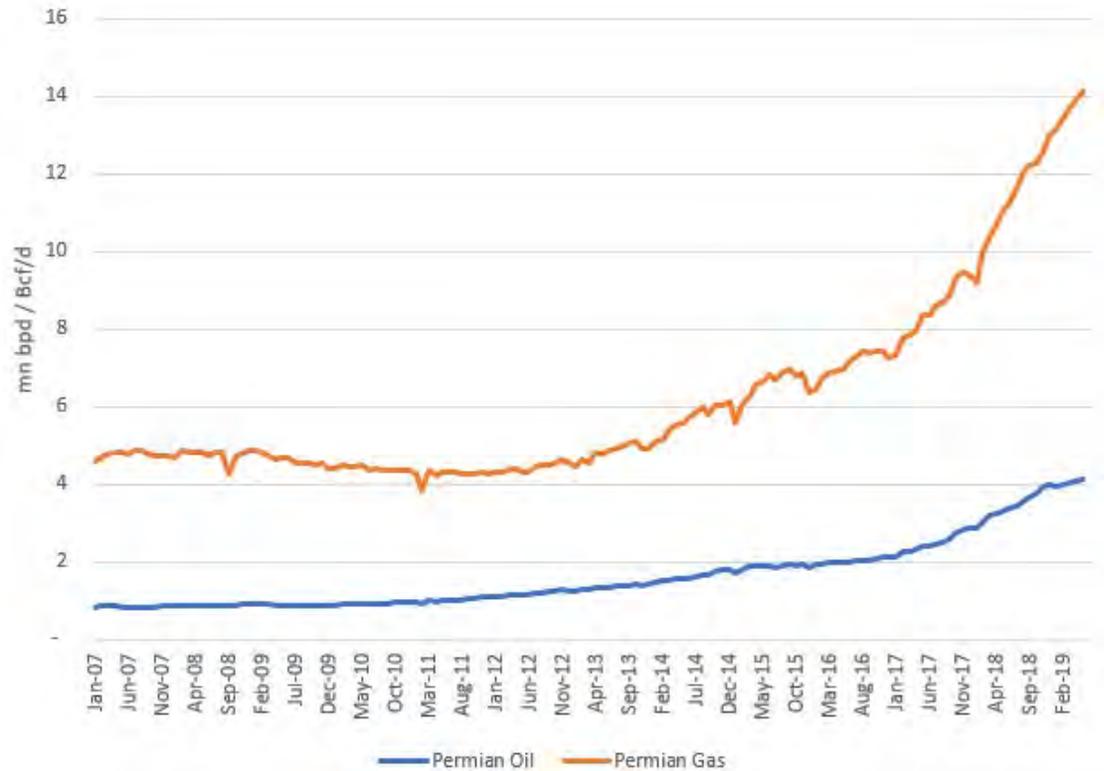
Permian Gas

Existing and planned natural gas pipelines out of the Permian Basin (July 2018)



Source: EIA

Permian Oil vs Permian Natural Gas Production



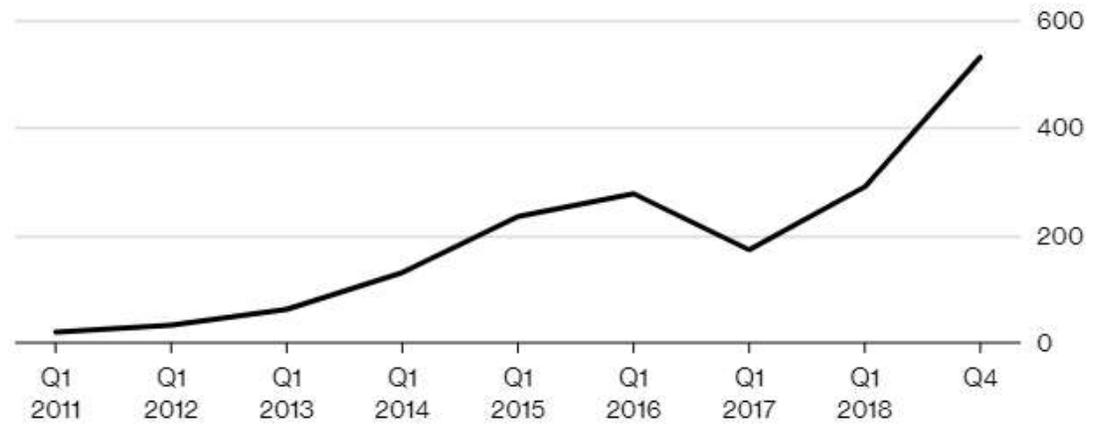
Source: EIA

Flaring

Burning Gas

Flaring has increased in the Permian as oil production surges, pipelines fill up

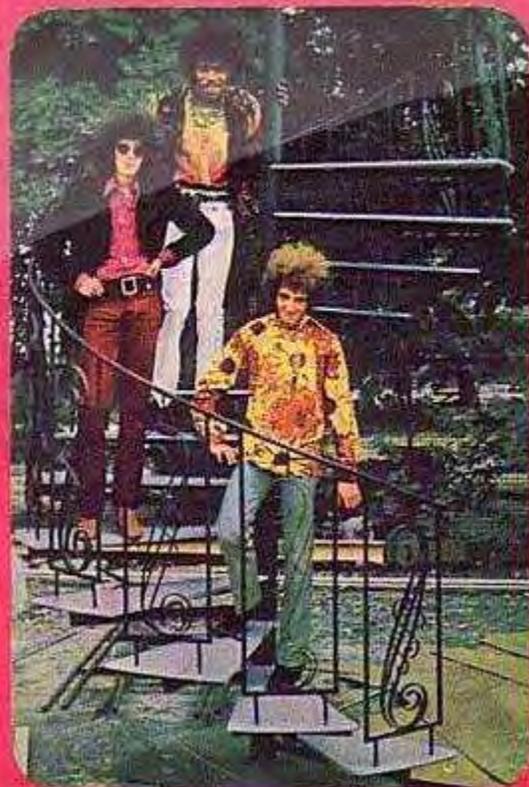
▀ Million cubic feet per day



Source: Rystad Energy

Source: Rystad, Bloomberg

THE JIMI HENDRIX EXPERIENCE

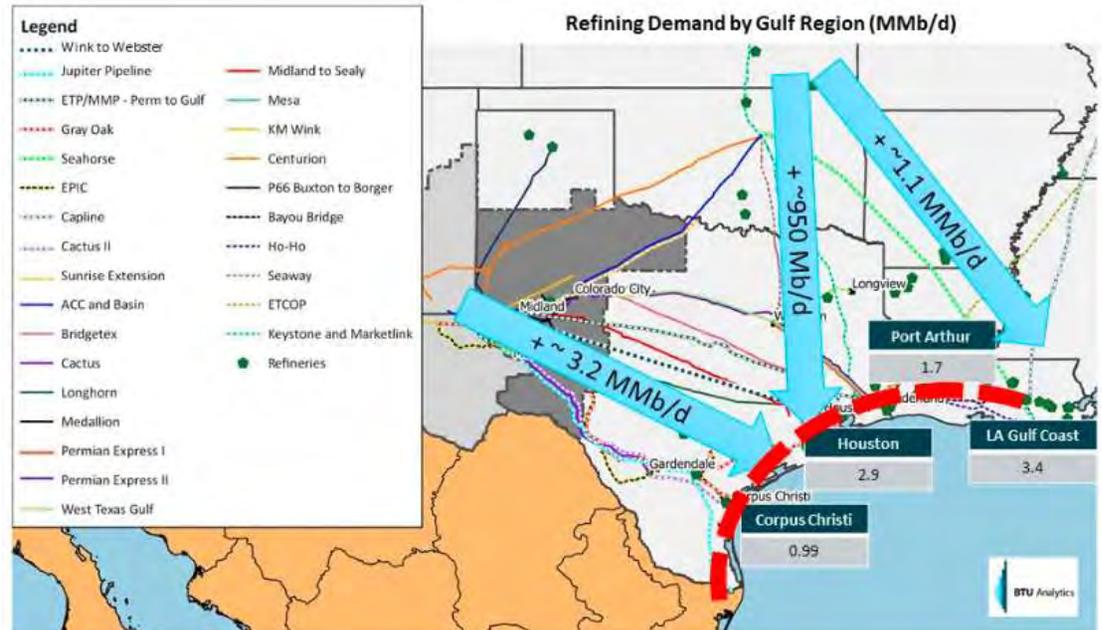


59256



Crosstown
Traffic
Gypsy Eyes

Crosstown Traffic...



Source: BTU Analytics

AC/DC

The logo for the rock band AC/DC is displayed in a highly stylized, three-dimensional font. The letters are metallic and feature a fine, grid-like texture. A prominent lightning bolt strikes the letter 'C', which is the second letter from the right. Below the lightning bolt, there is a small icon of a speaker with sound waves emanating from it, suggesting audio content.

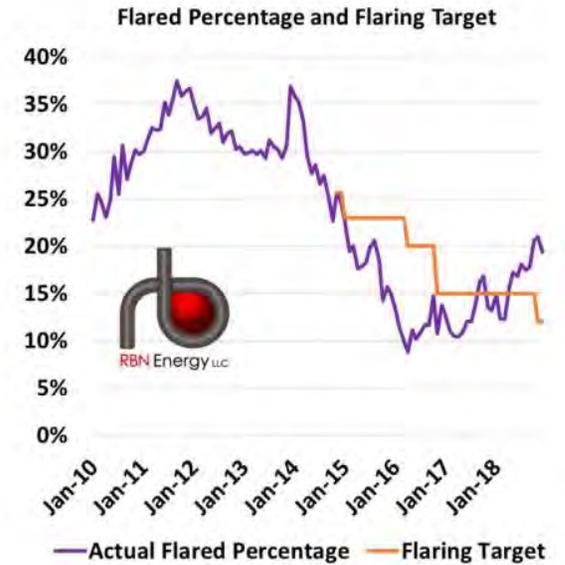
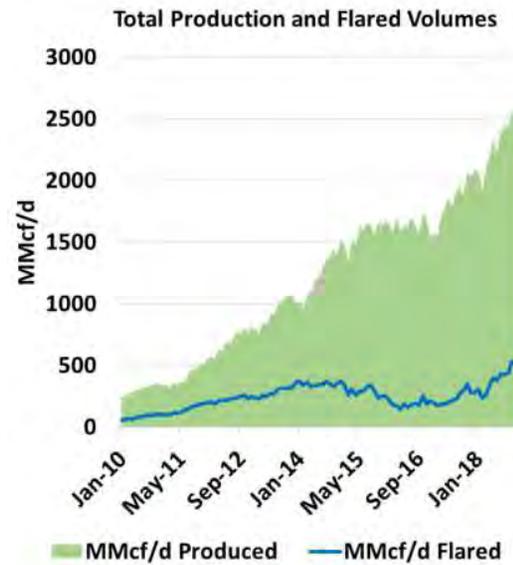
BACK IN BLACK

Bakken (not so) Black



Source: NPR / NASA

Production vs Flaring



Source: RBN Energy

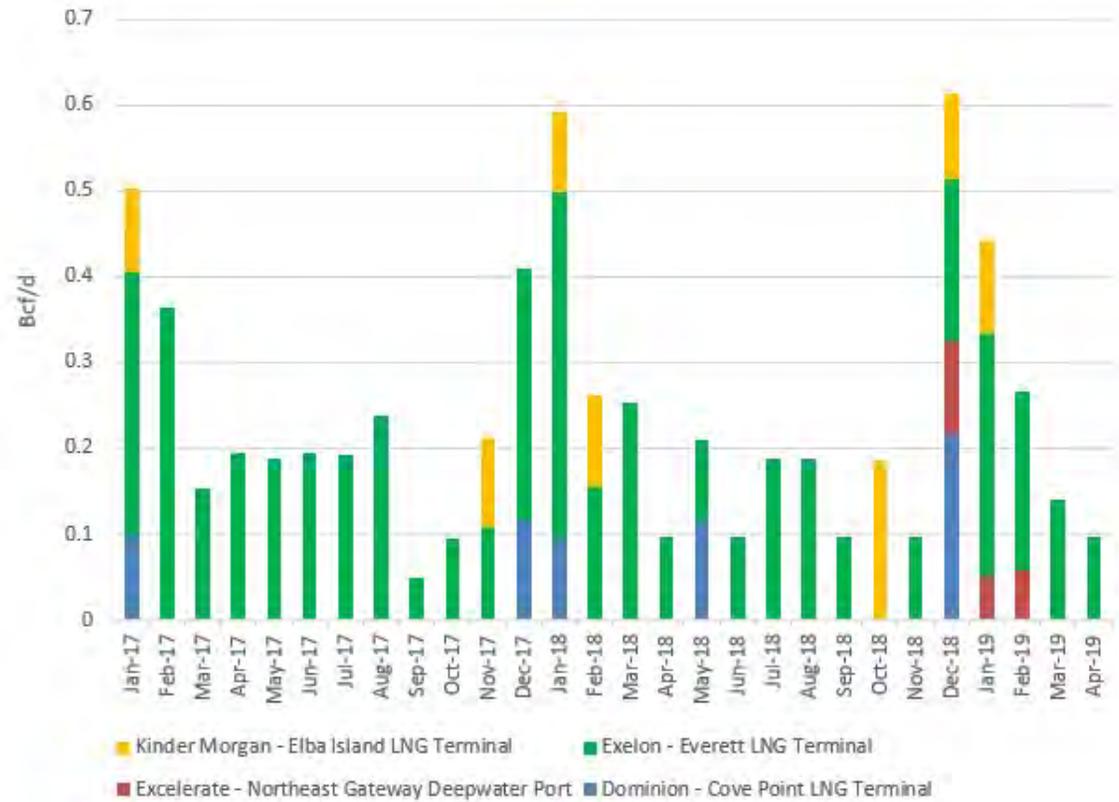
Bakken Oil vs Bakken Natural Gas Production



Source: EIA

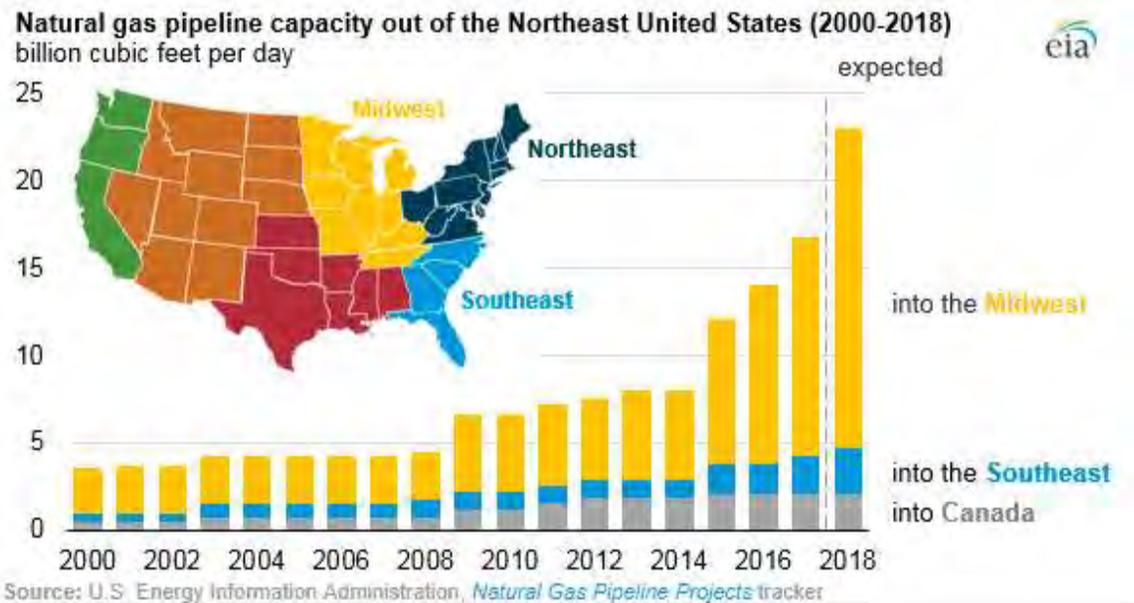


Northeast LNG Imports



Source: ClipperData

Northeast US Pipeline Capacity

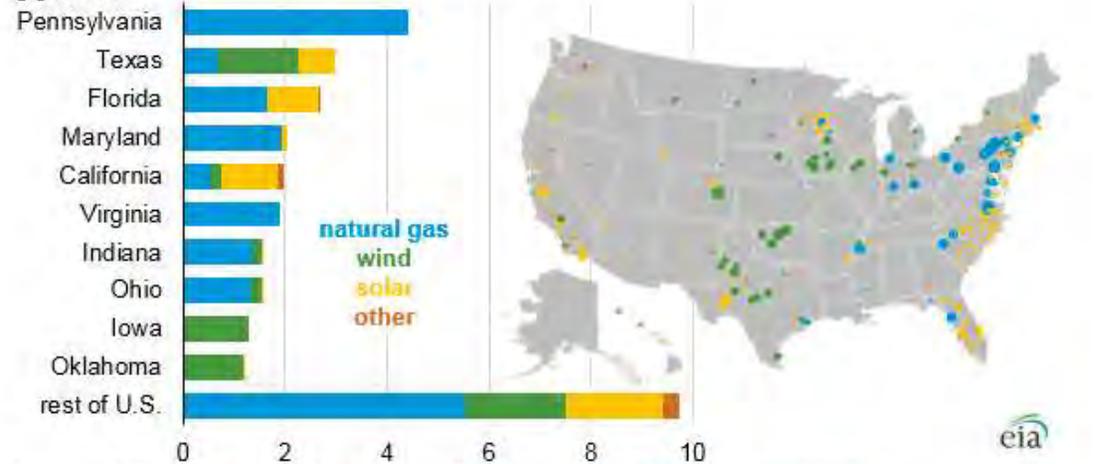


Source: EIA

Capacity Additions

U.S. electric generating capacity additions, 2018

gigawatts



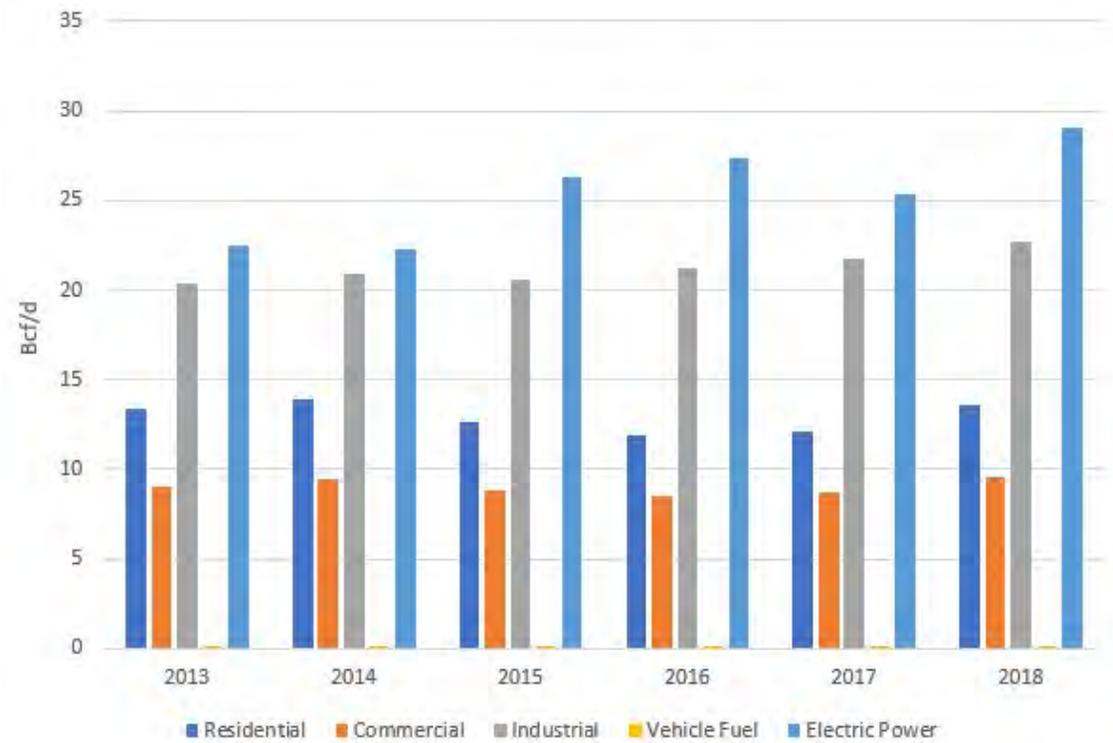
Source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*

Source: EIA

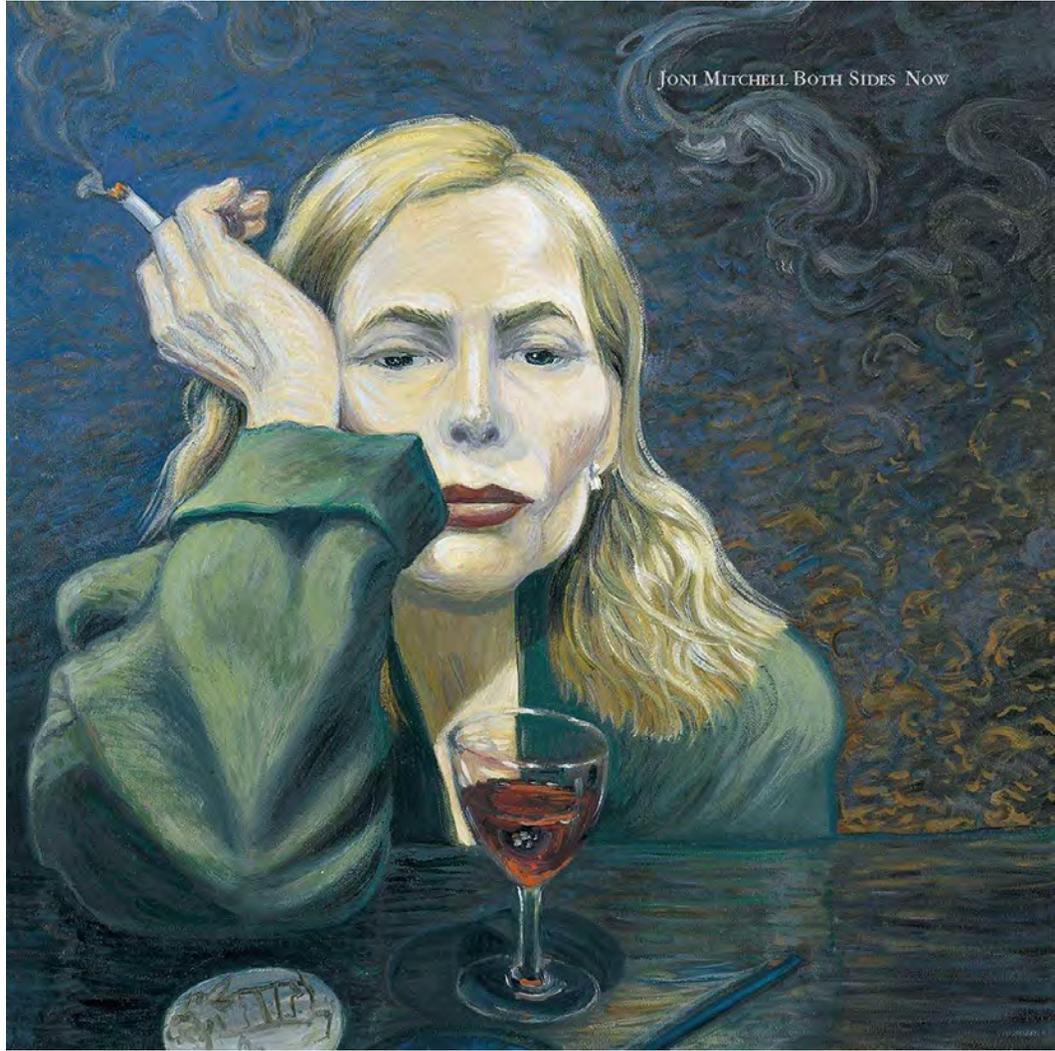
COME TOGETHER



Total Demand



Source: EIA



Demand



Source: EIA



DOCTOR
ZHIVAGO
A NEW MUSICAL

Based on the novel by Boris Pasternak
Book by Michael Weller Music by Lucy Simon
Lyrics by Michael Korie and Amy Powers



The Mighty



Abudi Zein



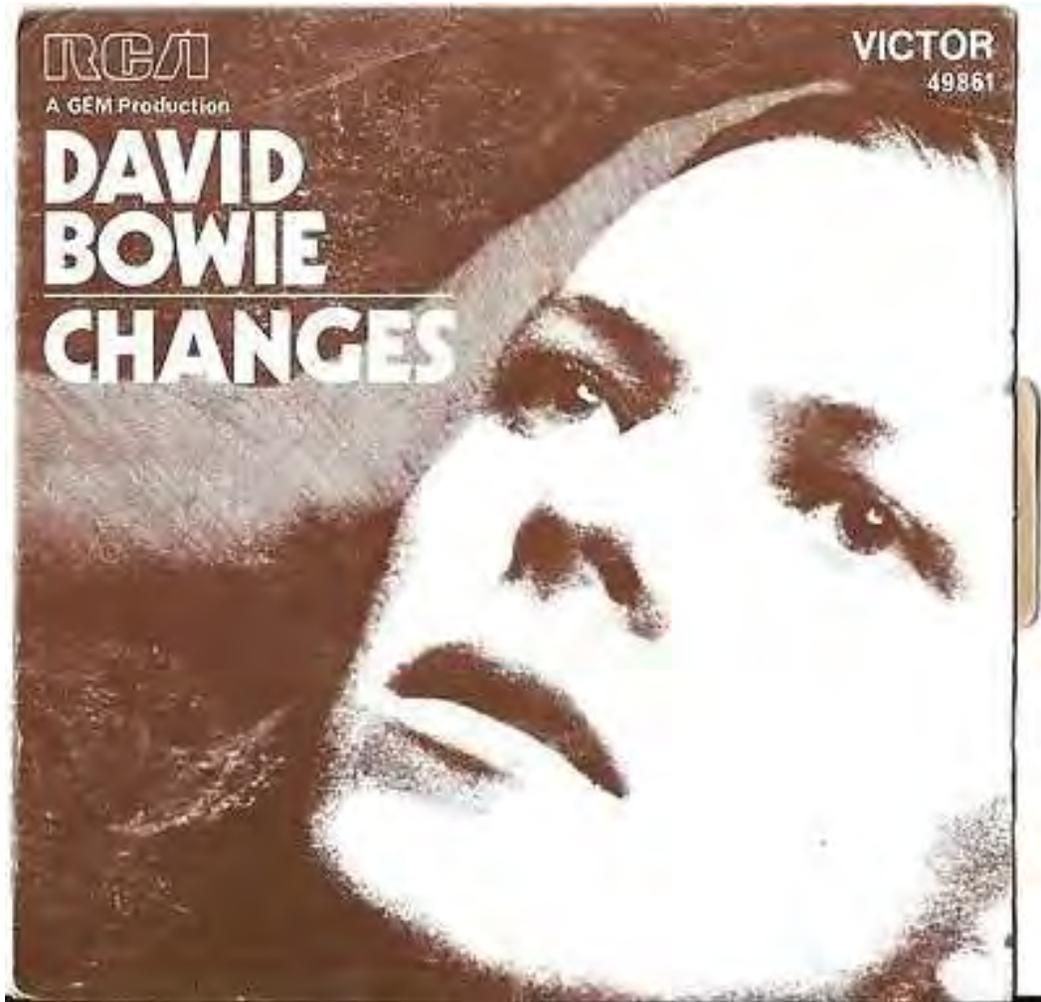
RCA

A GEM Production

**DAVID
BOWIE
CHANGES**

VICTOR

49861



Net Natural Gas Flows

Monthly U.S. natural gas trade (Jan 2016-Feb 2019)

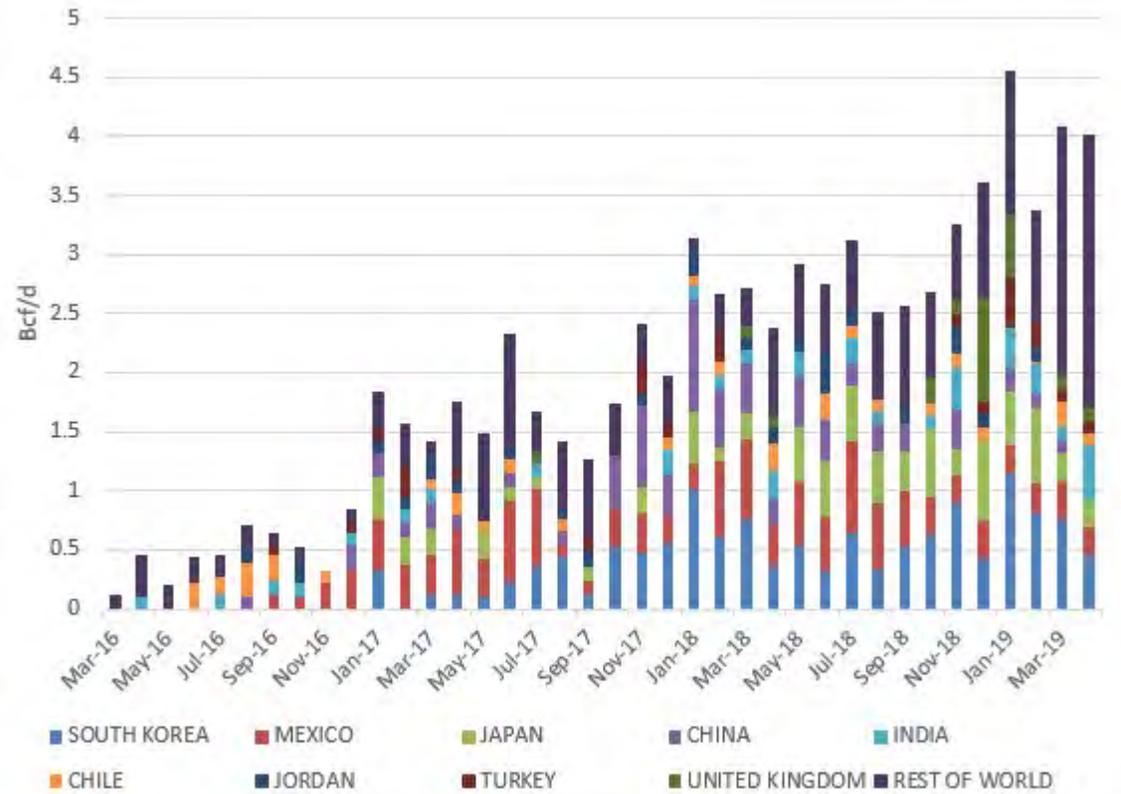
billion cubic feet per day



Source: U.S. Energy Information Administration, *Natural Gas Monthly*

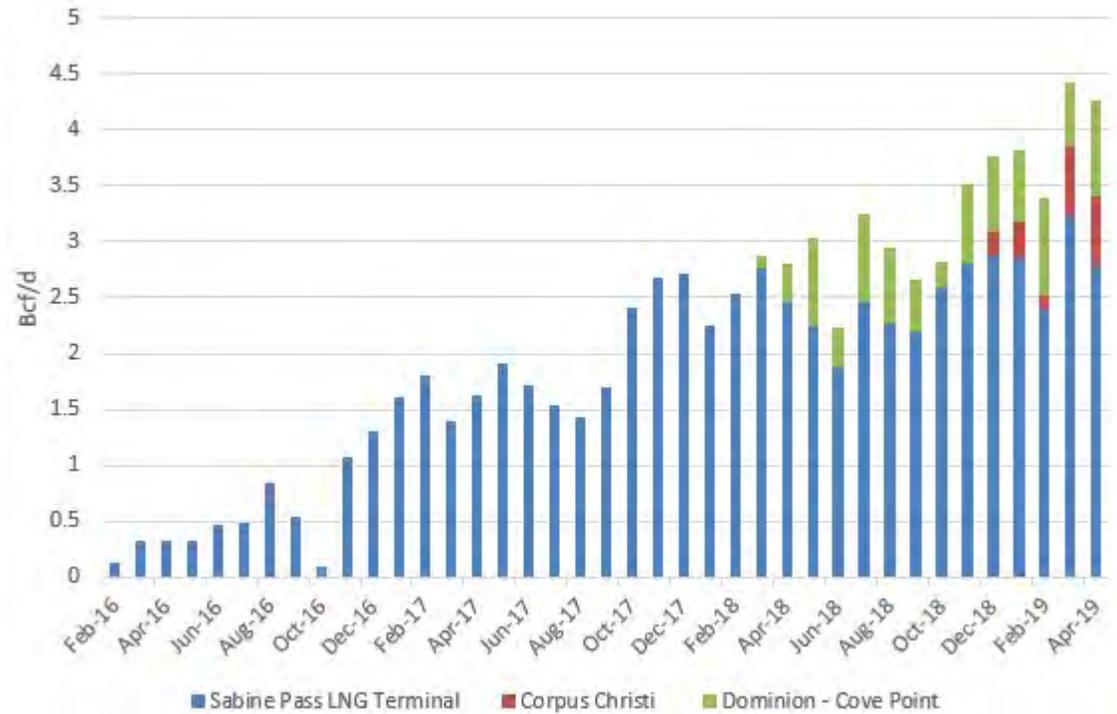
Source: EIA

US LNG Exports by Destination



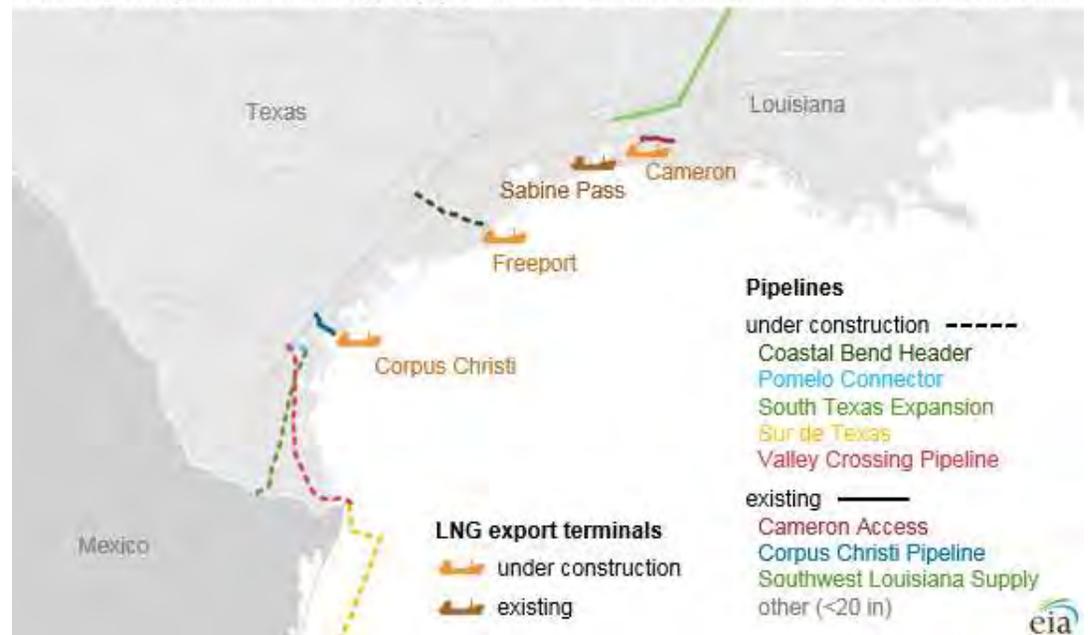
Source: ClipperData

US LNG Exports by Load Point



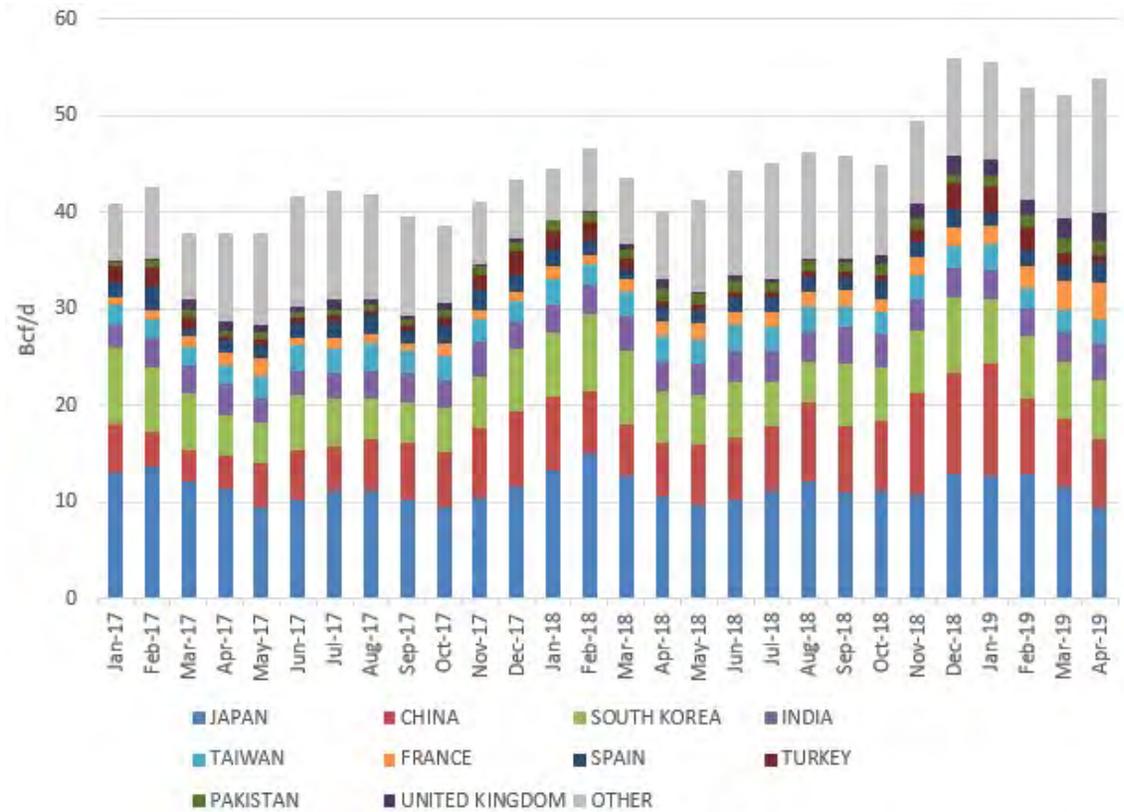
LNG Infrastructure Acomin'

Existing and planned natural gas pipeline and LNG infrastructure in Texas and Louisiana



Source: EIA

Leading Consumers of LNG



Source: ClipperData

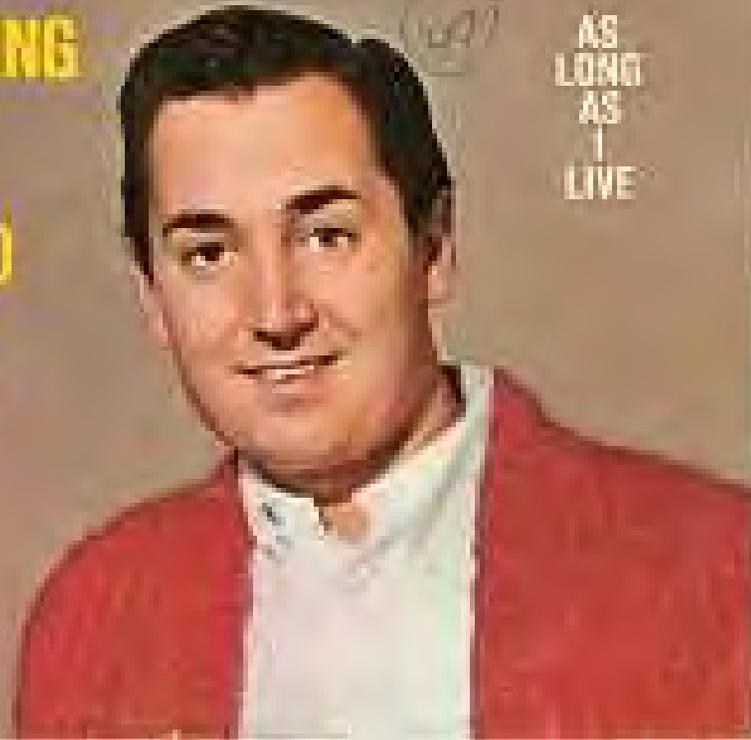
NEIL SEDAKA

45 RPM

ACA VICTOR
A DIVISION OF
G.M.C. & C.

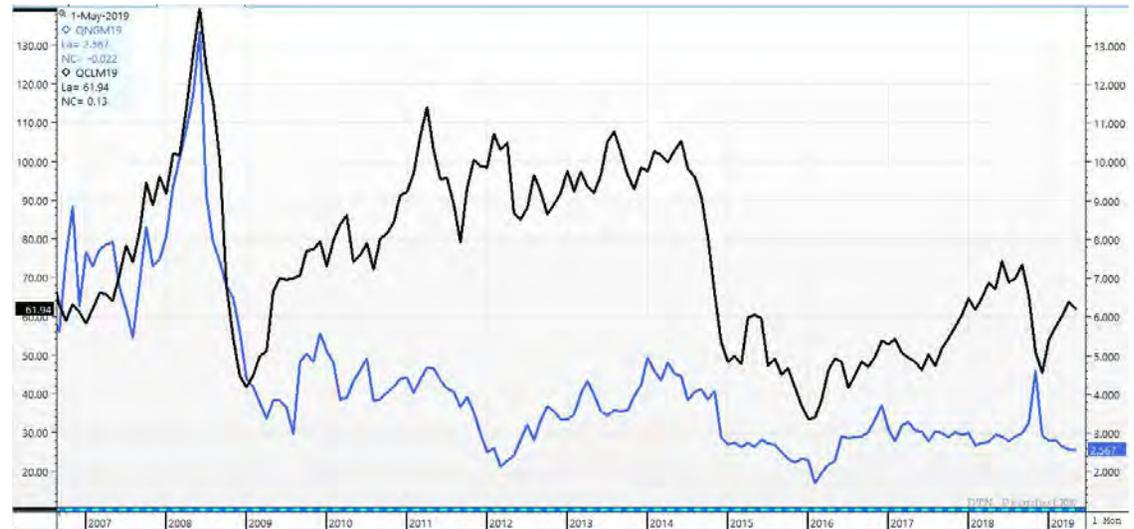
BREAKING
UP
IS
HARD
TO
DO

AS
LONG
AS
I
LIVE



© 1967 RCA Victor
A Division of
G.M.C. & C.

Oil vs. Natural Gas



Source: NYMEX / ProphetX

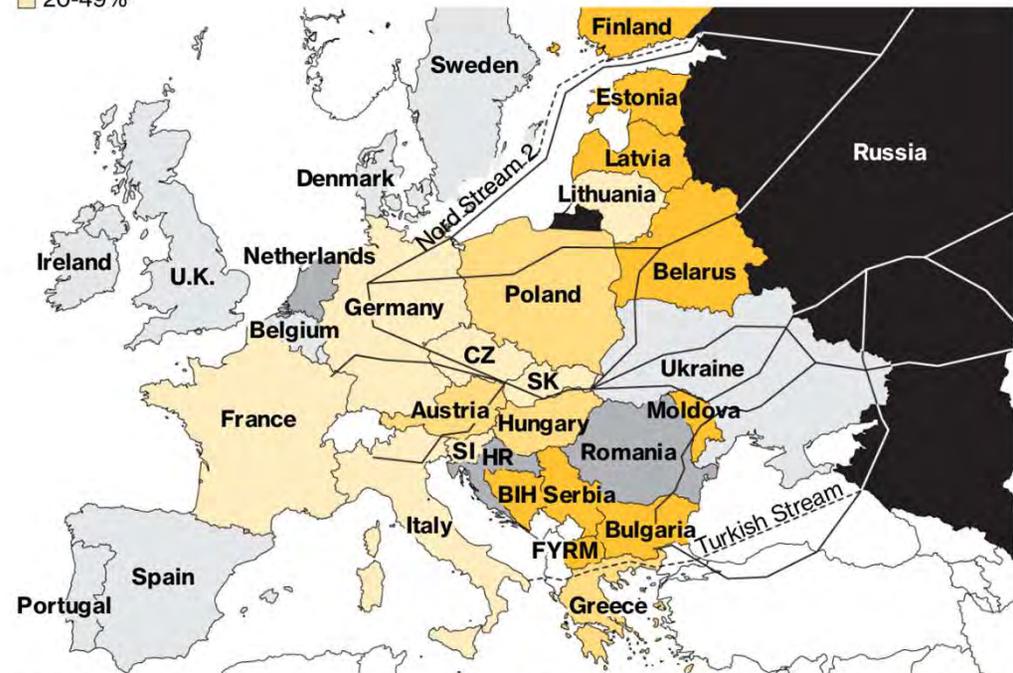


Who Relies on Russia Gas?

Who's Dependent on Russian Gas?

About a third of Europe's gas comes from Russia

- 75-100%
- 50-75%
- 20-49%
- Less than 20%
- 0%
- Major pipeline
- Planned pipeline



2016 data. Source: Agency for the Cooperation of Energy Regulators **BloombergQuickTake**

Source: Bloomberg

45
RPM
109
BPM
19
90

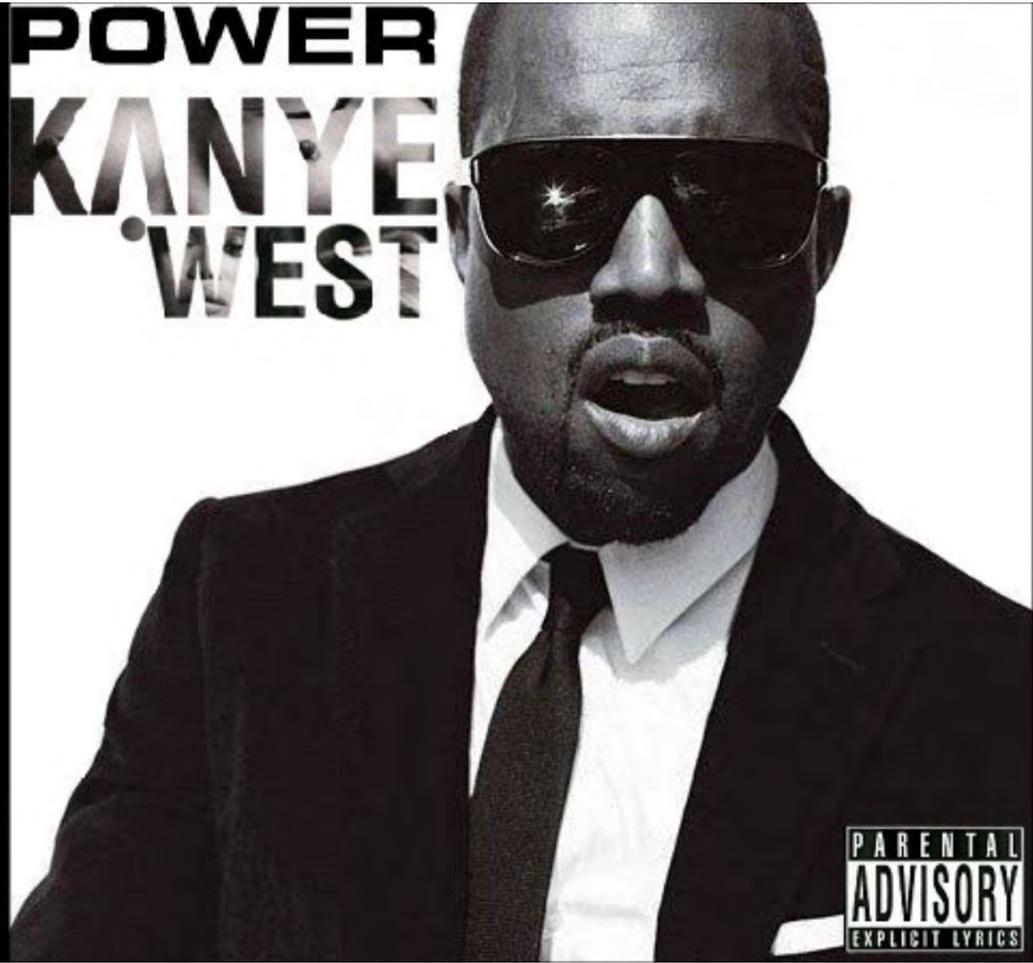


APPROVED
BY THE
TRUST
AUTHORITY

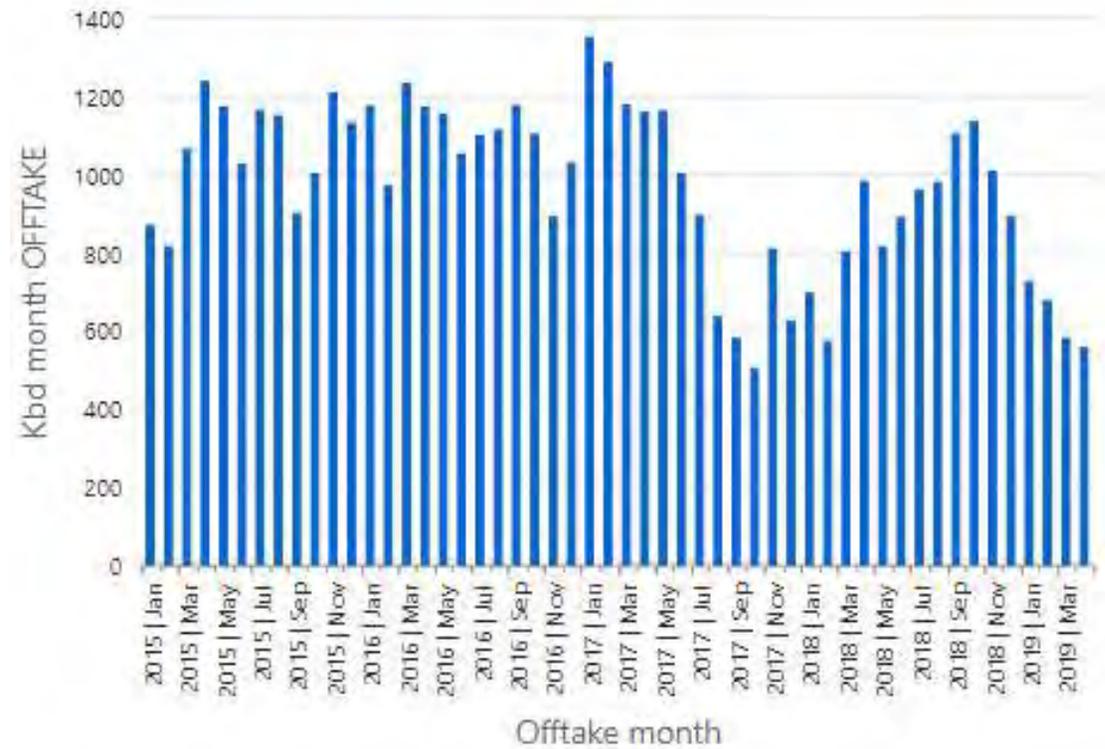
THE POWER

ON SALE
NOW!

POWER
KANYE
WEST

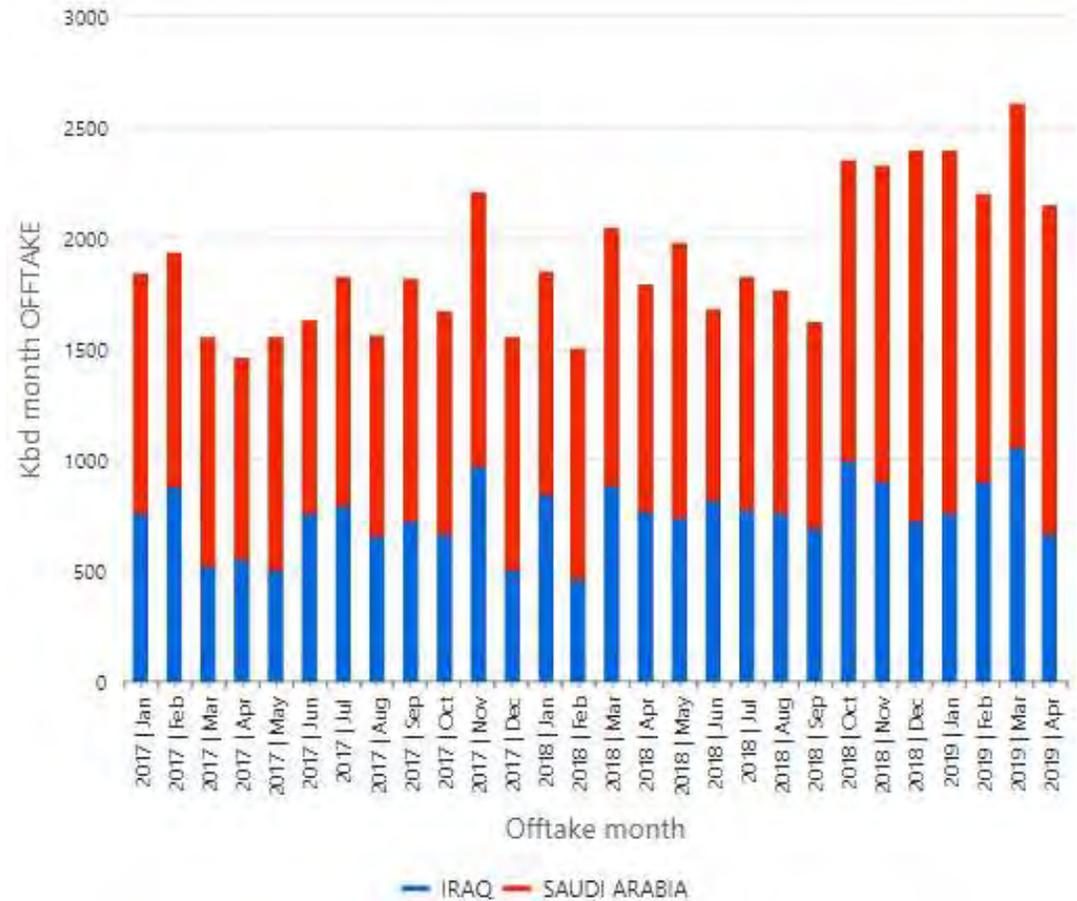


PARENTAL
ADVISORY
EXPLICIT LYRICS



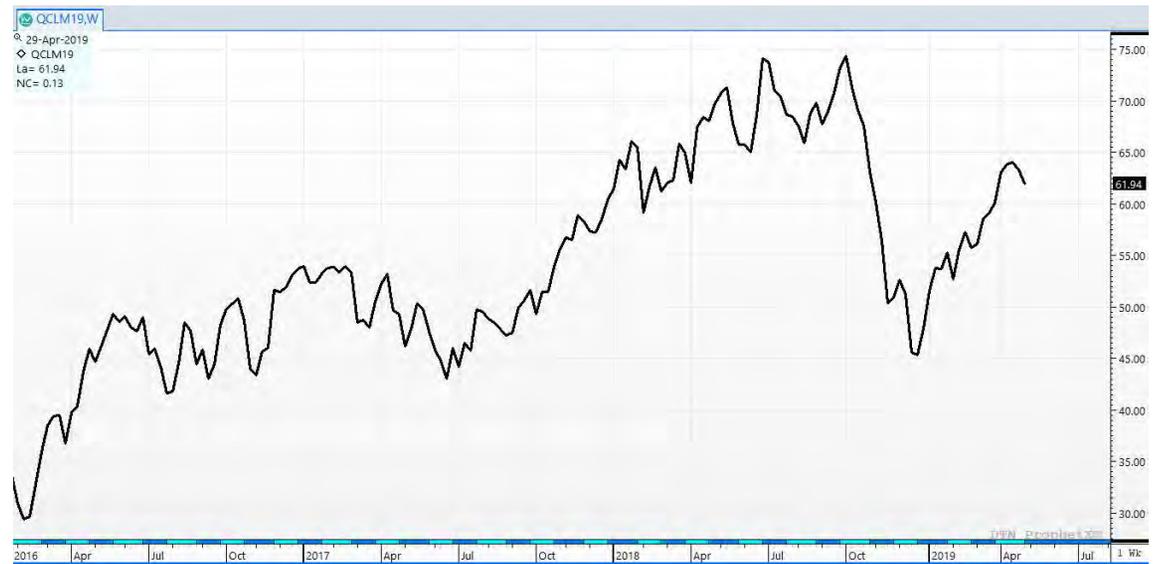
Source: ClipperData

**“You Look Left,
And They Fall
Right”**



Source: ClipperData

Oil Prices



Source: Nymex, ProphetX

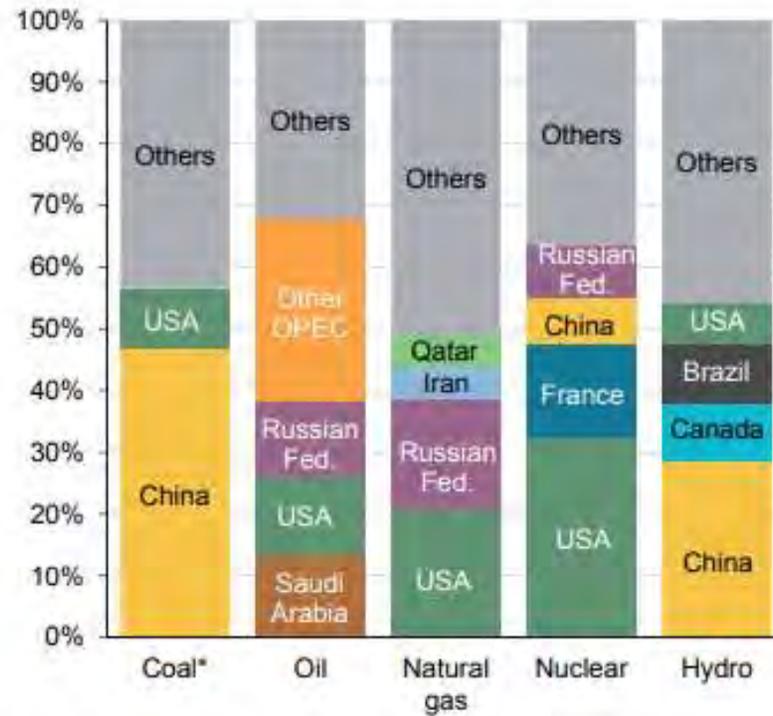
Retail Gasoline Prices



Source: GasBuddy



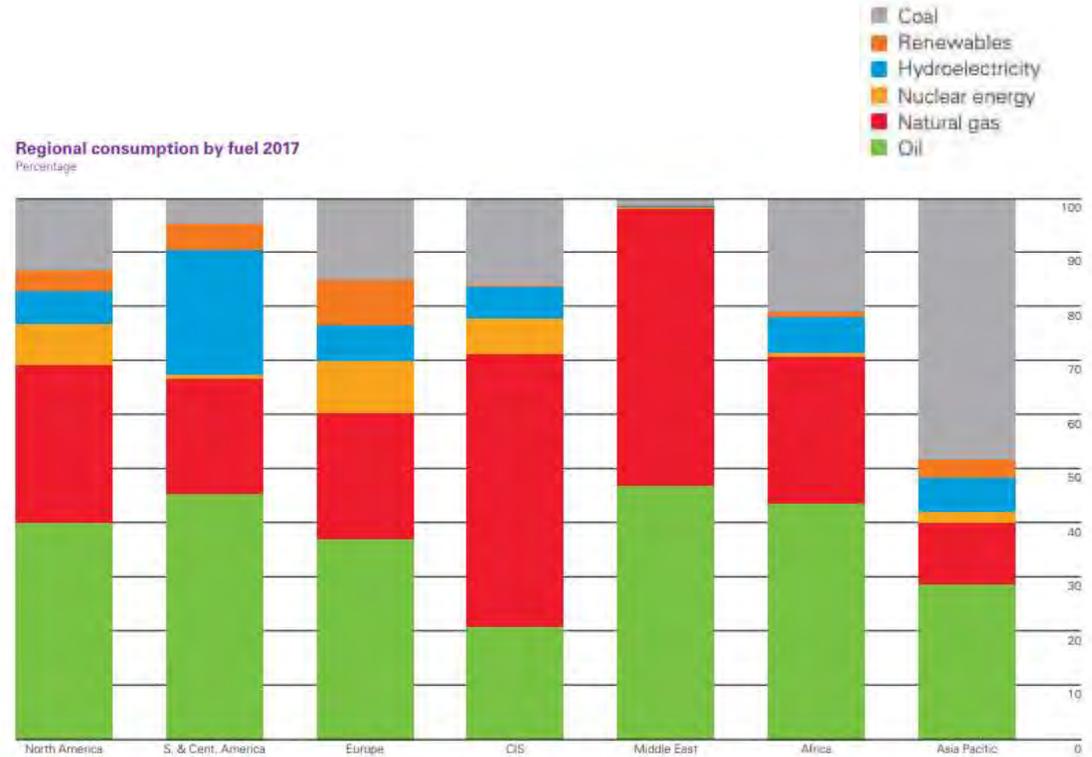
Largest Producers of Energy



* In this graph peat and oil shale are aggregated with coal.

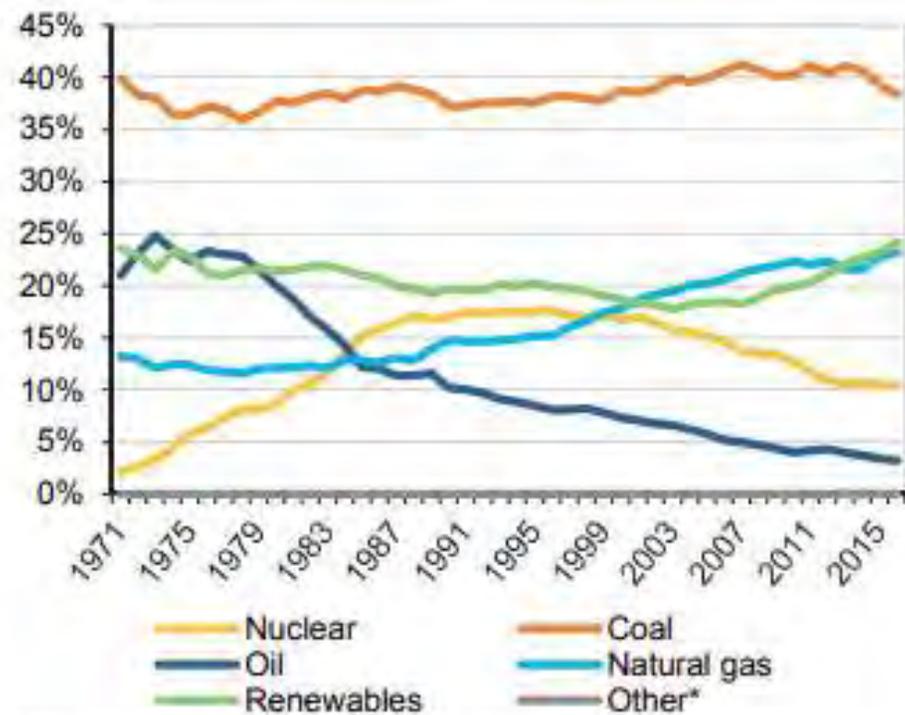
Global Energy Consumption

Regional consumption by fuel 2017
Percentage



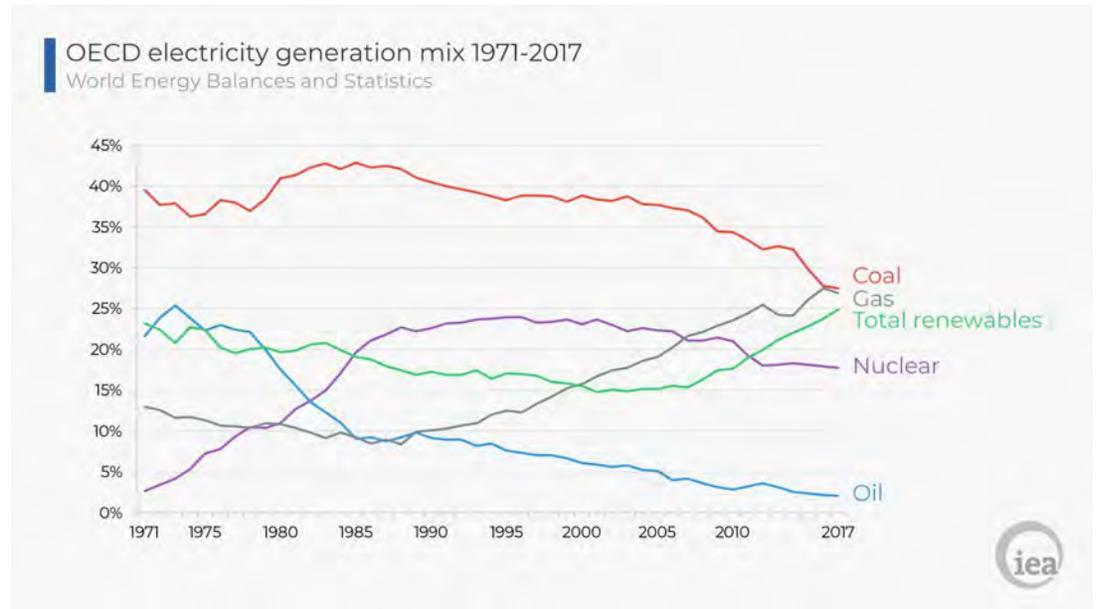
Source: BP

World Generation Mix



* Other includes non-renewable waste and non-renewable heat.

OECD Generation Mix



Source: IEA

THE WHO

60.002 M[®]

DECCA
AMERICAN SERIES

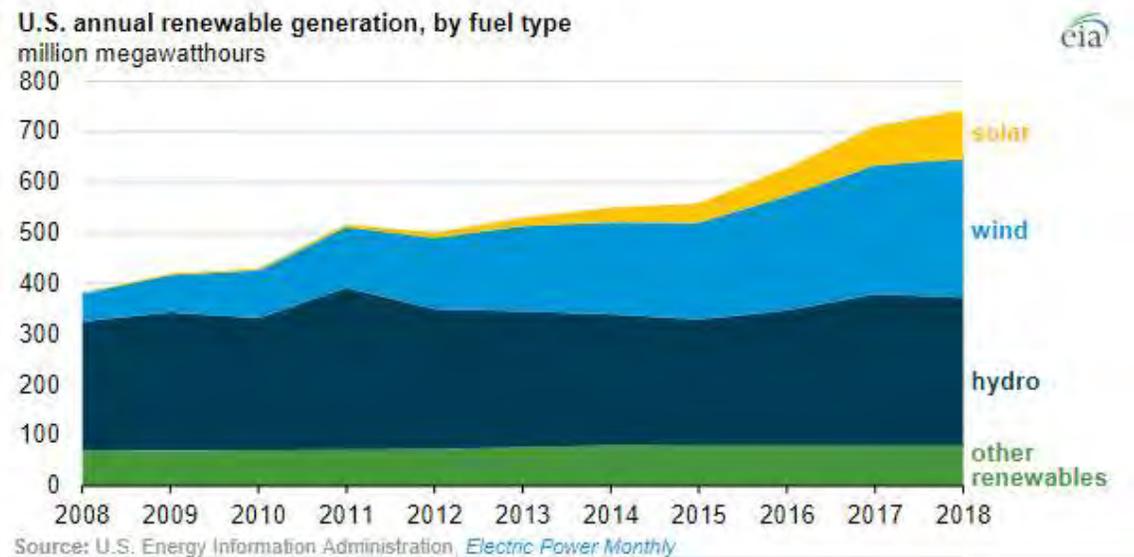
MY GENERATION

LA-LA-LA-LIES
MUCH TOO MUCH

THE OX

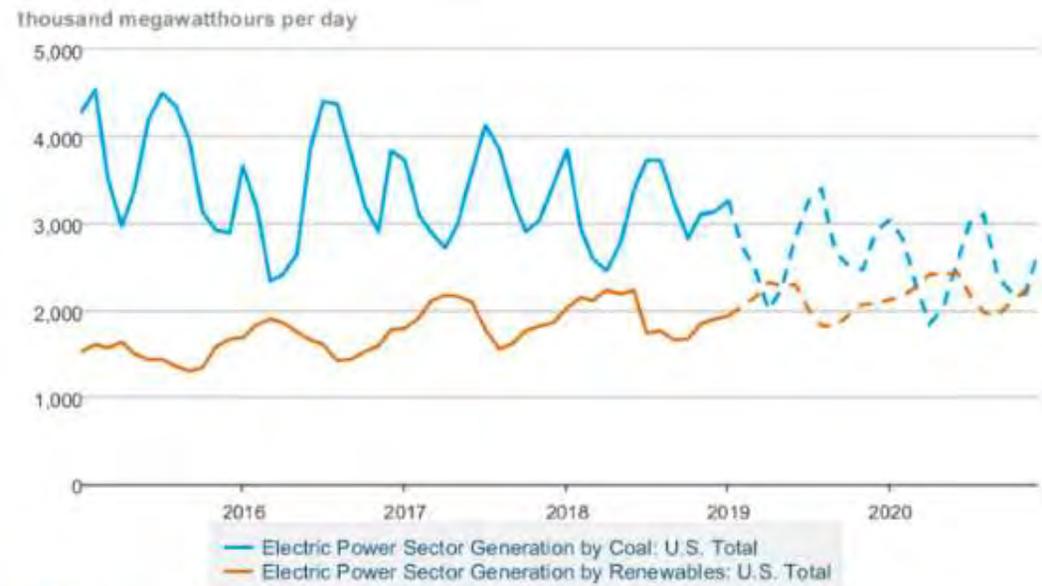


Renewable Energy



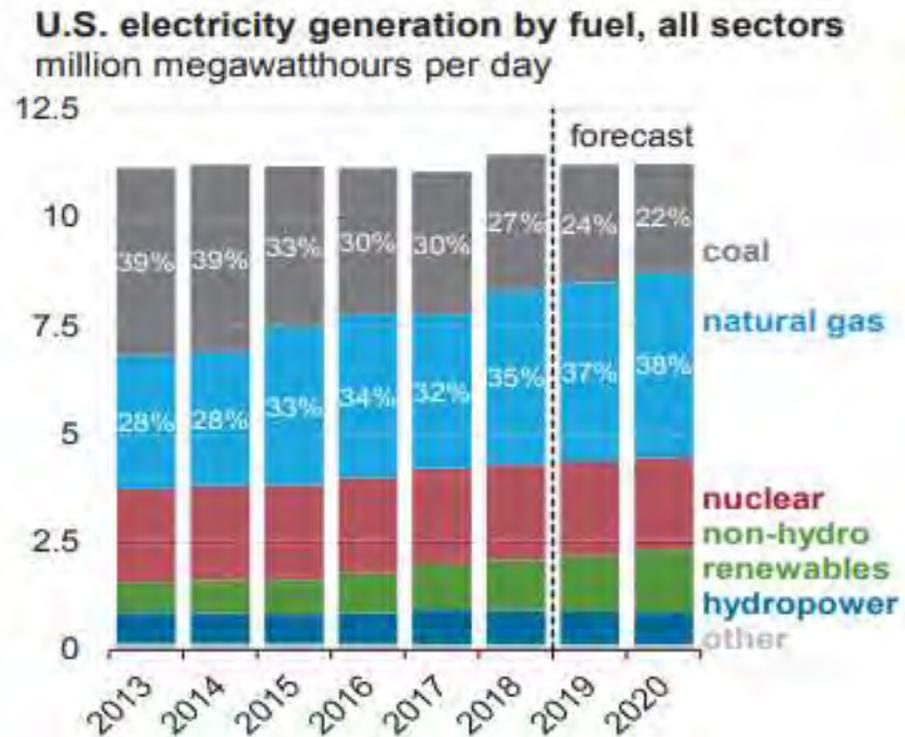
Source: EIA

Renewable Energy



 Source: U.S. Energy Information Administration

Generation Mix

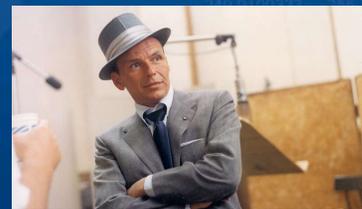
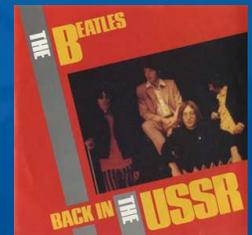


Source: EIA



215.8134516	415.8107586	300.7338774	17.51613333	249.9321	281.6691935
56.79670968	107.6034828	87.77735484	10.30648667	106.7500333	83.30318355
249.8062256	216.7714463	315.5951935	23.29256667	147.9395	188.9316452
58.02041935	68.52393103	28.79812903	22.10406667	187.7517	223.9775161
			41.99383333	97.92925606	

Conclusions





NATURAL GAS SAFETY BEST PRACTICES

MAY 2019



MATERIAL PRESENTED ON A COURTESY BASIS



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OPERATIONS SAFETY

JAKE PARENTEAU AREA MANAGER SOUTH DISTRICT
CHRIS SERRITSLEV AREA MANAGER NORTH DISTRICT

CENTERPOINT ENERGY

- Introduction
- Natural gas pressures
- EFV's (excess flow valves)
- Demarcation points on CenterPoint Energy vs. customer piping
- What to do and who to call if a natural gas emergency arises

INTRODUCTION



- Jake Parenteau – Area Manager South District
 - 12 years field experience
 - 6 years management experience

- Chris Serritslev – Area Manager North District
 - 10 years field experience
 - 8 years management experience

PRESSURE CLASSES

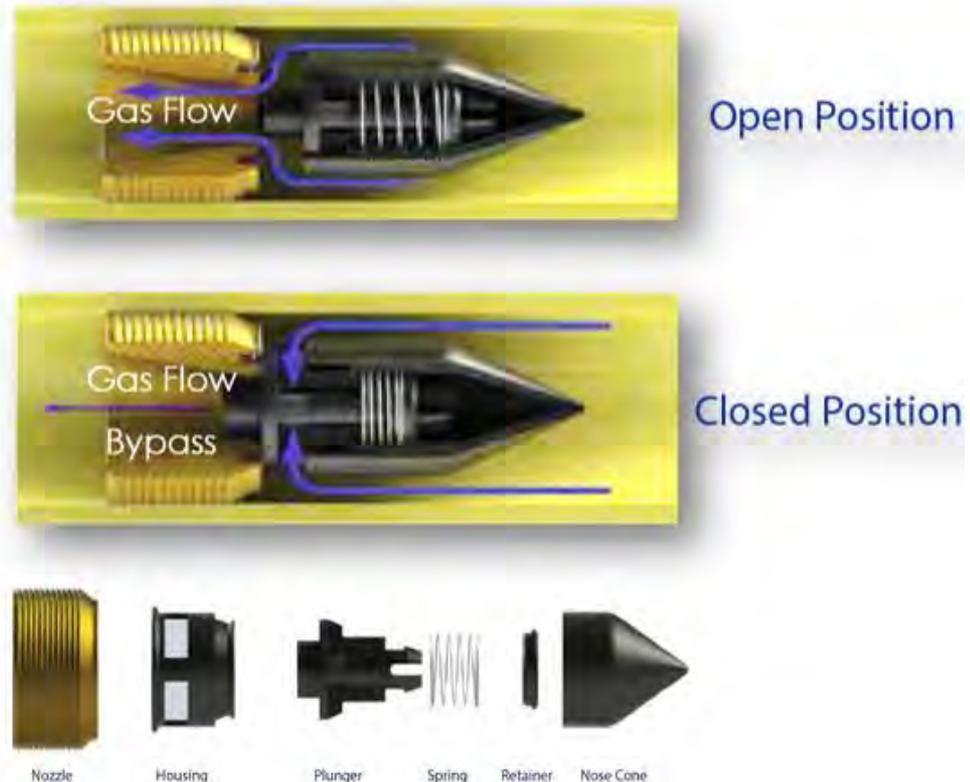
Pressure Class

Color Class Normal Pressure Range

	1	7" W.C.
	2	8–10 PSIG
	5	20–25 PSIG
	6	50–55 PSIG
	7	70–76 PSIG
	8	70–95 PSIG
	A	125 PSIG OR LESS
	C	175 PSIG OR LESS
	E	215 PSIG OR LESS
	F	250 PSIG OR LESS
	K	400 PSIG OR LESS
	L	450 PSIG OR LESS
	M	500 PSIG OR LESS
	N	550 PSIG OR LESS
	O	600 PSIG OR LESS
	P	650 PSIG OR LESS

EFV'S (EXCESS FLOW VALVES)

- ▶ An Excess Flow Valve (EFV) is a device installed in a service line that can automatically stop or limit the flow of gas in case of break or damage



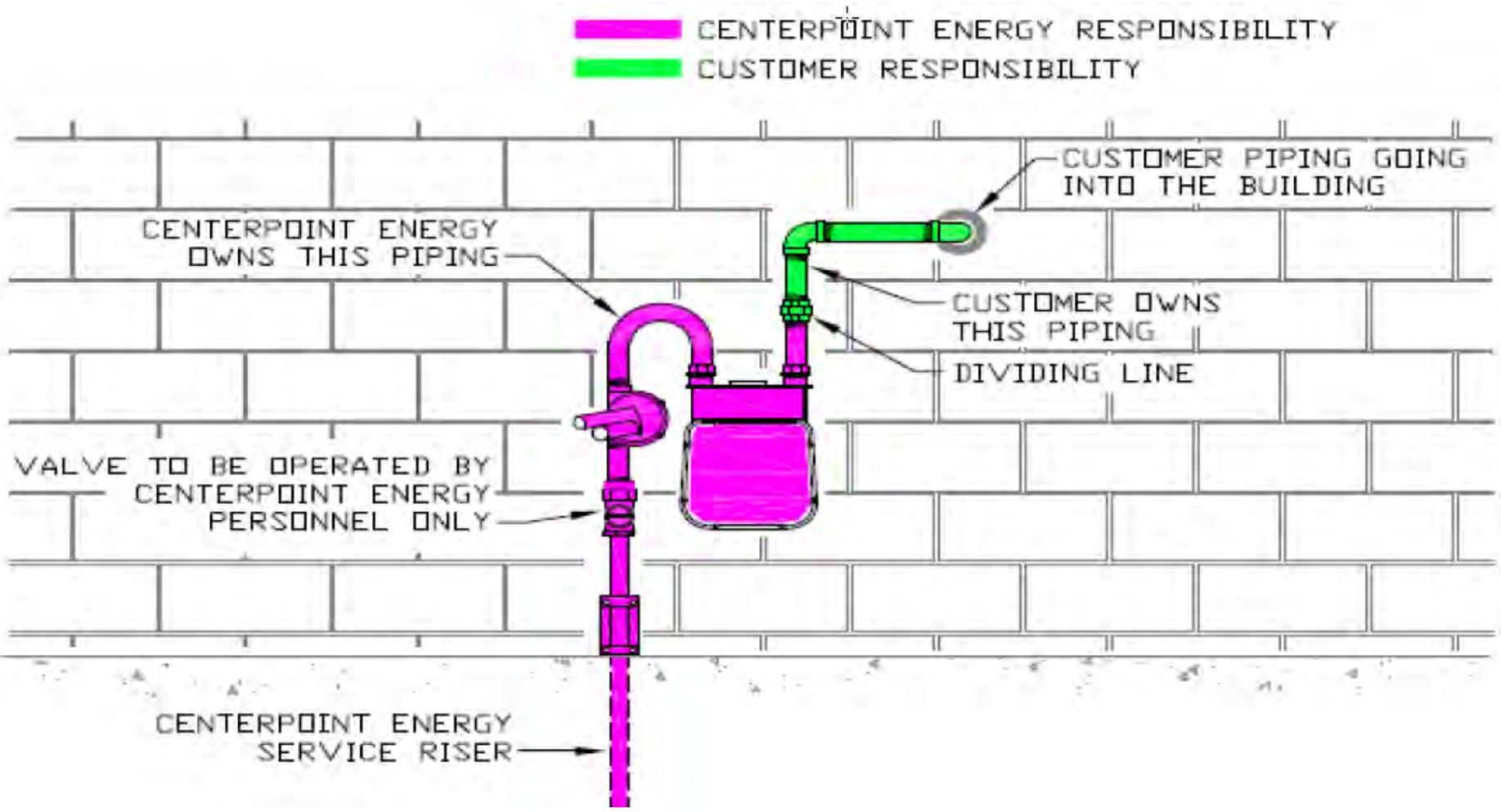
EFV'S CONTINUED

EFVs come in different sizes depending on load

- Engineering will size EFV according to customer load following manufacturer's recommendation.



DEMARCATIION – RESIDENTIAL

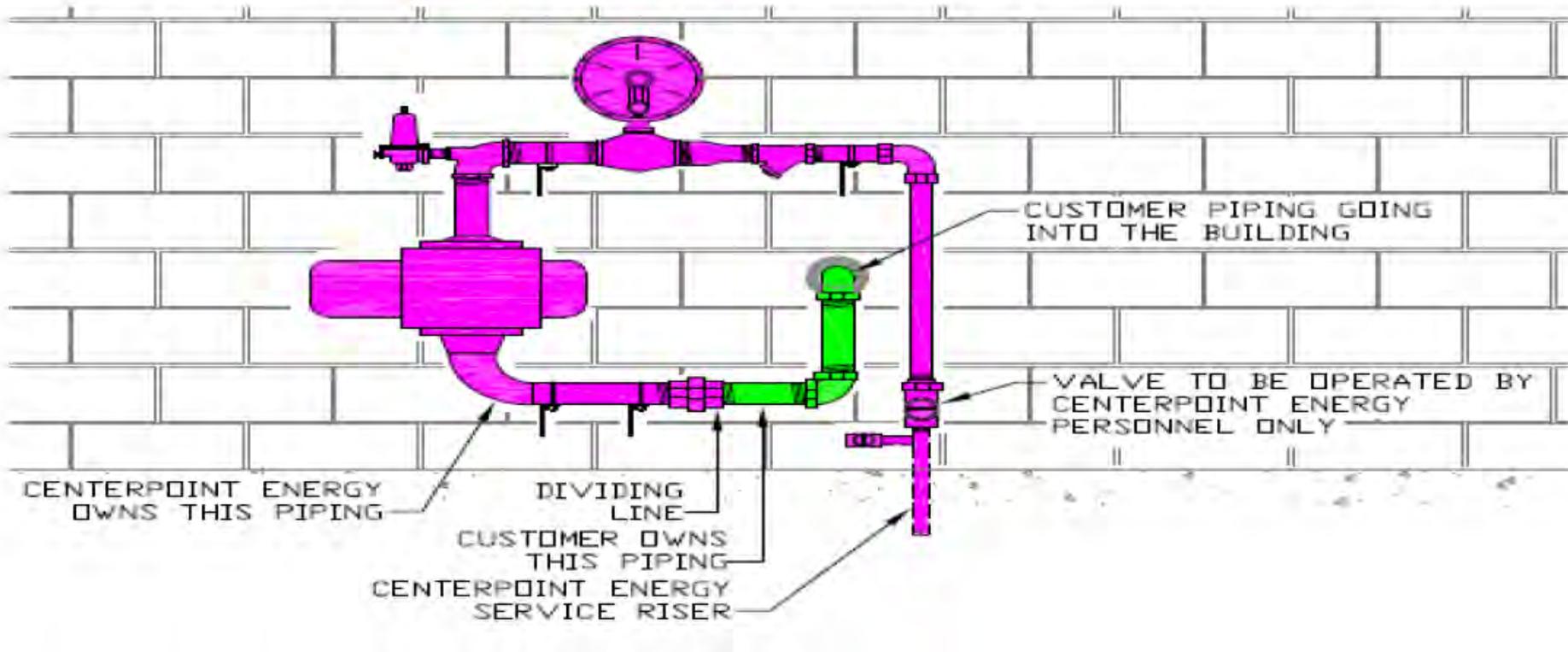


■ CENTERPOINT ENERGY RESPONSIBILITY
■ CUSTOMER RESPONSIBILITY

DEMARCATIION - COMMERCIAL



■ CENTERPOINT ENERGY RESPONSIBILITY
■ CUSTOMER RESPONSIBILITY



WHAT TO DO IF YOU SMELL NATURAL GAS



INSIDE your home or building:

Step 1: Leave immediately on foot! Do not use electric switches, telephones (including cell phones), start or drive a car or anything that could cause a spark.

Step 2: Go directly to a safe location, on foot, and call both CenterPoint Energy 612-372-5050 (toll free 800-722-9326) and 911. Do not use email or Internet to contact the company about a leak and never assume someone else has reported a leak.

Step 3: Alert your neighbors. CenterPoint Energy checks suspected natural gas leaks at not cost to you.

Step 4: Never try to repair a natural gas leak yourself. Leave all repairs to a trained technician.

WHAT TO DO IF YOU SMELL NATURAL GAS



OUTSIDE your home or building:

Step 1: Leave immediately on foot! Do not use electric switches, telephones (including cell phones), start or drive a car or anything that could cause a spark. Move in an upwind direction away from leak or vapor cloud where you can no longer smell gas and maintain a safe distance.

Step 2: Go directly to a safe location and call both CenterPoint Energy 612-372-5050 (toll free 800-722-9326) and 911.

Step 3: Warn others to stay away from the leak. Abandon any equipment being used in or near the area.

Questions?



DAMAGE PREVENTION & PUBLIC AWARENESS

KEITH NOVY MANAGER DAMAGE PREVENTION
STEVE OLINGER PUBLIC AWARENESS SPECIALIST

CENTERPOINT ENERGY

PUBLIC AWARENESS TIMELINE



- **June 20, 2005** - RP 1162 was incorporated by reference into a final rule.
- **June 20, 2006** – CenterPoint Energy Public Awareness Plan due to PHMSA-Pipeline Hazardous Material Safety Administration
- **July 1, 2006** – CenterPoint Energy executes it's Public Awareness plan

PUBLIC AWARENESS PROGRAM OBJECTIVES

- Raise awareness of the presence of pipelines in their communities
- Increase understanding of the role of pipelines in transporting energy



PUBLIC AWARENESS PROGRAM OBJECTIVES



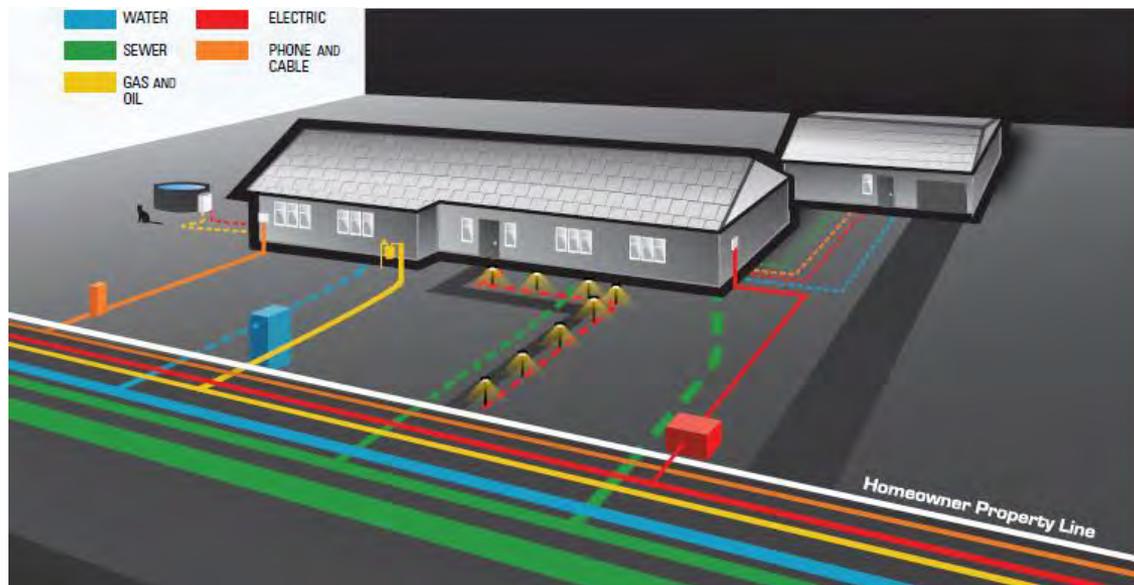
Help the public:

- Understand that pipelines are a relatively safe mode of transportation
- Understand that pipeline operators undertake a variety of measures to prevent pipeline accidents
- Understand that operators anticipate and plan for management of accidents if they occur
- Understand the steps that should be taken to prevent and respond to pipeline emergencies

- CNP can provide literature for:
 - Safety Days
 - Training Days
- Email address: PublicSafetyAwareness@centerpointenergy.com
- Coordinated response
 - Emergency phone number for a leak:
 - 612-372-5050
 - 800-296-9815

PRIVATE FACILITIES

- Private underground facilities, such as private utility lines and private distribution networks, do not get marked by facility operators.
- When a property owner or tenant has any type of private underground facility, they are responsible to locate those facilities or hire someone to locate them



CALL 811 BEFORE YOU DIG



**Know what's below.
Call before you dig.**

Call 48-Hours in advance excluding Weekends and Holidays

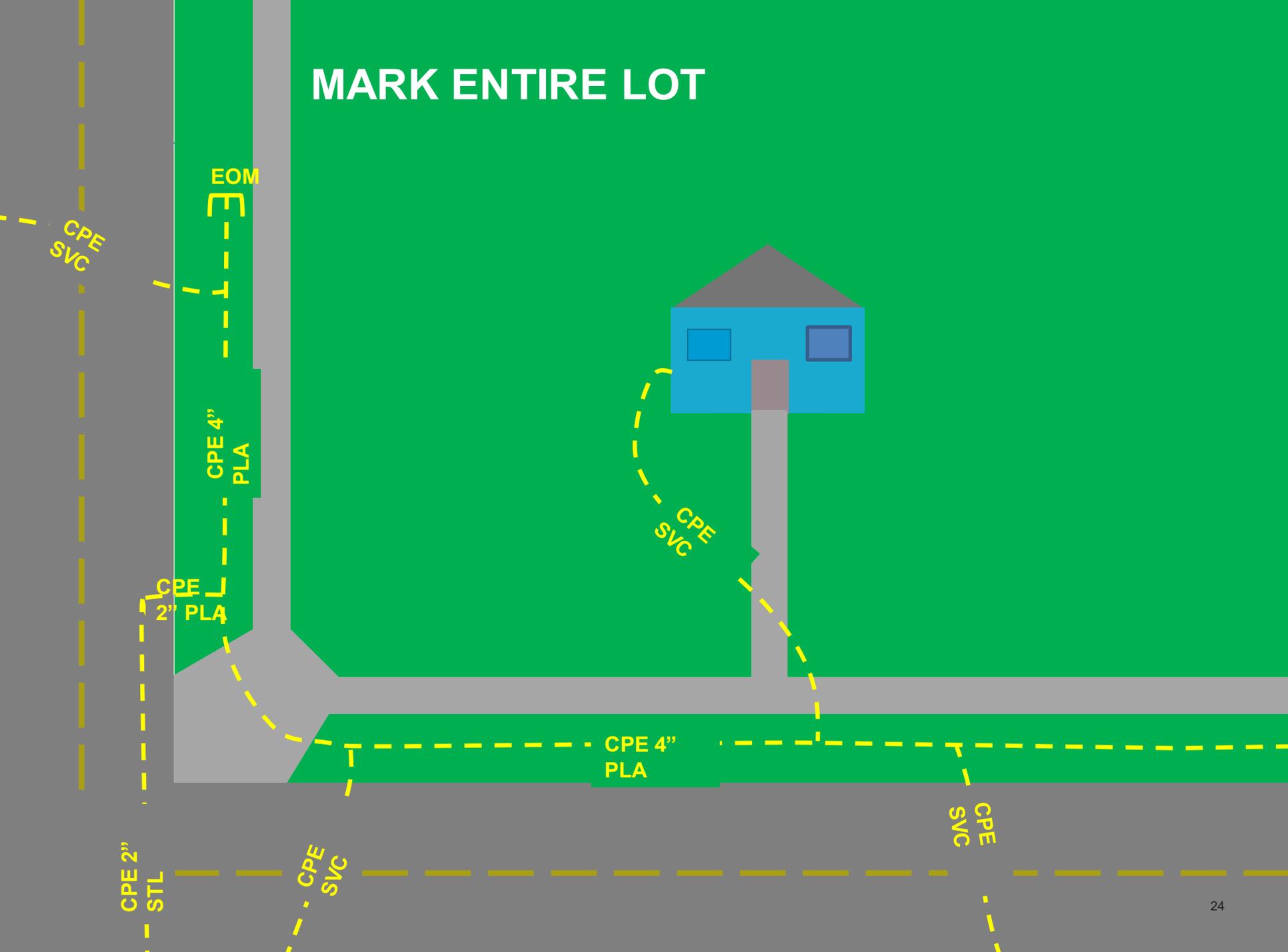
WHAT WILL WE COVER?

- GSOC basic ticketing information
- White Lining
- Positive Response
- Pre-work, site inspection
- Marking standards
- CenterPoint Energy facilities
- Potholing best practices
- Emergency response
- Questions

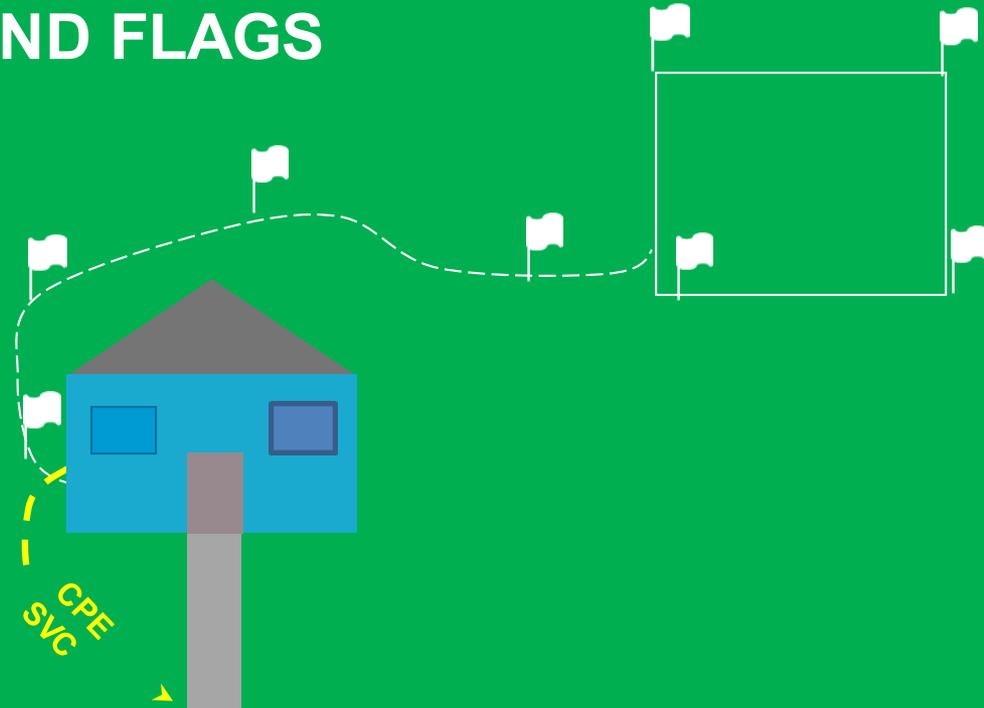
- Types of Excavation Tickets
- Routine tickets, 48hrs
- Emergency tickets-3hrs
- Meet ticket-when should I use that option? (meet sheets etc.)
 - Review ticket etiquette GSOC handbook p.50

- *“You are required to use white markings to define the entire area where excavation will occur, unless it can be shown it is not practical.”* (2019 GSOC Handbook, p.16)
- White lining saves the excavator and the locator time by cutting down on confusion, extra phone calls and marking of the wrong area or incomplete marking.

MARK ENTIRE LOT



WHITE PAINT AND FLAGS



10' RADIUS OF FLAGS

NO
CPE

NO
CPE

CPE 4"
PLA →

CPE
SVC

POSITIVE RESPONSE

- Positive response is an easy way to check the status of your locate request
- Before sending a crew out to a job, check positive response to make sure all facilities have been accounted for
- GSOC handbook pages 20-24 positive response codes

WHO TO CONTACT FOR WHAT



District	Company Name	Marking Concerns	Damage	Customer Service	Utility Types	Status
CMINNE01	CITY OF MINNEAPOLIS WATER	612-673-5600	612-673-5600	612-673-5600	W	Clear/No conflict
CMINNE04	CITY OF MINNEAPOLIS TRAFFIC	612-673-5516	612-673-5759	512-673-5569	TS	Marked (Ross Blonigen)
CMINNE05	CITY OF MINNEAPOLIS SEWER	612-673-5600	612-673-5600	612-673-5600	S	Marked (24 in storm along curb line)
COMCST03	COMCAST	800-778-9140	651-493-5305		TV	Clear/No conflict
CTLMN01	CENTURYLINK - CTLQL	855-742-6062	800-283-4237	855-742-6062	TEL	Marked
ENVTEL04	CONSOLIDATED COMMUNICATIONS I	800-778-9140	888-608-7822	507-387-1858	FO	Clear/No conflict
MCICOL01	MCI	800-624-9675	800-624-9675	800-624-9675	FO	Clear/No conflict
MINGAS03	CENTER POINT ENERGY	800-778-9140	612-321-5200	612-321-4421	G	Marked
MNCMRR01	MN COMMERCIAL RAIL WAY	651-295-8609	651-632-9013	651-632-9000		Not yet responded
UOMEMT01	UNIVERSITY OF MINNESOTA- FM	612-625-6537	612-625-6537	612-624-2900	FO	Clear/No conflict
WINMN01	WINDSTREAM COMMUNICATIONS	800-289-1901	800-289-1901	800-289-1901	TEL	Clear/No conflict
WLMTCM01	LEVEL 3 IS NOW CENTURYLINK	877-366-8344	877-366-8344	877-366-8344	FO	Clear/No conflict
XCEL07	XCEL ENERGY	800-848-7558	800-895-1999	800-848-4999		Marked

PRE-WORK SITE INSPECTION

- Thorough work site walk through
- Identify each line that will need to be potholed and exposed
- Look for utilities that are not marked
- Look for indicators that there are facilities in the area that might have been missed.....

MARKING STANDARDS

- Law requires all lines 8” and larger to be labeled with size.
- CPE requires lines 2” and larger to be labeled with size.
- “CPE --- Size --- Type”
- Examples:
 - CPE --- 2” --- PLA
 - CPE --- 24” --- STL
 - CPE --- 6” --- CI

POT-HOLING BEST PRACTICES

- GSOC handbook pages 25-26
- No mechanized excavation within 24" of marked lines
- Larger hand dig zone on larger pipes (24" plus ½ diameter of pipe)
- Hydro Vac when possible to reduce hand dig damages
- Check labeling prior to potholing. Look for the pipe that is labeled. If labeled 2" plastic and you find 8" steel, call your locator for clarification.

EXPOSE LINES WITH A SHOVEL OR A VACUUM TRUCK



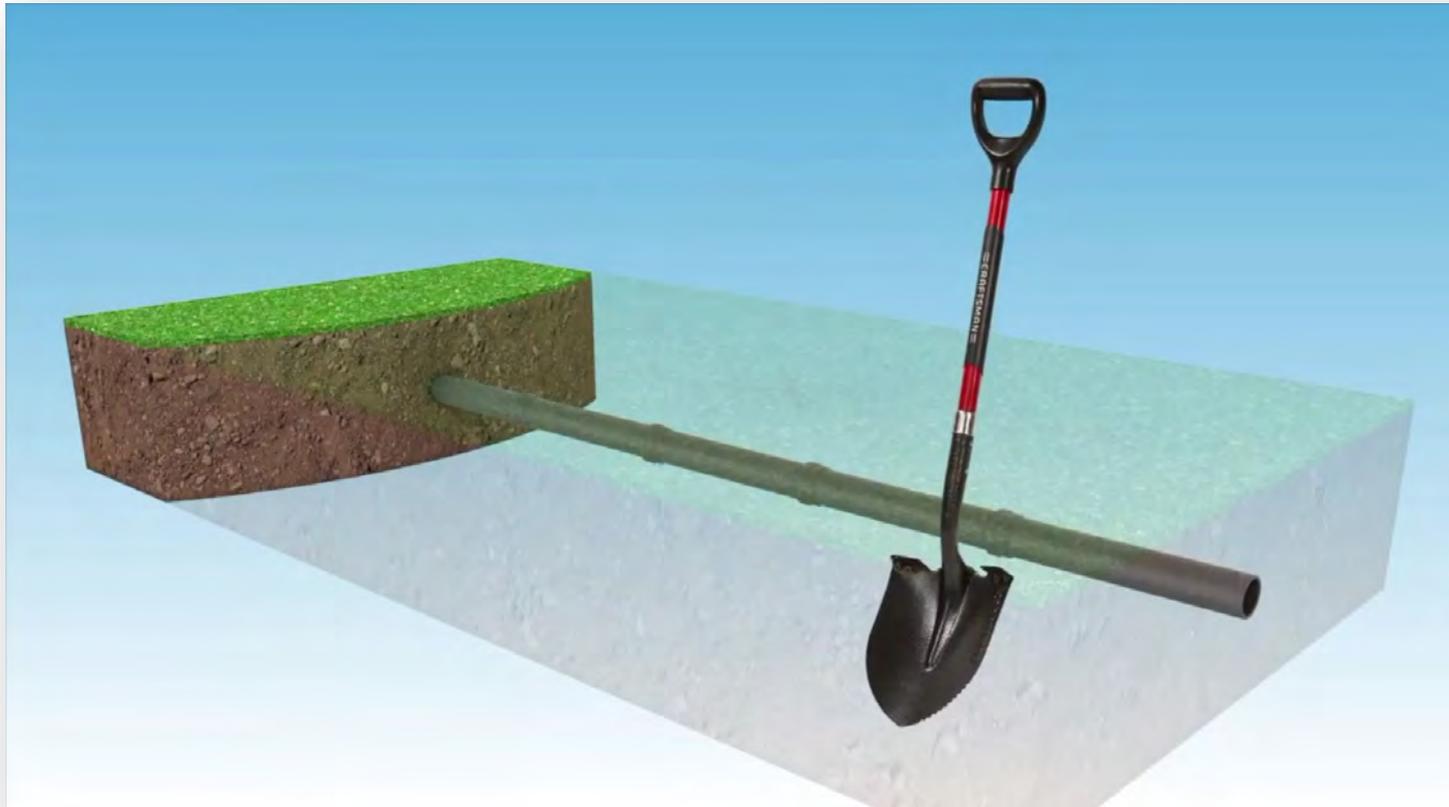
Safety Tip: Always expose the line first, then use mechanical equipment (backhoe, trencher, auger etc.) to do your work

SHOVEL EXCAVATION



Safety Tip: Always start away from the line mark not over it, this will help reduce the chance of damage to the utility

SHOVEL EXCAVATION



Safety Tip: Parallel the line mark never dig across it, this also will reduce the chance of damage to the utility

Digging safely:

- ▶ Reduces damages
- ▶ Prevents delays
- ▶ Increases profits
- ▶ Protects the public and your crew



Have A Plan.....

- In the event of natural gas escape, call 911 and get people up-wind of hit line
- After 911, call the CenterPoint Energy dispatch damage number: 612-321-5200
- If any contact has been made with any CenterPoint Energy facility and there is not gas escape, call CenterPoint Energy dispatch damage number: 612-321-5200. They will send a crew to verify the integrity of the pipe.
- Even slight coating damage today can lead to corrosion and gas leaks at a later time. It might not seem like much, but still needs to be examined prior to re-burying.
- Do not tape over or pinch of plastic lines. Let them vent to atmosphere. Static charge built up in the lines can be a source of ignition.

STATIC ELECTRICITY

- ▶ The movement of gas inside pipe creates static on the inside walls of the pipe.
- ▶ Why? That's where the friction is!
- ▶ Arcing can either ignite a gaseous mixture or shock the worker



INCIDENT EXAMPLE

Irrigation contractor plowing in lines on expired ticket with weathered marks hits main



DAMAGE PREVENTION

It's up to everyone to prevent damages



Questions?

Natural Gas Safety in Commercial Facilities

By Mike Bokenewicz

Leaks – call 911 then 612-372-5050

- **Step 1: Leave immediately on foot!** Do not use electric switches, telephones (including cell phones), drive or start a car or anything that could cause a spark.
 - **Step 2: Go directly to a safe location, on foot, and call both CenterPoint Energy and 911.** Do not use e-mail or the Internet to contact the company about a leak, and never assume someone else has reported the leak.
 - **Step 3: Alert your neighbors.** CenterPoint Energy checks suspected natural gas leaks at no cost to you.
 - **Step 4: Never try to repair a natural gas leak yourself.** Leave all repairs to a trained technician.
-
- Leaks can sometimes be identified by a smell (rotten eggs), visible dirt near a pipe blowing, and audio (hissing)
 - Avoid power doors if possible and use a manual exit door.
 - Leave the door open if simple and convenient
 - Train your employees on these simple procedures.

Annual Piping Inspections & Maintenance

Piping Supports Damage



Piping Alignment



New Robust Piping Support



Typical meter & roof piping without a manual ball on the outlet of the meter for owner operation.



Typical roof piping can easily be buried in snow. Safe walking areas on the roof

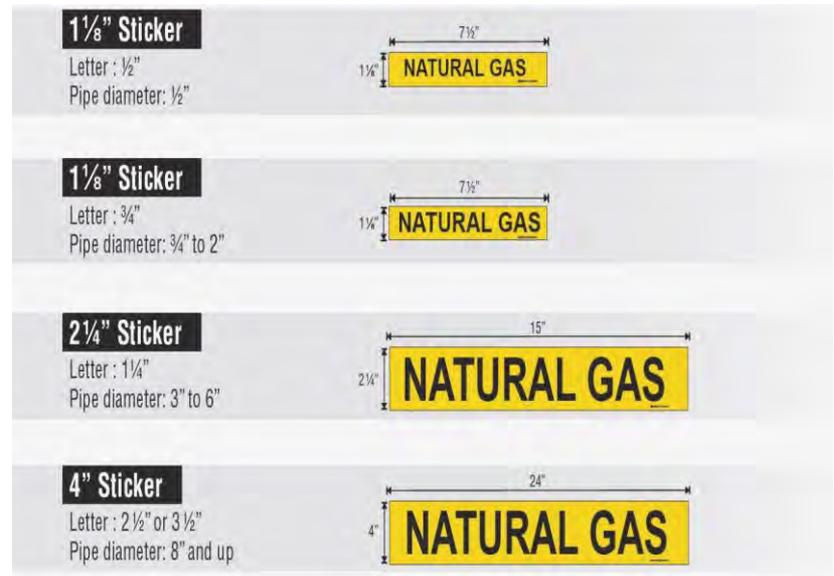


Piping Maintenance & Leak Checking

Piping Paint and Label Missing



Add Piping Labels & Flow Arrows



Mike Bokenewicz

mbokenewicz@yalemech.com

952-292-4174 cell

952-884-1661 office