Strategic Energy Management (SEM) with ISO 50001 and 50001 Ready

ORNL 50001 Ready Training Webinar Series, Session 3 February 23, 2021 10:00 a.m. to 12:30 p.m.

Agenda – Session THREE

- Welcome, Safety, and Housekeeping

- Review Previous Sessions

- Today's Content – ***Where Does All my Energy Go?***

    - Section 3: Planning

        ◦ Task 8: Energy Data and Collection
        ◦ Task 9: Significant Energy Uses (SEUs)

- Webinar Training Schedule & Preparations

- Kahoot Quiz Game

- Q&A

But first, a POLL!

Polling Question 1

1) Reflecting on the impact of the COVID 19 virus, how was your <u>production volume</u> (and the associated energy consumption) affected in 2020?

   A. Significantly lower
   B. Somewhat lower
   C. Up and down, sporadic
   D. Limited impact, stable
   E. Somewhat higher
   F. Significantly higher

Welcome

- Welcome to the Virtual INPLT *50001 Ready* webinar training series

- Eight, 2-1/2 hour webinars, focused on Strategic Energy Management (SEM), in general, and the ISO 50001 standard and *50001 Ready Navigator,* in particular

- The webinars will help you understand the why and how of SEM and the *50001 Ready Navigator* tool

- Thank you for your interest!

Safety and Housekeeping

- Please make sure that your surroundings are safe:
  - If you are driving, please use hands free mode
  - If you are in a building, be sure you know the exit paths
  - If you are at home, be sure there are no distractions
- You are welcome to ask questions at any time during the webinar
- When you are not asking a question, please MUTE your mic and this will provide the best sound quality for all participants
- We will be recording all these webinars and by staying on-line and attending the meeting you are giving your consent to be recorded
  - A link to the recorded webinars will be provided, afterwards

Team Review

- Our Team for this 50001 Ready Training

Our 50001 Ready Training Group

- **Information on our 50001 Ready Training Group:**
  - 26 different organizations, many with multiple sites
  - Many with global footprints
  - Size of sites range from 100,000 square feet up to 586 acres
  - A wide range of products and markets:
  - Primary Energy types:
    - Electricity
    - Natural Gas
    - Liquid Propane
    - Diesel and other Fuel Oils
    - Some solar, some biogas, and some CHP

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Energy Consulting
Cheese & Whey
Plastics
Composites
Chemicals
Automotive vehicles
Automotive batteries
Automotive fuel systems
Electronics
Fiberglass
Flooring materials
Organic foods
Packaging
Glass
Craft beers
City government
Wastewater treatment
Industrial machinery
Shrimp peeling equipment
Filtration media
Tape
Medical

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Review of Previous Sessions

- Quick List of Acronyms

- The 50001 Ready navigator

- Session TWO: Tasks 1-7
  - Laying the Foundation

Quick List of Acronyms

- SEM = Strategic Energy Management
- EnMS = Energy Management System
- SEU = Significant Energy Use
- EnPI = Energy Performance Indicator
- EnB= Energy Baseline
- PDCA = Plan, Do, Check, Act

Why 50001?: A System

- FREE
- Download ONLY, one way information flow
- None of your site info is uploaded
- Single site or multi-site capability

50001 Ready: Review Previous Tasks

Context of the Organization

1. An EnMS and your Organization

2. People and Legal Requirements

3. Scope and Boundaries

Leadership

4. Management Commitment

5. Energy Policy

6. Energy Team and Resources

Planning

7. Risks to EnMS Success
8. Energy Data Collection and Analysis
9. Significant Energy Uses
10. Improvement Opportunities
11. Energy Performance Indicators (EnPIs) and Baselines (EnBs)
12. Objectives and Targets
13. Action Plans for Continual Improvement

Support

14. Competence and Training
15. Awareness and Communication
16. Documenting the EnMS

Operation

17. Operational Controls
18. Energy Considerations in Design
19. Energy Considerations in Procurement

Performance Evaluation

20. Monitoring and Measurement of the EnMS
21. Monitoring and Measurement of Energy Performance Improvement
22. Internal Audit
23. Management Review

Improvement

24. Corrective Action
25. Continual Improvement

Plan

Act

Do

Check

- Today's Content

Tasks 8 - 9

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50001 Ready Navigator: Today's Tasks

Context of the Organization	Leadership	Planning	Support	Operation	Performance Evaluation	Improvement

1. An EnMS and your Organization

2. People and Legal Requirements

3. Scope and Boundaries

4. Management Commitment

5. Energy Policy

6. Energy Team and Resources

7. Risks to EnMS Success

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Plan · Act · Do · Check

Understanding your energy performance

YOUR COMPANY: Energy Types IN

- Liquid Propane, 1.61%
- Diesel Fuel, 0.04%
- Electricity, 45.73%
- Natural Gas, 52.63%

YOUR COMPANY: Energy Uses by System

- Facility Air Compressors, 3.1%
- Facility Lighting, 0.8%
- Facility Towers, 0.7%
- Facility Exh Fans, 0.4%
- Facility Vehicles, 3.7%
- Facility Boilers, 24.2%
- Footing Paint, 5.6%
- Beam Paint, 6.1%
- Facility HVAC, 7.7%
- Facility Pumping, 8.0%
- Shelf Paint, 9.0%
- Facility Chillers, 12.5%
- Frame Paint, 18.3%

What energy comes into my site?
Where does all this energy go? [SEUs]
What are my EnPIs and EnBs?
What are my objectives, energy targets & action plans?

Polling Question

2) Think about the two pie charts on the previous slide. Think about your current data collection and energy evaluation processes. What level of effort would it take to produce both pie charts?

   A. I already have similar charts for both

   B. I am close on both, just need a little tweaking

   C. I am good on "Energy IN", but would need some effort to get "Energy USE"

   D. It would take a significant effort to get both, especially "Energy USE"

   E. "We're gonna' need a bigger boat"

Energy IN

Energy USE

Task 8: We <u>identify</u> our energy sources and energy uses, have a data collection plan in place, and <u>collect</u> related energy and relevant variable data.

We <u>ensure</u> the accuracy and repeatability of measurements (e.g., calibration)

We <u>analyze</u> our energy use and consumption data.

Task 8: Questions to Think About

- How do you determine, collect and analyze energy data?
  - What are your energy sources?
    - (e.g. electricity, natural gas, fuel oil, etc.)
  - What are your energy users?
    - (e.g. chillers, boilers, fans, pumps, lighting, etc.)
    - Who knows about energy uses across your site?
  - What process are already in place that you can use?
  - Who currently works with your energy data? Contractors?
- Are relevant variables understood, collected and used?
- How is all this data analyzed and results recorded?
- How do you ensure accuracy and repeatability of data?

Task 8: Key Terms
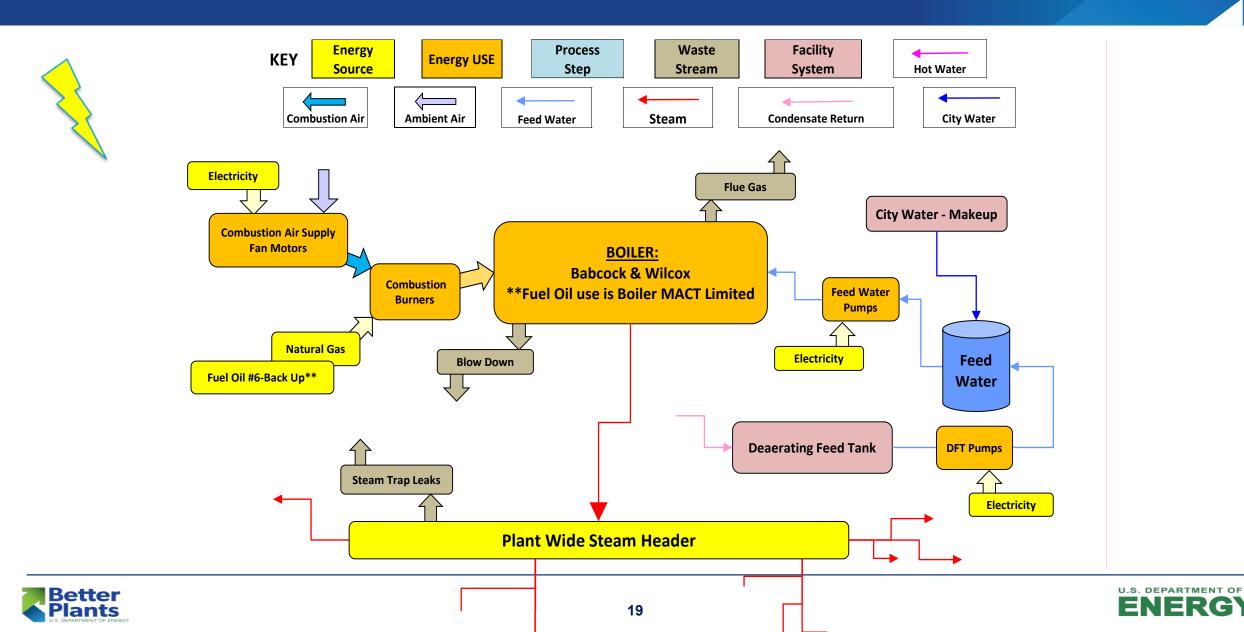
- ## Energy Source
  - Electricity, natural gas, fuel oil, diesel fuel, liquid propane, renewables, etc.

- ## Energy Use
  - Machinery, equipment, processes: Boiler, chiller, fan, pump, lighting, air compressor, paint booth, air handling unit, etc.

- ## Energy Consumption
  - A quantity of energy: kilowatt hours, dekatherms, gallons, MMBTUs, etc.

- ## Energy Efficiency
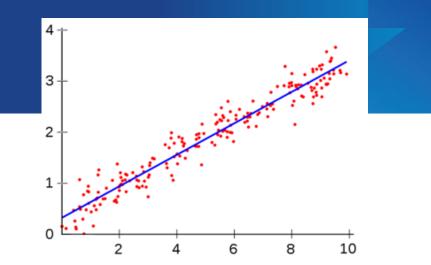 - A ratio of energy output to energy input, typically expressed as a percentage
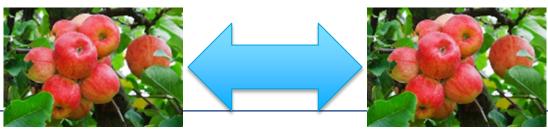
Task 8: Process Energy Maps Can be Useful

KEY

| Energy Source | Energy USE | Process Step | Waste Stream | Facility System | ← Hot Water |

| ← Combustion Air | ← Ambient Air | ← Feed Water | ← Steam | ← Condensate Return | ← City Water |

Electricity → Combustion Air Supply Fan Motors → Combustion Burners → **BOILER: Babcock & Wilcox **Fuel Oil use is Boiler MACT Limited** → Flue Gas

Natural Gas → Combustion Burners

Fuel Oil #6-Back Up**

Blow Down

City Water - Makeup → Feed Water

Feed Water Pumps ← Electricity

Deaerating Feed Tank → DFT Pumps ← Electricity

Steam Trap Leaks

Plant Wide Steam Header

Task 8: More Key Terms

- ## Relevant Variables
  - Impacts energy performance, i.e., relevant
  - Typically changes, i.e., variable
  - Examples: weather conditions (heating degree days, cooling degree days, average outside temperature, humidity, working hours, occupancy, production output, etc.)
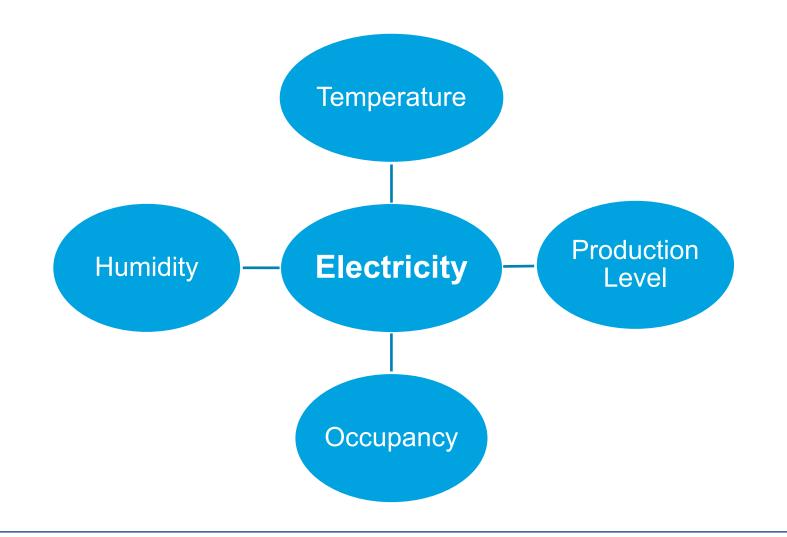
- ## Normalization
  - Allows for comparison of apples to apples
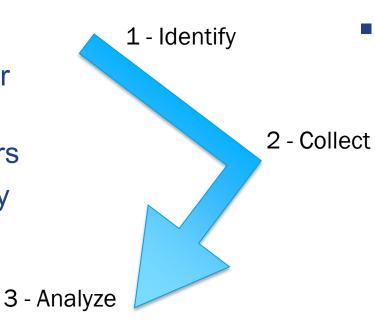 - Accounts for changes so that you can properly compare energy performance to energy baselines

Task 8: Relevant Variables & Energy Use

Task 8: Delegating Roles

Types of data needed

- Total energy consumption for all sources
- Energy consumption by users
- Square footage & occupancy
- Relevant variables
- Product volumes

1 - Identify

2 - Collect

3 - Analyze

Sources of data

- Utility bills
- Sub-metering
- Site floor plans
- Weather data
- Process flow charts
- Production data
- End user equipment specs

Who will be responsible for attaining this information?
Who will be responsible for cleaning/analyzing the data?
Where will we store the data?
What is our naming convention to avoid misunderstandings about most current information?

Task 8: Playbook

Activity

- Look at Task 8 in 50001 Ready
- Look at the Task 8 Playbook

50001 Ready Navigator Playbook

Task 8: Energy Data Collection and Analysis

Date last modified/updated: Click here to enter a date.   **Internal audit:** Click here to enter a date.
Who last modified/updated: Click here to enter text.   **Management review:** Click here to enter a date.

This part of the Navigator Playbook is completed when you have:

1. Identified all energy sources that are consumed within the scope and boundaries.
2. Made a list of energy uses within the scope and boundaries.
3. Identified relevant variables that potentially affect the energy consumption of SEUs and would help create meaningful energy performance indicators (EnPIs) and energy baselines (EnBs).
4. Developed and implemented a data collection plan based upon the data needs including the key characteristics of ISO 50001.
5. Ensured measurements and metering are conducted accurately and are repeatable.
6. Determined appropriate analysis methods and used them to understand and monitor energy use and consumption.

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3) Think about your current data collection processes relative to Task 8 in 50001 Ready. Where do you feel you are with respects to the requirements?

A. Got it all covered and it is running like a Swiss watch

B. We have robust data collection, just needs a little tweaking

C. We are good on incoming energy and utility bills, but we need more work on relevant variables and production data

D. It would take a significant effort to get our data collection upgraded to meet task 8

E. "That's no moon, it's a space station"

Task 9: Significant Energy Uses

Task 9: We <u>determine</u> our significant energy uses (SEUs), <u>identify</u> and <u>monitor</u> their relevant variables and energy performance, and <u>identify</u> the persons that affect the SEUs.

We have a process to <u>review</u> and <u>update</u> SEU data and related information, including our methods and criteria to <u>determine</u> that an energy use should be an SEU.
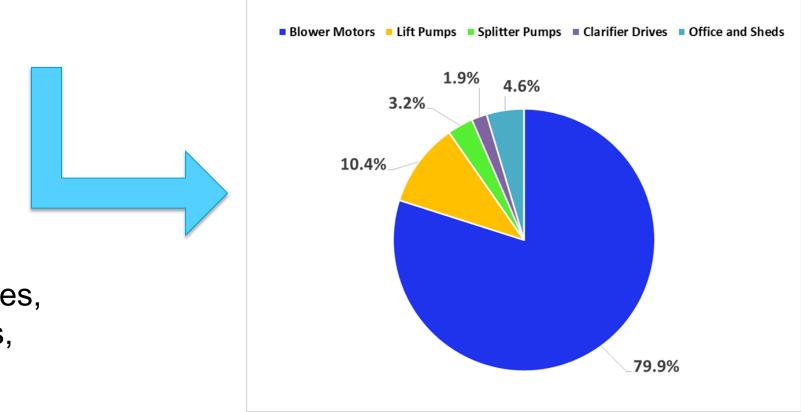
- **Significance** is determined by your organization

SEUs can be facilities, systems, processes, or equipment.

- **3.5.6**
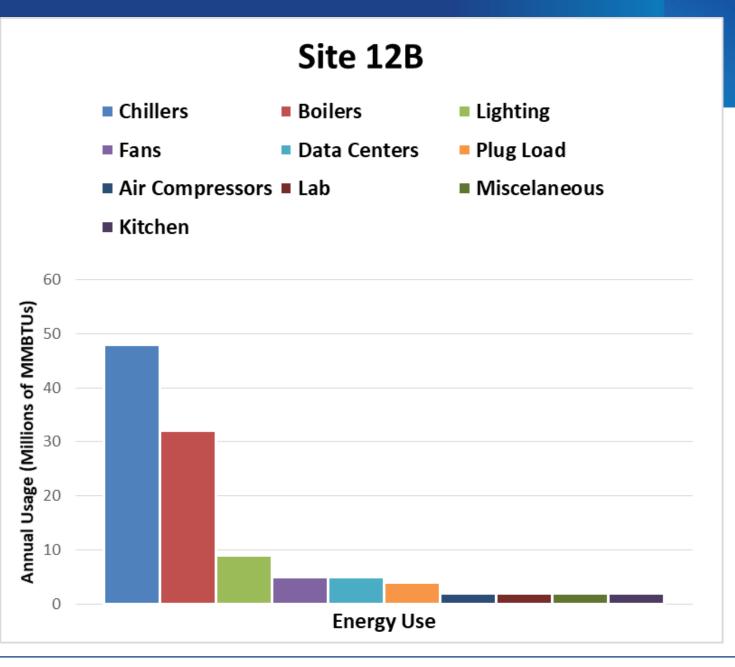
- **significant energy use**

- **SEU**

- *energy use* accounting for substantial *energy consumption* **and/or** offering considerable potential for *energy performance improvement*

  - Note 1 to entry: Significance criteria are determined by the *organization*

  - Note 2 to entry: SEUs can be facilities, systems, processes, or equipment.

Task 9: 80-20 rule
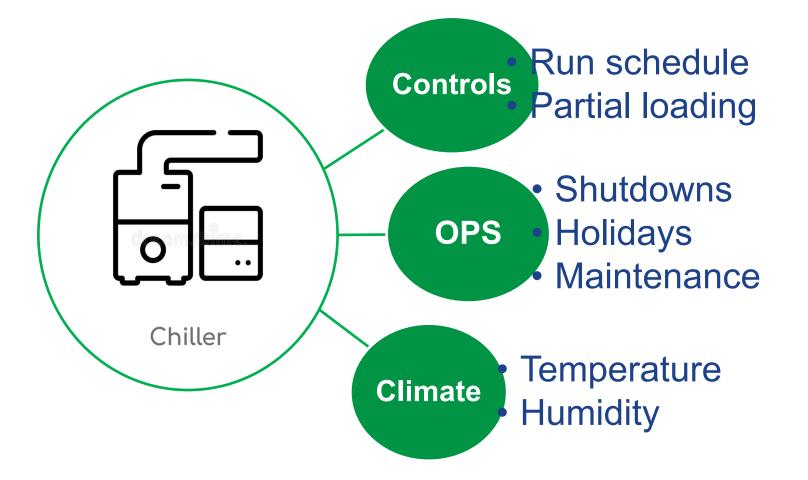
80% of consumption from 20% of end uses

Task 9: SEUs Require Lots of Work

- Each selected SEU will require work in these areas:
  - Task 12, ISO section 6.2.2 Objectives and energy targets
  - Tasks 8 & 9, ISO section 6.3 Energy review (3x)
  - Task 8, ISO section 6.6 Planning for collection of energy data (3x)
  - Task 17, ISO section 8.1 Operational planning and control (2x)
    - This entire section is focused on SEUs
  - Task 19, ISO section 8.3 Procurement
  - Task 20 & 21, ISO section 9.1 Monitoring, measuring, analysis and evaluation of energy performance, General
    - Must include the operation of SEUs

There are at least 11 things to do for each selected SEU!!

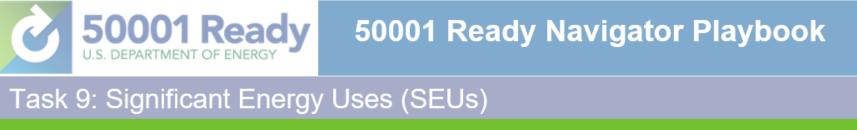# Task 9: What impacts SEU energy performance?

Controls
- Run schedule
- Partial loading

OPS
- Shutdowns
- Holidays
- Maintenance

Climate
- Temperature
- Humidity

Chiller

Task 9: Playbook

Activity

- Look at Task 9 in 50001 Ready
- Look at the Task 9 Playbook

50001 Ready Navigator Playbook

Task 9: Significant Energy Uses (SEUs)

Date last modified/updated: Click here to enter a date. **Internal audit:** Click here to enter a date.
Who last modified/updated: Click here to enter text. **Management review:** Click here to enter a date.

This part of the Navigator Playbook is completed when you have:

1. Identified the energy uses that consume the most energy within your boundaries.
2. Identified factors and persons that affect the energy consumption of identified energy uses.
3. Established selection criteria for identifying which of these energy uses should be a significant energy use (SEU).
4. Determine SEU energy performance based upon energy consumption and relevant variables as appropriate.
5. Review the SEU selection criteria as part of the SEU update process.

1. Identify the energy uses that consume the most energy within your boundaries.
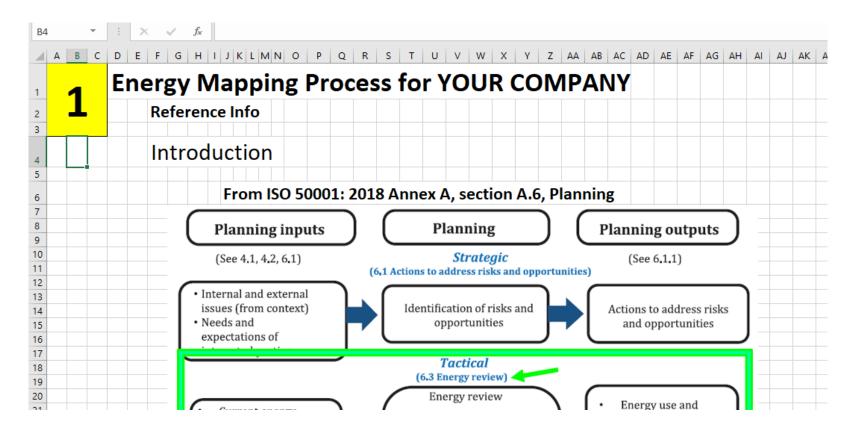2. Identify factors and persons that affect the energy consumption of identified energy uses.

Task 9: Energy Mapping Template

Activity

- Review the tabs of the Energy Mapping Template Tool

Polling Question 4

4) Thinking about Tasks 8 - 9:
   Task 8: Energy Data and Collection
   Task 9: Significant Energy Uses (SEUs)

Where do you feel your organization is relative to these two tasks?

A. We essentially already have all of this in place. Just a little tweaking is needed.

B. These make sense and my organization has some of this in place. It would not take too much effort to complete these.

C. Most of this is new to my organization, but we do have some basics in place. It would take some effort to get this in place.

D. I would basically have to start from scratch to get these tasks completed.
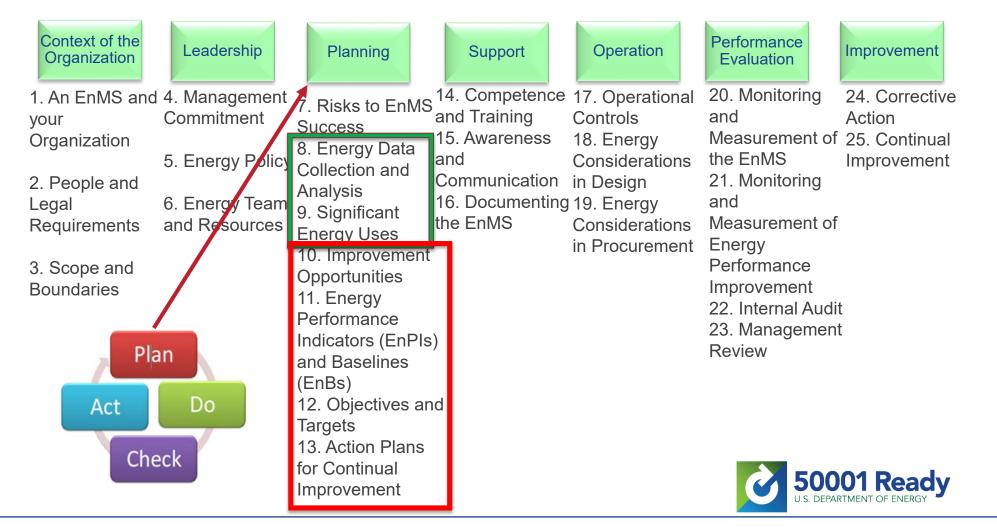
E. I need a valium!

- Review and Wrap Up

Webinar Training Schedule & Preparations
Kahoot Quiz Game
Q&A

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50001 Ready Navigator Tasks: Webinar #2

Context of the Organization

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6. Energy Team and Resources

Planning

7. Risks to EnMS Success

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Improvement

24. Corrective Action
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Plan
Act
Do
Check

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Training Schedule: By Session

1. An Introduction and Overview – DONE – February 9

2. Laying the Foundation of 50001 – DONE – February 16

3. Where does all the Energy Go? – **TODAY** – February 23

4. Sorting out the Energy Data – **NEXT**

   a) March 2, 10:00 a.m. to 12:30 p.m.

5. Engaging Other Functions – March 9

6. Evaluating Performance – March 16

7. Ensuring Continual Performance – March 23

8. Wrap Up and Next Steps – March 30

Preparation for Session FOUR

- If desired, purchase the ISO 50001: 2018 standard
- Set up, use, and maintain your 50001 Ready account
- Prepare for Session FOUR:
  - Review tasks 10-13 in 50001 Ready
  - Download the playbooks for task 10-13, if desired
  - What are your site objectives and energy targets (Task 12).
  - What could you possibly use as your Energy Performance Indicators (EnPIs)? (Task 11)
  - What criteria do you use for prioritizing energy improvement opportunities? (Tasks 10 & 13)

Between Sessions

As a routine, use the 50001 Ready Navigator to assign tasks and update task completion status

Overview of 50001 Ready - Resources

- 50001 Ready Program
  - https://www.energy.gov/eere/amo/50001-ready-program
- 50001 Ready Navigator
  - https://navigator.lbl.gov/
- Energy Footprint Tool
  - https://www.energy.gov/eere/amo/downloads/energy-footprint-tool
- EnPI Lite Tool
  - https://enpilite.lbl.gov/
- 50001 Ready at Better Building
  - https://betterbuildingssolutioncenter.energy.gov/better-plants/software-tools

Polling Question

5) After listening to today's webinar session THREE, and now having covered tasks 1-9, how do you feel about 50001 Ready as a resource to help you with your energy management plans:

A. Still overwhelmed

B. Overwhelmed, but feeling some better

C. Cautiously optimistic

D. Encouraged

E. Ready to get Ready

F. I want my money back. Oh, wait. It was free!

G. Why oh why didn't I take the BLUE pill?

And now, our Kahoot Quiz Review Game

Question and Answer Time

Please Contact Us With Any Questions

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