Better Plants
U.S. DEPARTMENT OF ENERGY

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

ORNL 50001 Ready Training Webinar Series, Session 6
February 22, 2022
10:00 a.m. to 12:30 p.m.

U.S. DEPARTMENT OF ENERGY

Agenda – Session SIX

- Welcome, Safety, and Housekeeping
- Review Previous Sessions
- Today's Content: *Evaluating Performance*

  PERFORMANCE EVALUATION, Section 6:
  - Task 20 - Monitoring and Measuring of the EnMS
  - Task 21 - Monitoring and Measuring of Energy Performance Improvement
- Webinar Training Schedule & Preparations
- Kahoot Quiz Game
- Q&A

But first, a POLL!

Polling Question 1

Polling Question

1) Based on your organization's corporate goals, where does your company stand with regards to carbon footprint?
   A. We have specific carbon reduction goals in our energy policy and plans. This is very important to us.
   B. Our energy policy and energy saving projects are based on reducing our carbon footprint.
   C. We want to improve our carbon footprint, but this is not yet incorporated into our energy policy or plans
   D. We have not considered our carbon footprint
   E. We plan to produce all heat, hot water, steam, etc., by burning coal!

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!

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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

Our 50001 Ready Training Group

Better Plants U.S. DEPARTMENT OF ENERGY

DENSO

Leggett & Platt

DOW

synapse

MAPLE LEAF

TE connectivity

Lineage

COMAU

HNI

McWANE

OWENS CORNING

Steelcase

DAIMLER Daimler Trucks North America

TKE

MIAMI-DADE COUNTY Water and Sewer Department

OZINGA

TRAM GROUP TRAM TAC TRMI TRIN

BOEING

Avon Lake Regional Water

Didion

ADM

SAINT-GOBAIN

Graham Packaging

ESTĒE LAUDER

Celanese

NAVISTAR

Electrolux

plenco

IAC International Automotive Components

OXY

OAK RIDGE National Laboratory

COUNTY OF FAIRFAX 1742 VIRGINIA

BOARDMAN FOODS, INC. Boardman Oregon

CITY OF LOS ANGELES FOUNDED 1781

BRIDGESTONE Bridgestone Americas, Inc.

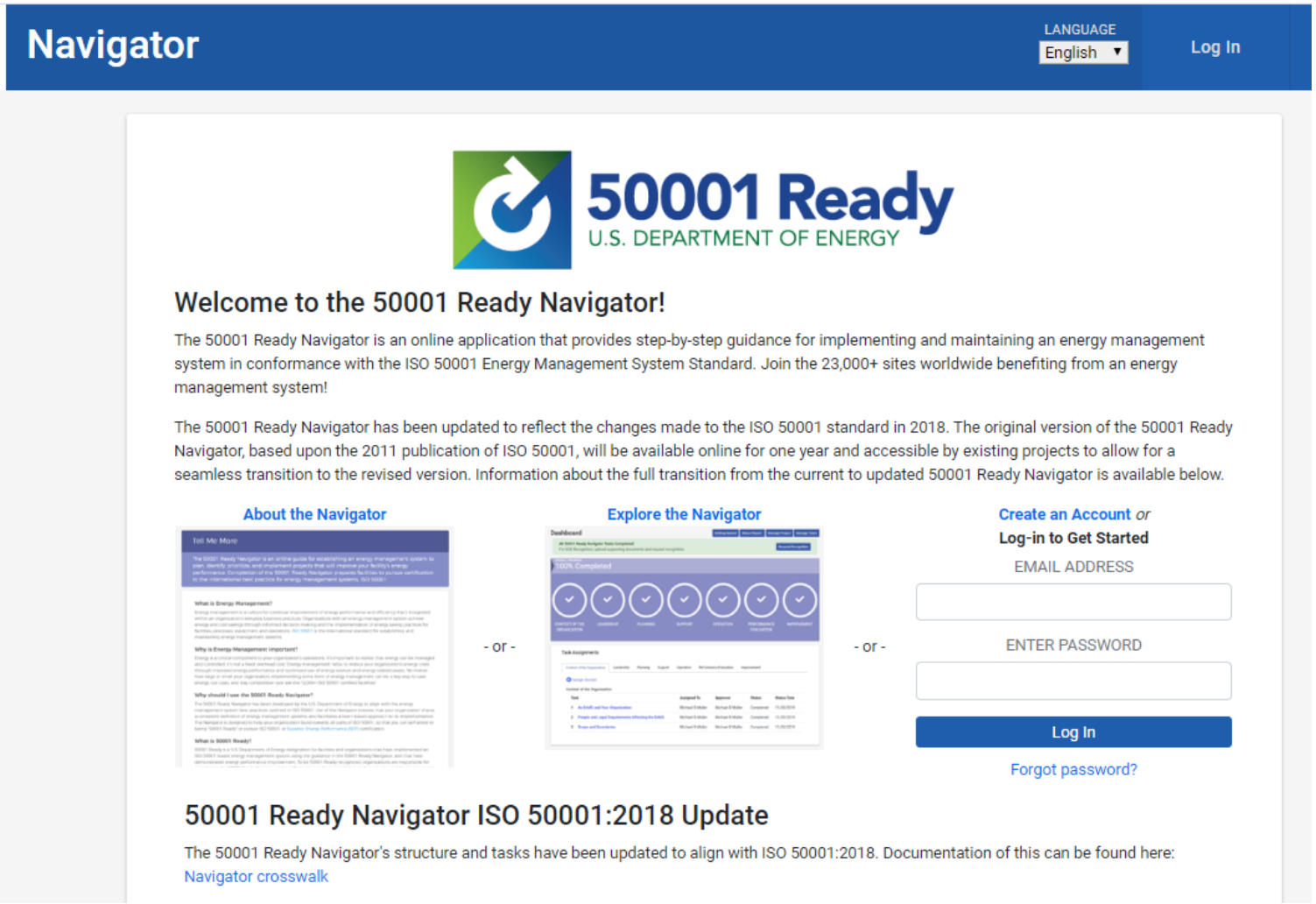
- REVIEW

Review of Previous Sessions

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
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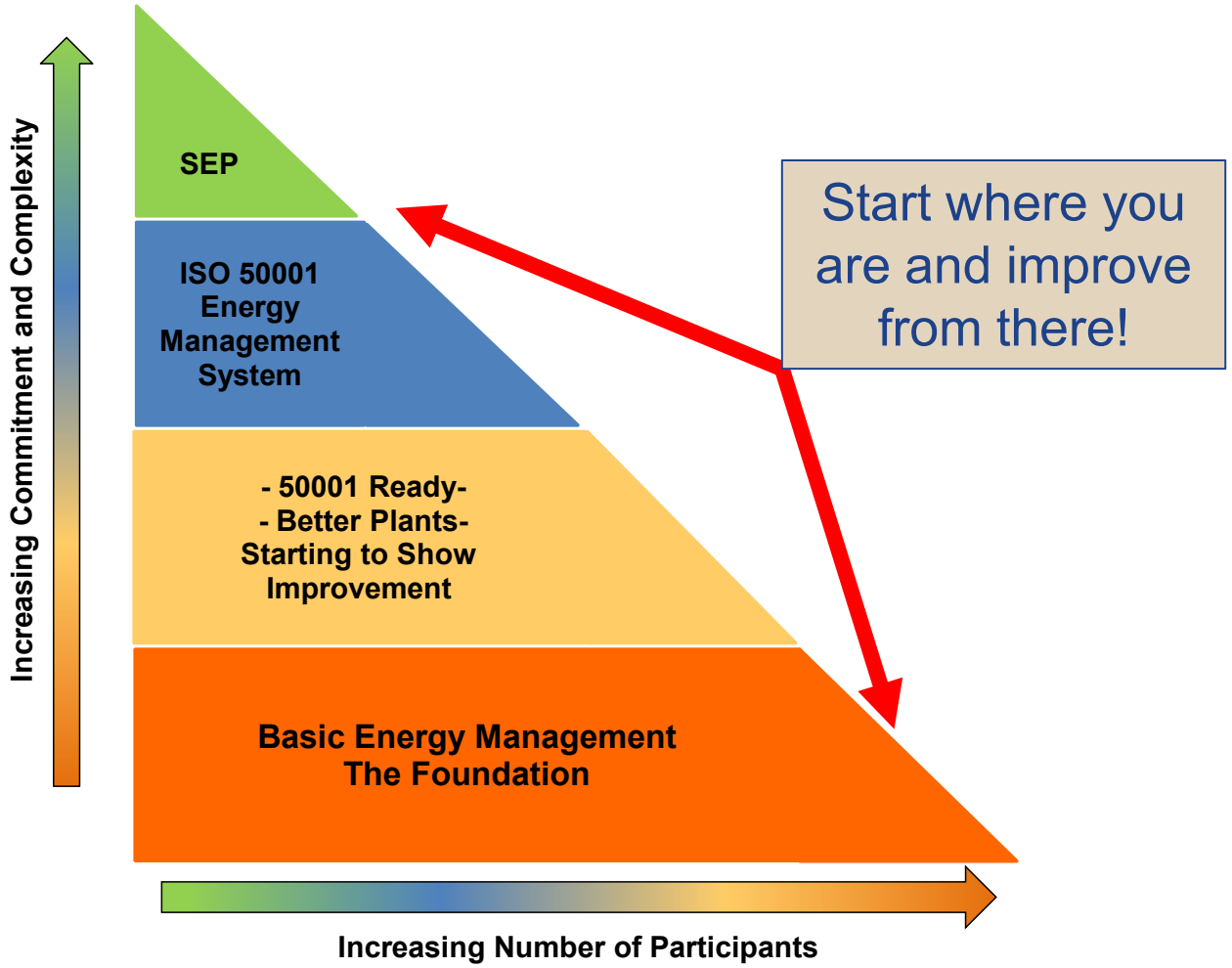
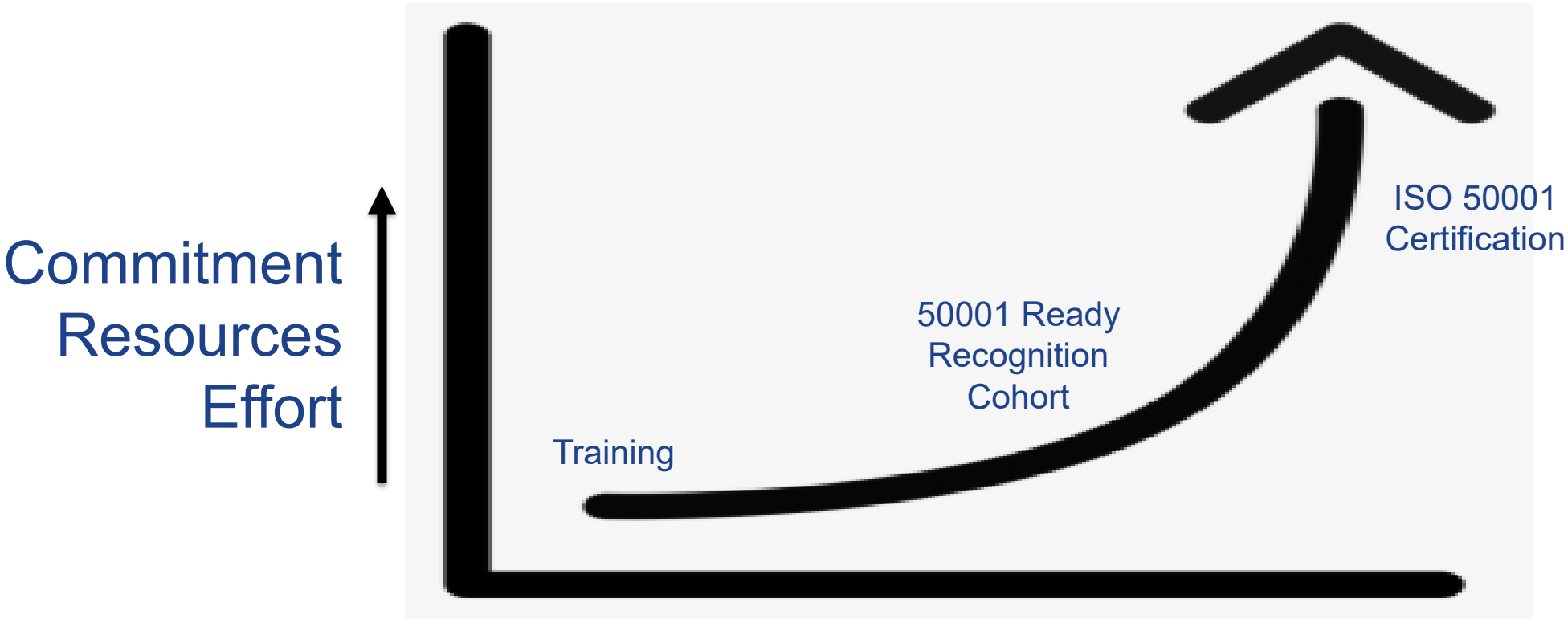
Why SEM? - The Continuum



Consider your Pathway for 50001 Energy Management

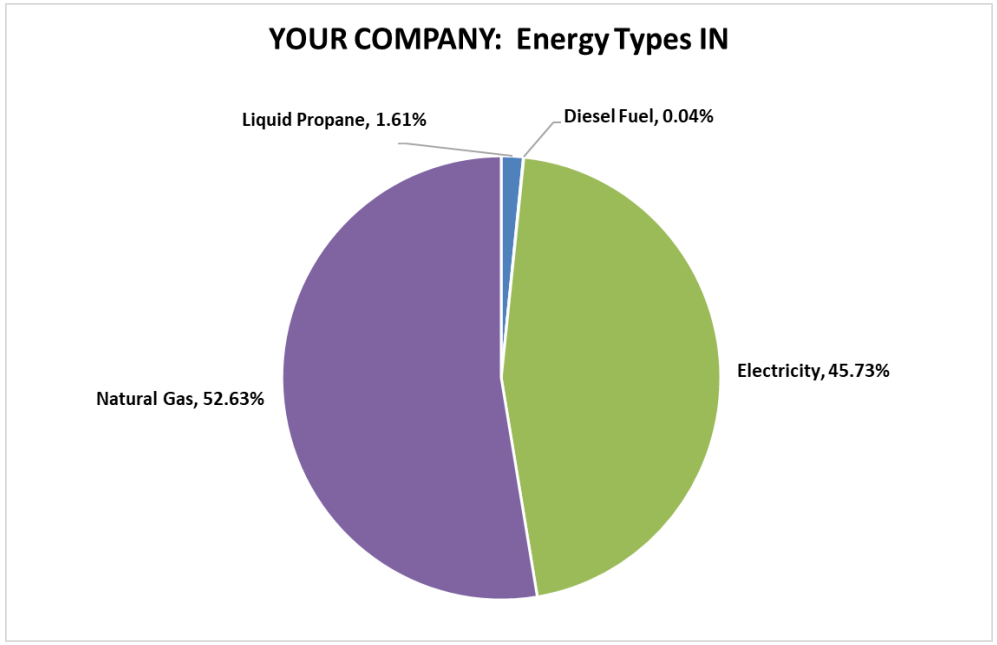


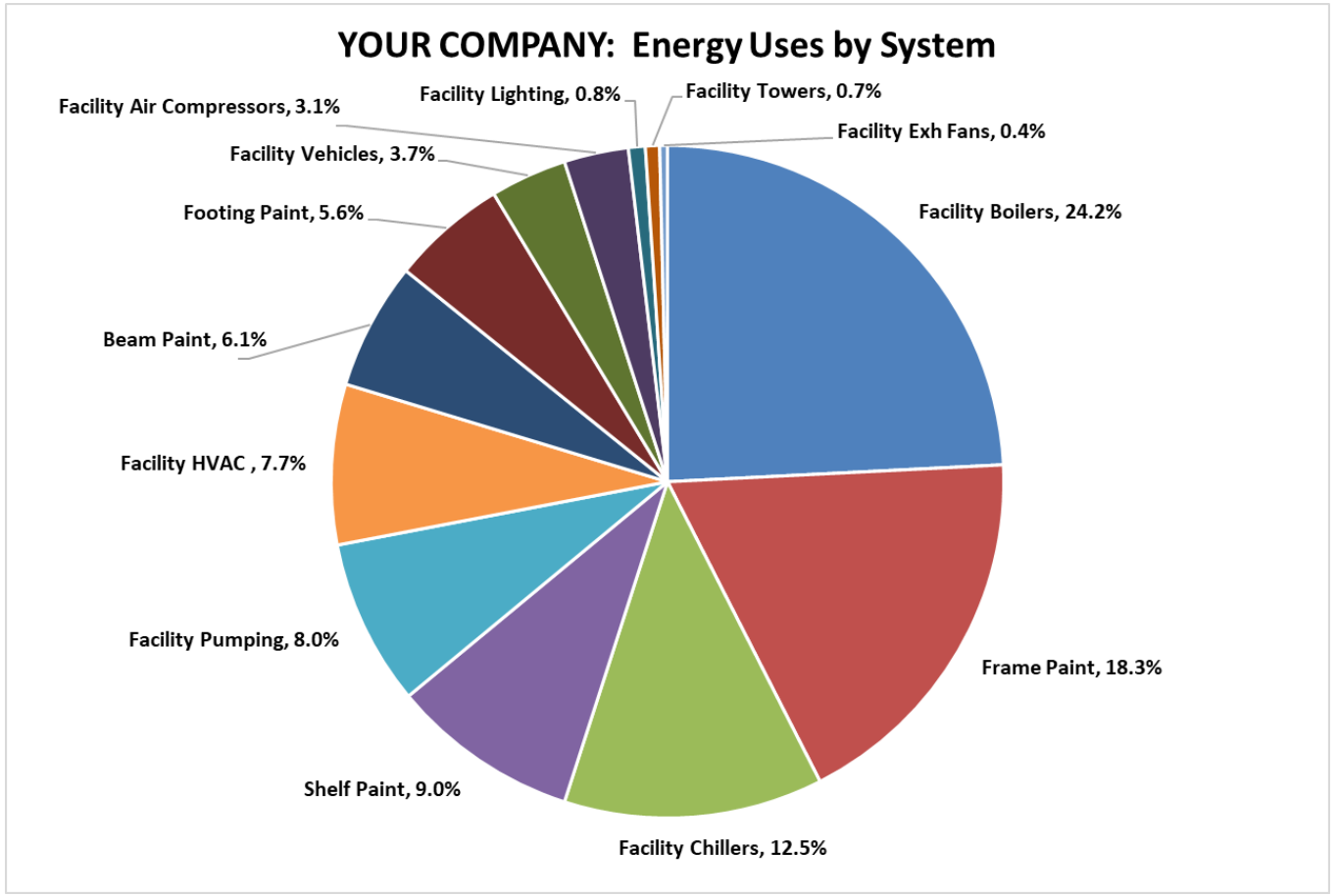
50001 Ready: Review Previous Tasks

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 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	14. Competence and Training 15. Awareness and Communication 16. Documenting the EnMS	17. Operational Controls 18. Energy Considerations in Design 19. Energy Considerations in Procurement	20. Monitoring and Measurement of the EnMS 21. Monitoring and Measurement of Energy Performance Improvement 22. Internal Audit 23. Management Review	24. Corrective Action 25. Continual Improvement

Planning Section (Tasks 8-13) – Two Key Pies

Understanding your energy performance

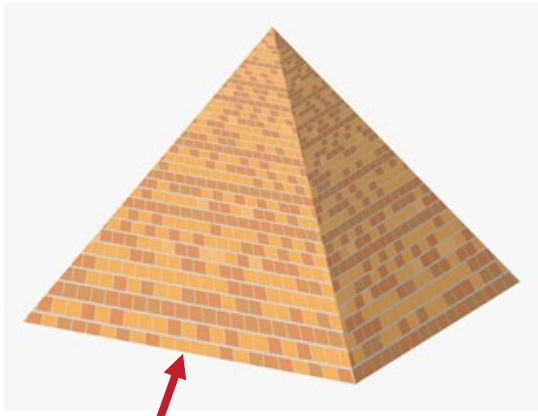




What energy comes into my site?
Where does all this energy go? [SEUs]
What are my EnPIs and EnBs?
What are my objectives, energy targets & action plans?

Tasks 1-19: The Big Picture

- Building the energy success pyramid starts with a wide base of small actions that build to the completion of energy policy



The broad base

Policy

Objectives

Energy Targets

Action Plans

Operational Controls

- Today's Content

Tasks 20 - 21

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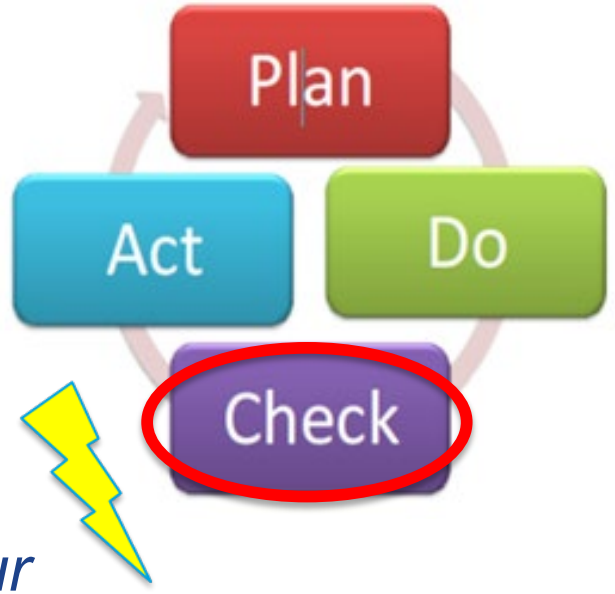
50001 Ready Navigator: Today's Tasks

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 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	14. Competence and Training 15. Awareness and Communication 16. Documenting the EnMS	17. Operational Controls 18. Energy Considerations in Design 19. Energy Considerations in Procurement	20. Monitoring and Measurement of the EnMS 21. Monitoring and Measurement of Energy Performance Improvement 22. Internal Audit 23. Management Review	24. Corrective Action 25. Continual Improvement

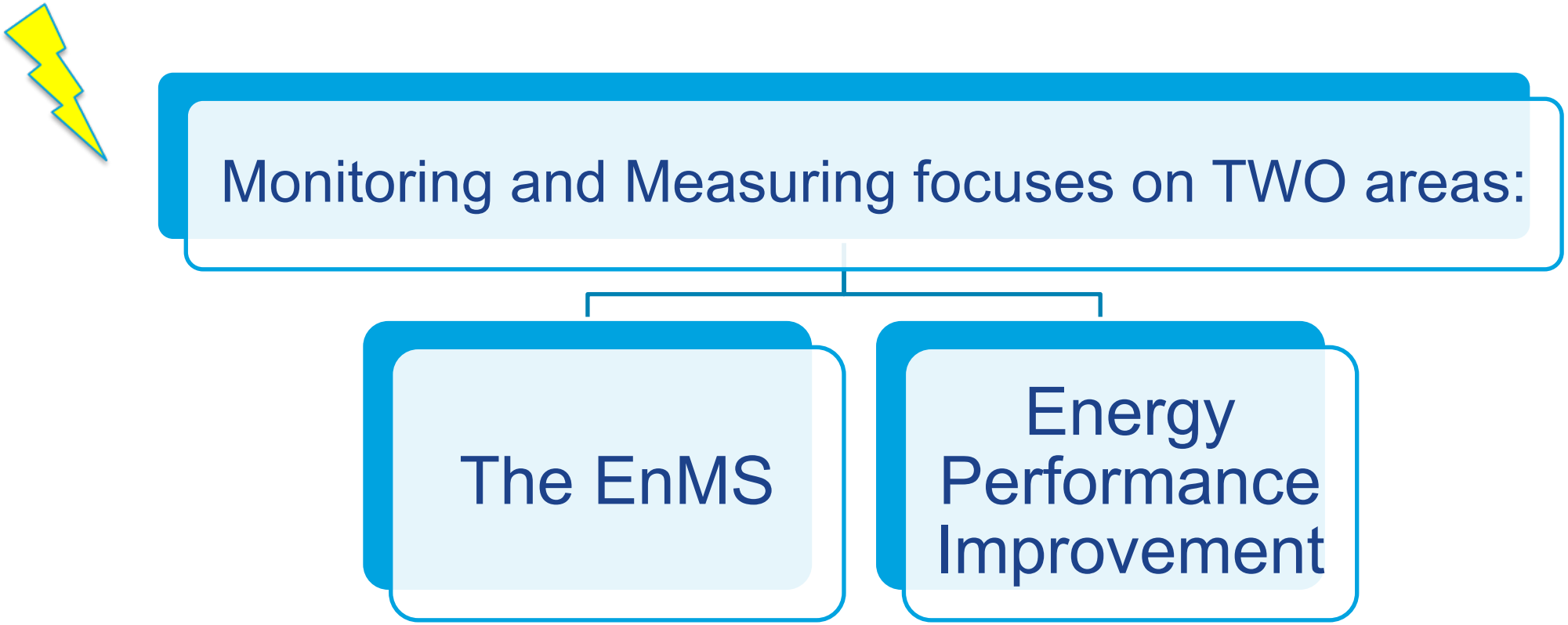
Performance Evaluation (4 tasks)

CHECK on how you are doing for **both** your EnMS and your energy performance improvement



Are you effectively monitoring and measuring your EnMS and your energy performance improvement?
How are your tracking systems working?
Are internal audits and management reviews all set up? [Session 7]

Performance Evaluation: The Big Picture



Task 20: Monitoring and Measurement of the EnMS

Task 20: We monitor trends in energy management system (EnMS) performance and evaluate the effectiveness of the EnMS in achieving intended outcomes and planned results.

The methods used, the frequency of the monitoring, and when the results are analyzed and evaluated are defined.

Task 20: Key Terms

Monitoring: Passive, periodic, or intermittent

- ❑ Monthly utility bills
- ❑ Compliance
- ❑ Weather data
- ❑ Natural gas commodity pricing

Measurement: Active, point reading, recorded

- ❑ Stack analyzer readings
- ❑ Chilled water supply temperature
- ❑ Boiler pressure
- ❑ Electric sub-meter on a chiller plant

Analysis: Make use of the data

Task 20: Key Actions

What data and information is needed?

- ❑ To establish trends
- ❑ To evaluate the results of the EnMS
- ❑ To evaluate the effectiveness of the EnMS
- ❑ To determine if your EnMS is meeting your goals

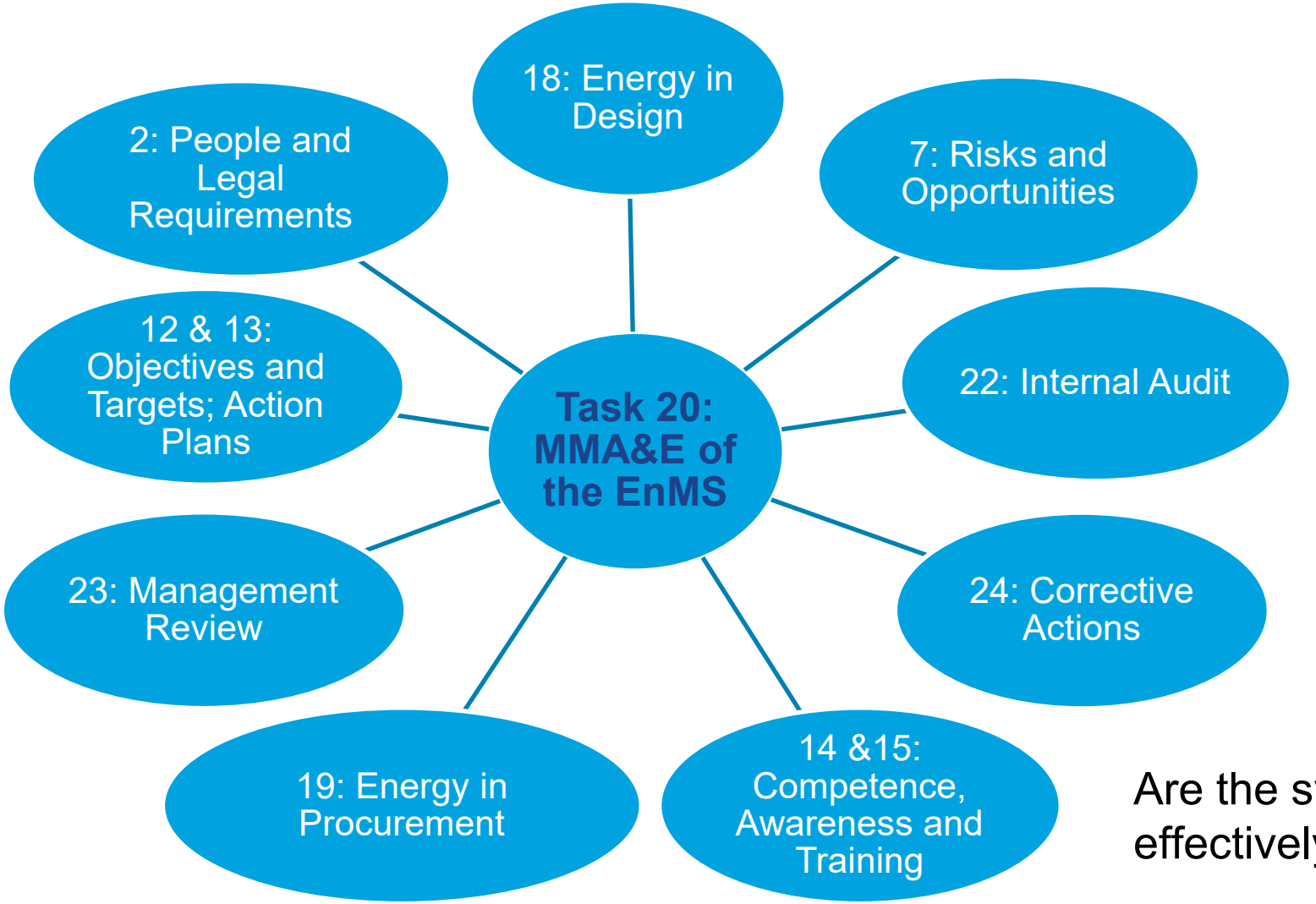
How will you do this?

- ❑ Methods, systems, measuring equipment
- ❑ Spreadsheets, programs, analytics
- ❑ How do you ensure valid results

When will you do this?

- ❑ Collect info daily, weekly, monthly, annually, other
- ❑ How often is info analyzed and evaluated

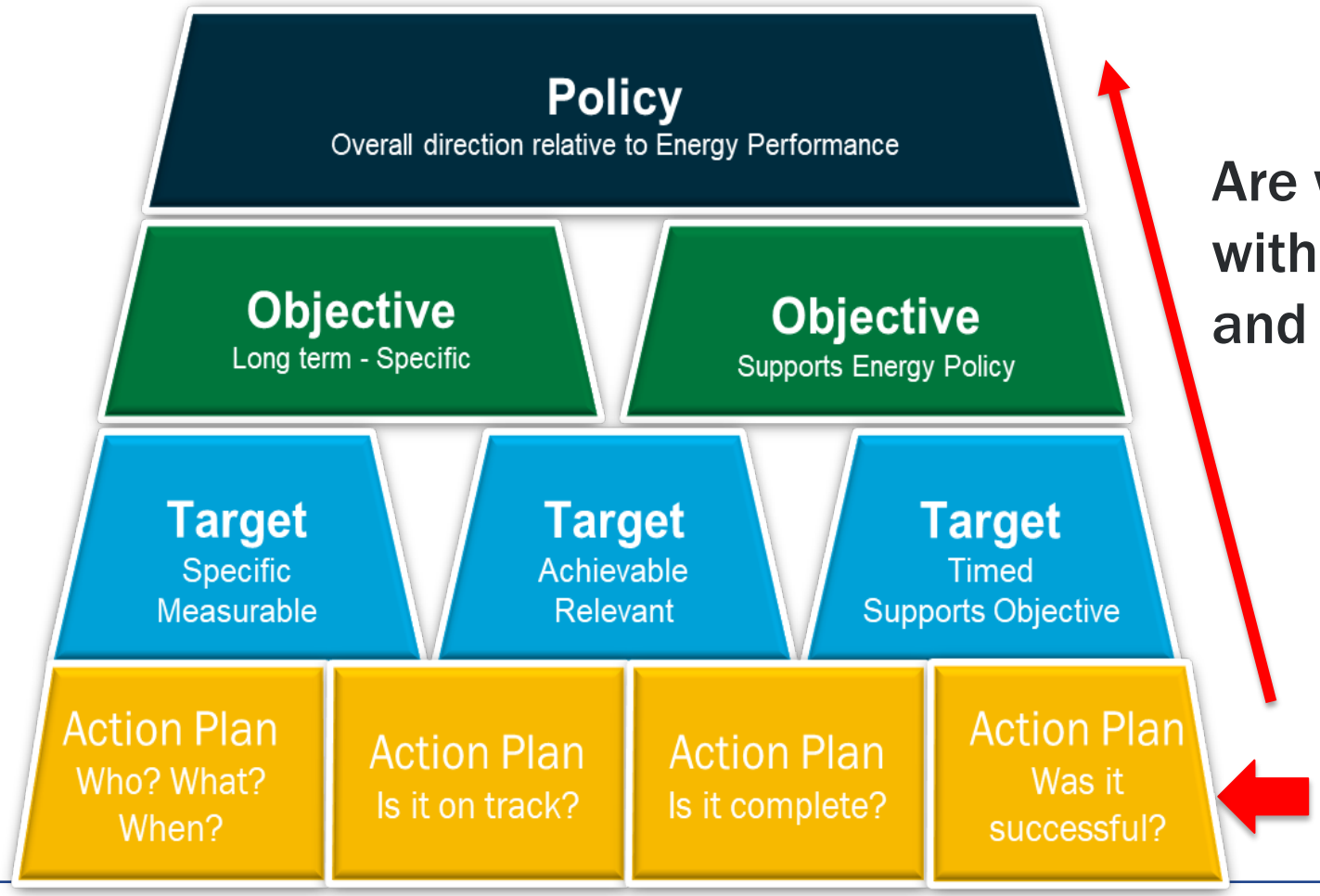
Task 20: Connecting the Dots Between Tasks



Are the systems in place working effectively to support our goals?

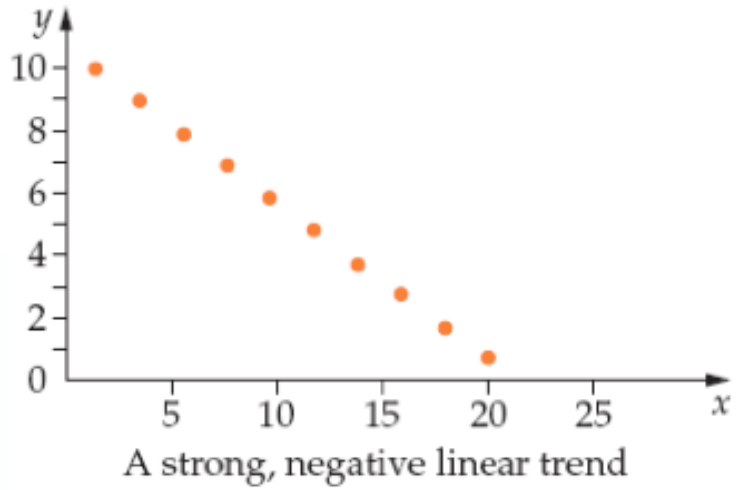
Task 20: Base Measurement on Goals

How do we keep tabs on our smallest scale goals?

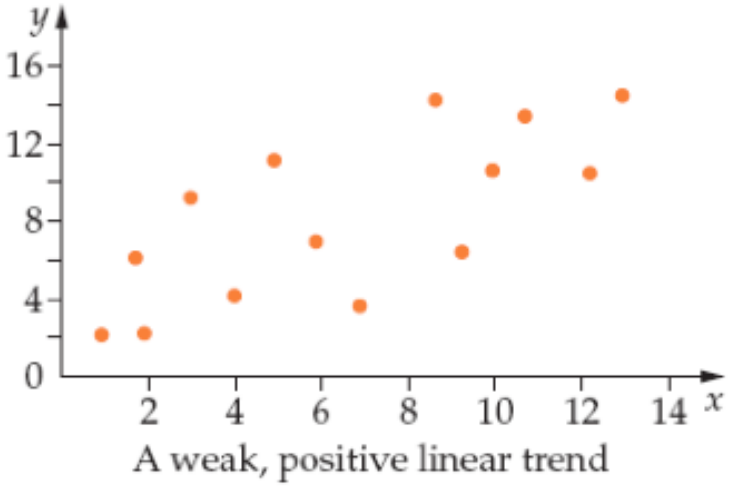


Are we on track with our goals and timelines?

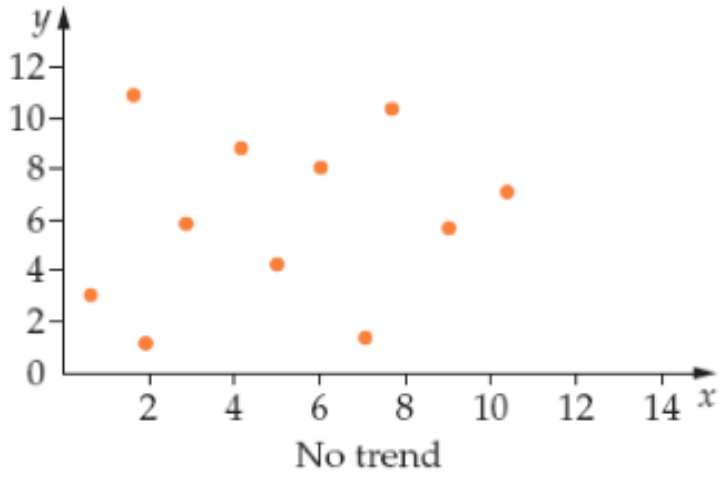
Task 20: Track Measurements to Monitor Trends



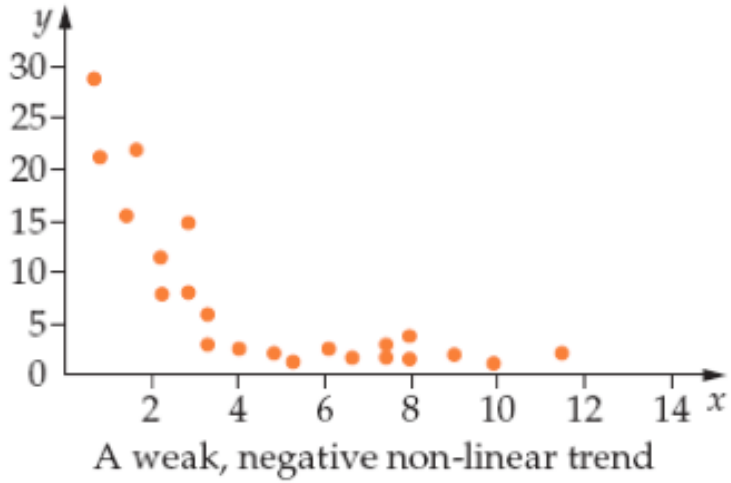
A strong, negative linear trend



A weak, positive linear trend



No trend



A weak, negative non-linear trend

Plotting and trending systematic results is a GREAT method for evaluating the operations of your EnMS.

Polling Question 2

Polling Question

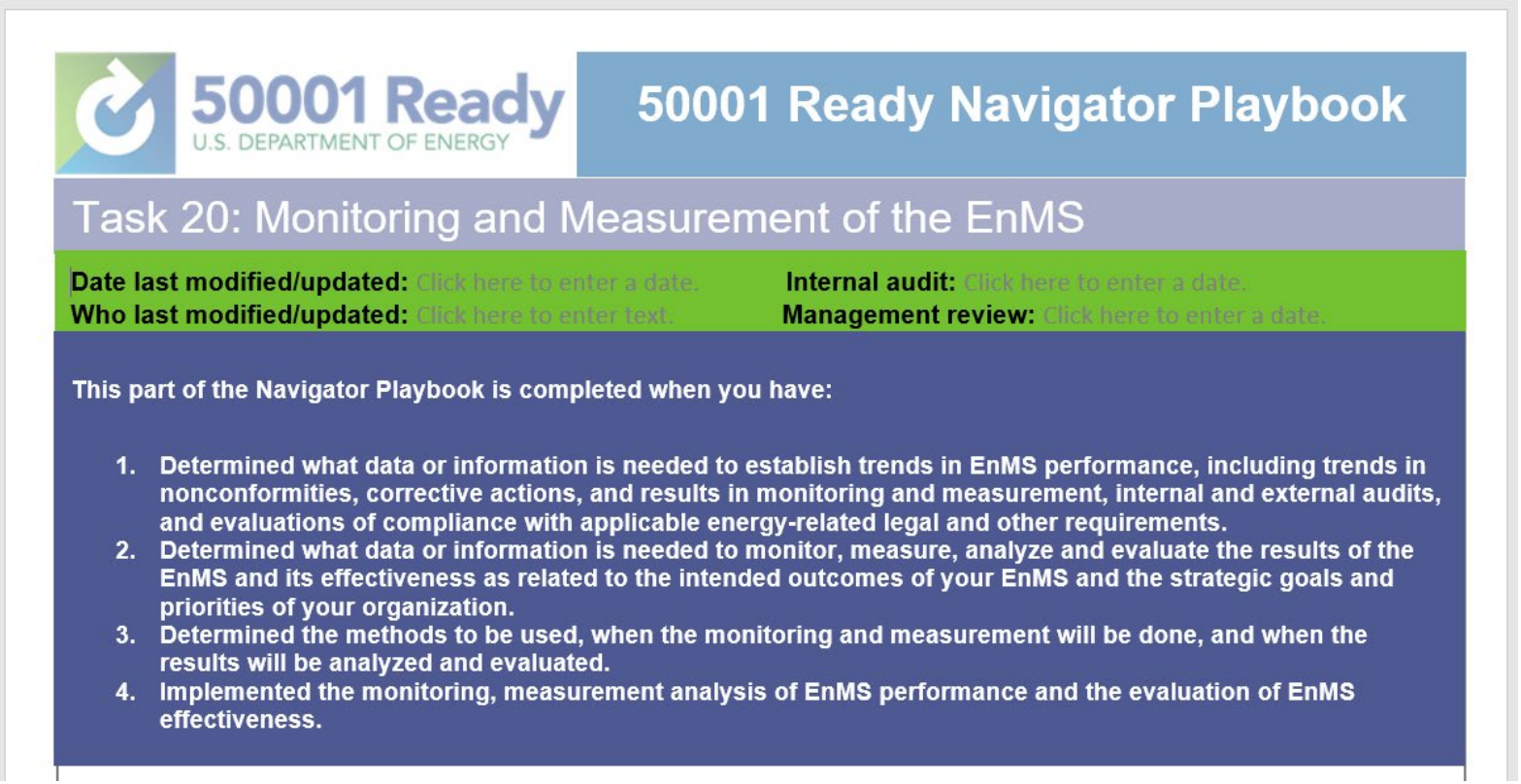
2) Based on your current monitoring and measuring, do you make use of graphing and trending?

A. We understand and make excellent use of graphing and trending to evaluate system performance
B. We understand the value and make some use of graphing and trending
C. We have some understanding of graphing and trending and would like to use this more
D. We are not sure how to make the best use of trending and graphing
E. “If it's somethin' weird, and it don't look good. Who ya gonna call?!”

Task 20: Playbook

Activity

- Look at Task 20 in 50001 Ready
- Look at the Task 20 Playbook



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50001 Ready Navigator Playbook

Task 20: Monitoring and Measurement of the EnMS

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

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

1. **Determined what data or information is needed to establish trends in EnMS performance, including trends in nonconformities, corrective actions, and results in monitoring and measurement, internal and external audits, and evaluations of compliance with applicable energy-related legal and other requirements.**
2. **Determined what data or information is needed to monitor, measure, analyze and evaluate the results of the EnMS and its effectiveness as related to the intended outcomes of your EnMS and the strategic goals and priorities of your organization.**
3. **Determined the methods to be used, when the monitoring and measurement will be done, and when the results will be analyzed and evaluated.**
4. **Implemented the monitoring, measurement analysis of EnMS performance and the evaluation of EnMS effectiveness.**

Task 21: Monitoring & Measuring of Energy Performance Improvement

Task 21: We monitor and measure the key characteristics (i.e. EnPIs) of processes that affect our energy performance.

We define:

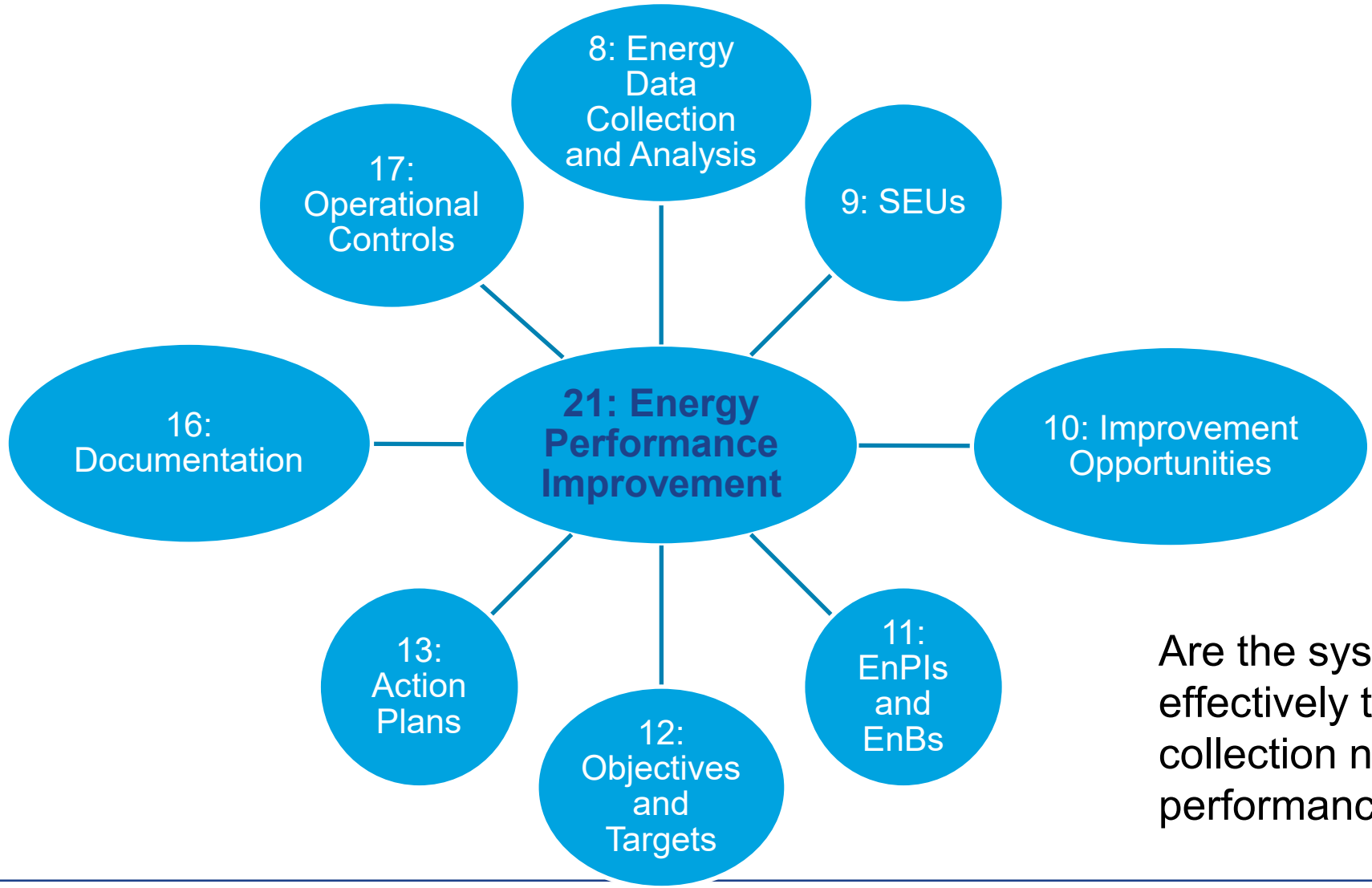
- the methods used
- the frequency of the monitoring and measurement, and
- when the results are analyzed and evaluated.

We evaluate our energy performance improvement and investigate and respond to significant deviations in energy performance.

Task 21: Questions to Ask

- What do you need to monitor and measure for determining energy performance? Use input from:
  - The energy review
  - Energy data collection plans
  - The operations of Significant Energy Users (SEUs)
  - Selected EnPIs and EnBs
  - Actual versus expected energy consumption
- When will monitoring and measuring be performed?
- How do you evaluate energy performance?
- What methods will you use to determine energy performance improvement (i.e. EnPIs compared to EnBs)?
- Have you defined criteria for significant deviations in energy performance?

Task 21: Connecting the Dots Between Tasks

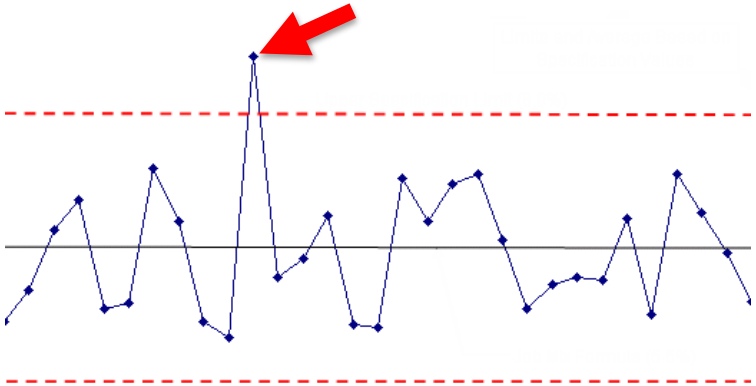


Are the systems in place working effectively to support the data collection needed to measure energy performance improvement?

Task 21: Key Term

- Significant deviation:
  - "The organization shall investigate and respond to *significant deviations* in energy performance." (ISO 50001: 2018, 9.1.1)
  - When to respond and how to respond will be determined and appropriate personnel will be trained
  - Maintain records of the results of the responses and investigations into significant deviations

Your energy team defines what amount of deviation becomes significant



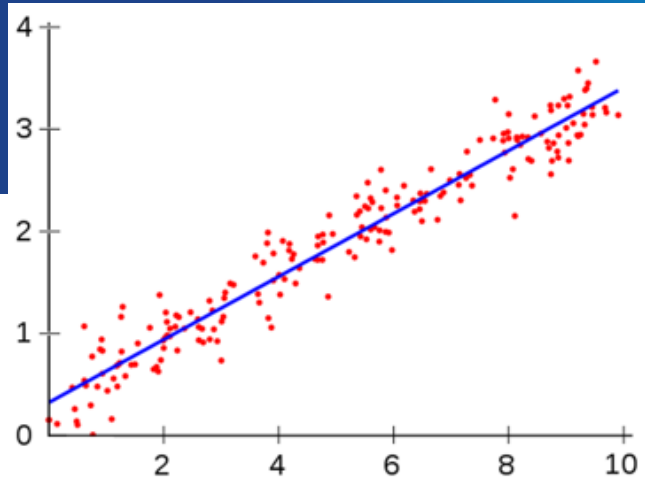
Task 21: Investigating Deviations

Assess and document:

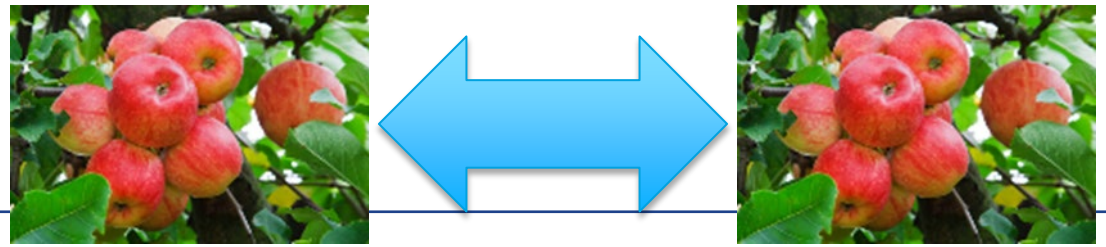
- What happened?
- Why?

How do we prevent this from happening again in the future?

Task 21: 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



Polling Question 3

Polling Question

3) Based on your current monitoring and measuring, do you track and use relevant variables to normalize your energy data?

A. We understand and make excellent use of relevant variables to evaluate our energy performance improvement
B. We understand the value and make some use of relevant variables
C. We have some understanding of relevant variables and would like to make more use of these
D. We are not sure how to make the best use of relevant variables
E. We do not think that we have any relevant variables
F. “Variable, this is Knife, over. Variable, this is Knife, over! Variable I am not receiving!”

Task 21: Energy Metrics – Complexity Levels

Simple

- month v. month last year
- actual v. budget
- annualized trend

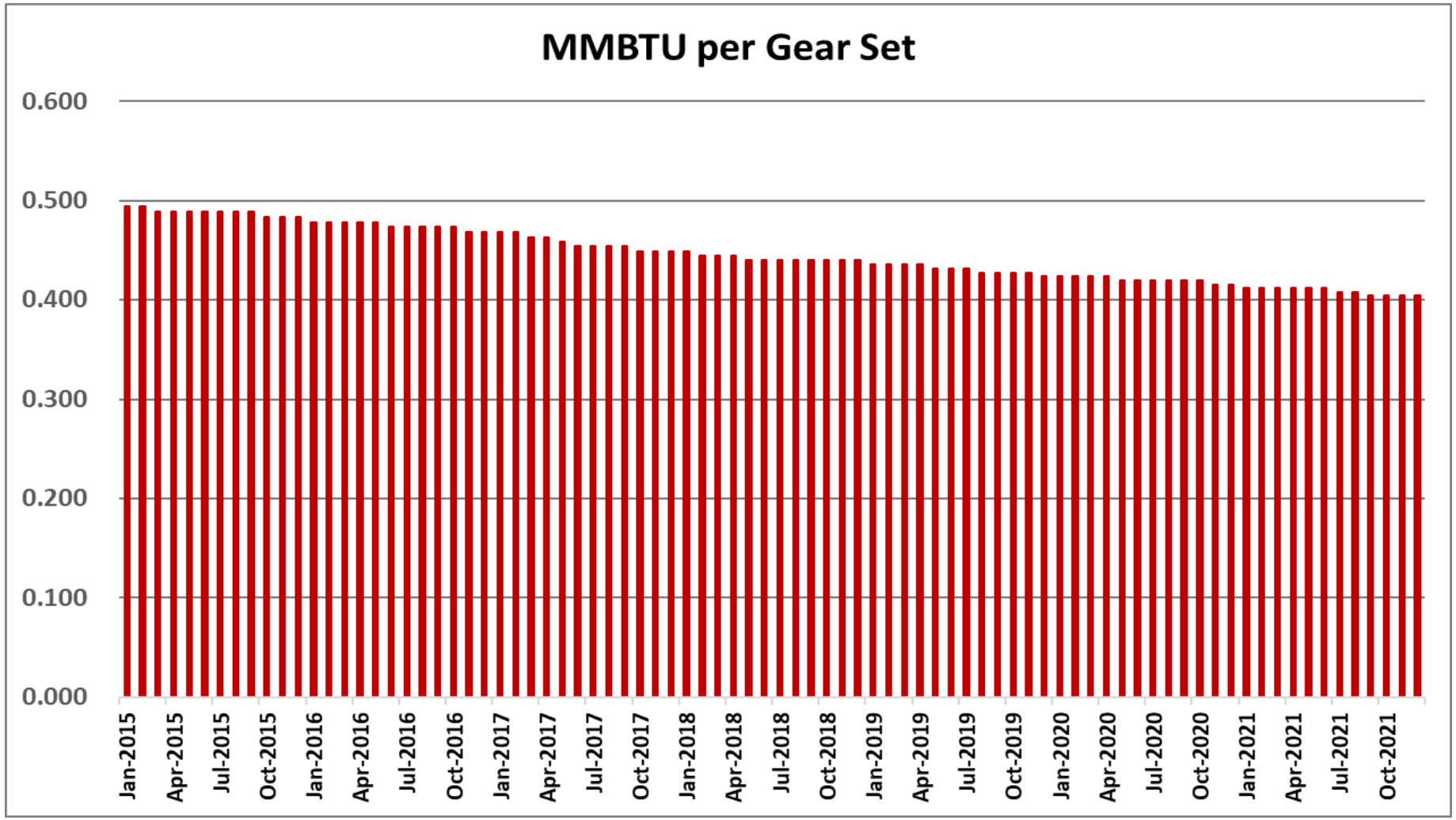
Complex

- use per unit output
- cooling energy per degree day
- Specific Energy Consumption (SEC)

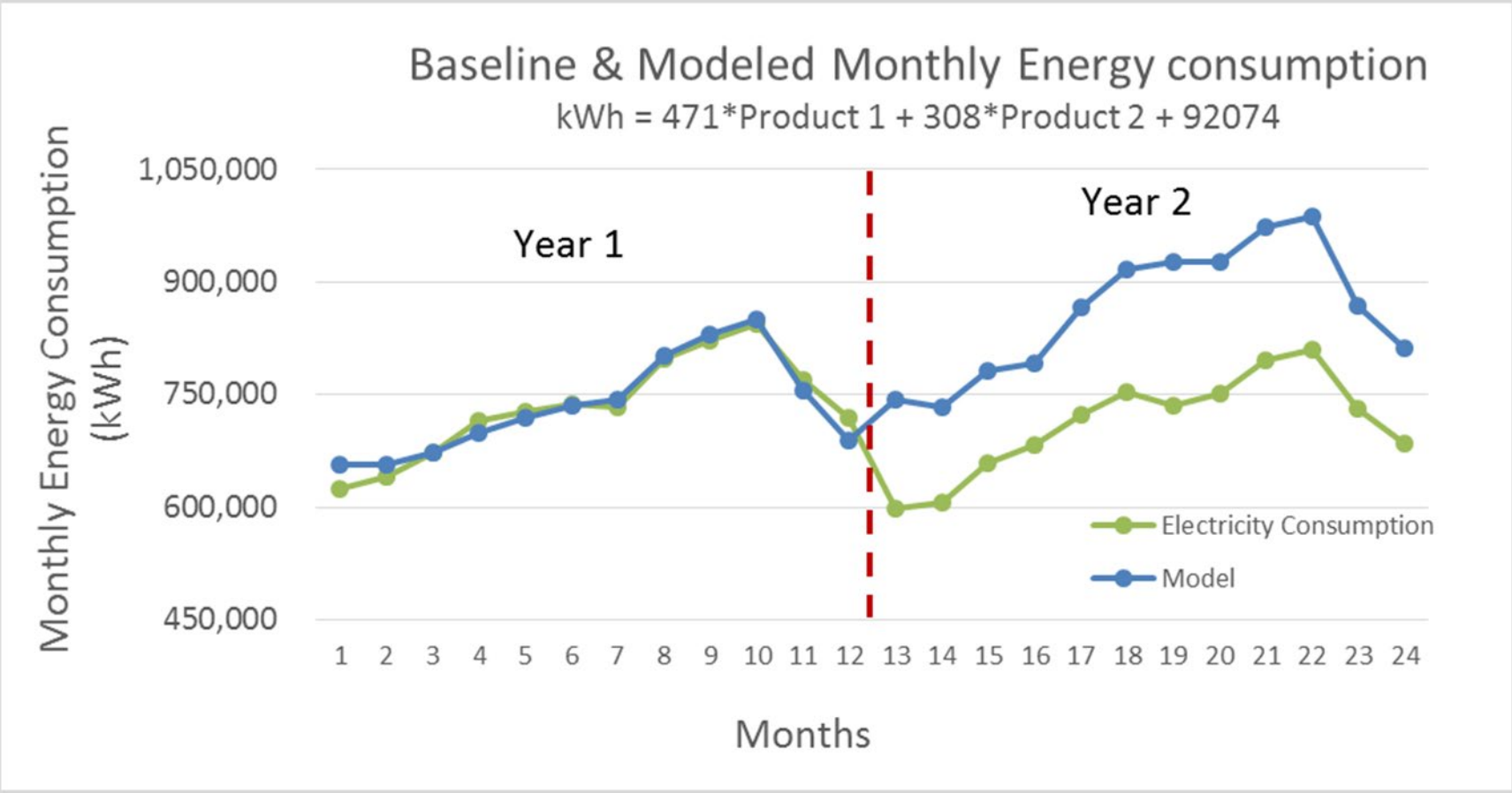
Normalized Statistical Model

- Multivariable linear regression

Task 21: Energy Intensity Metric - Ratio



Task 21: Linear Regression Model



Task 21: Playbook

Activity

- Look at Task 21 in 50001 Ready
- Look at the Task 21 Playbook

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50001 Ready Navigator Playbook

Task 21: Monitoring and Measurement of Energy Performance Improvement

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. **Determined what needs to be monitored and measured for energy performance, including the key characteristics of operations affecting energy performance. Use the data and information you generated in the energy review, energy data collection plan, analysis of SEUs, your energy performance indicators (EnPIs) and energy baselines (EnBs).**
2. **For each datum/metric, defined the method used for monitoring, measuring, analysis and evaluation. Defined how often and when the results are to be analyzed and evaluated.**
3. **Implemented all needed monitoring, measurement and analysis if not already in place from prior Navigator tasks.**
4. **Evaluated your organization's energy performance by comparing EnPI values to the corresponding EnB.**
5. **For each performance metric in the energy measurement plan, defined the criteria or parameters for a significant deviation in energy performance.**
6. **Established a process for investigating and responding to such deviations and for retaining records of the results.**
7. **Trained the appropriate personnel on how to identify and respond to significant deviations in energy performance.**
8. **Recorded results from monitoring and measurement.**

Polling Question 4

Polling Question

4) Thinking about Tasks 20-21:

Task 20: Monitoring and Measuring of the EnMS

Task 21 - Monitoring and Measuring of Energy Performance Improvement

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

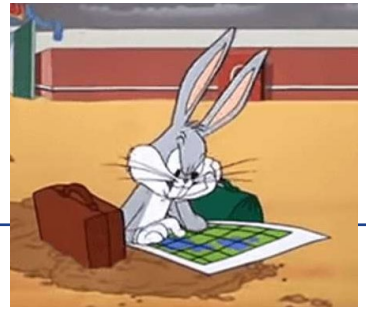
A. We essentially already have all of this in place. Just a little tweaking is needed.

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 knew I should've taken that left turn at Albuquerque!”



- Review and Wrap Up

Webinar Training Schedule & Preparations
Kahoot Quiz Game
Q&A

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50001 Ready Navigator Tasks: Webinar #6, and then #7

Context of the Organization	Leadership	Planning	Support	Operation	Performance Evaluation	Improvement
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Performance Evaluation (4 tasks)

CHECK on how you are doing for **both** your EnMS and your energy performance improvement

Are you effectively monitoring and measuring your EnMS and your energy performance improvement?
How are your tracking systems working?
Are internal audits and management reviews all set up? [Session 7]

Continual Improvement (2 tasks)

When we check, if things are not okay, then we **ACT** to fix them, and we do this in an ongoing method

Do you have a strong corrective action program to fix and follow up on nonconformities to your EnMS?
Do you continually improve both your EnMS and your energy performance? *[Session 7]*

Training Schedule: By Session

1. An Overview – DONE, January 18
2. Laying the Foundation of 50001 – DONE, January 25
3. Where does all the Energy Go? – DONE - February 1
4. Sorting out the Energy Data – DONE - February 8
5. Engaging Other Functions – DONE - February 15
6. Evaluating Performance – TODAY - February 22
7. Ensuring Continual Performance – NEXT - March 1
8. Wrap Up and Next Steps – March 8

Preparation for Session SEVEN

- If desired, purchase the ISO 50001: 2018 standard
- Set up, use, and maintain your 50001 Ready account
- Prepare for Session SEVEN:
  - Review the “Getting it Done” tab for tasks 22 & 25 in 50001 Ready
  - Have you selected internal auditors and set up an internal audit plan (22)?
  - Are audit findings recorded and corrected (22)?
  - Does top management review the EnMS periodically and provide input and guidance (23)?
  - Do you maintain records on any nonconformities, actions taken, and the effectiveness of corrective action (24)?

Between each session we will send out a quick homework survey. Please complete and return these.

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

Polling Question

5) Thinking about the resources on the previous slide, how many of these five have you looked at and/or used?

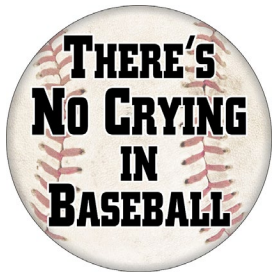
A. All five
B. Four
C. Three
D. Two
E. One
F. My links go to a dead-end screen, my internet crashed, and I lost my mouse, but the soft service ice cream machine is still working!

RESOURCES:
1) 50001 Ready Program
2) 50001 Ready Navigator
3) Energy Footprint Tool
4) EnPI Lite Tool
5) 50001 Ready at Better Building

Polling Question 6

Polling Question

6) After listening to today's webinar session SIX, and now having covered tasks 1-21, 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 much better
   C. Optimistic
   D. Very encouraged
   E. Ready to get Ready
   F. "There's no crying in baseball!" (or energy management!)



And now, our Kahoot Quiz Review Game

Question and Answer Time

Please Contact Us With Any Questions

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