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

**ORNL 50001 Ready Training
Webinar Series, Session 4
March 2, 2021
10:00 a.m. to 12:30 p.m.**

Agenda – Session FOUR

- Welcome, Safety, and Housekeeping

- Review Previous Sessions

- Today's Content – ***Sorting Out all the Energy Data***
  - Section 3: Planning
    - Task 10: Improvement Opportunities
    - Task 11: Energy Performance Indicators (EnPIs) and Baselines (EnBs)
    - Task 12: Objectives and Targets
    - Task 13: Action Plans for Continual Improvement

- Webinar Training Schedule & Preparations

- Kahoot Quiz Game

- Q&A

But first, a POLL!

Polling Question 1

1) Reflect on your current role within your organization. On average, about what percentage of your time is used working on things related to energy management?

A. 100%, it is my full-time job

B. 75 to 99%

C. 50 to 74%

D. 25 to 49%

E. Less than 25%

F. I cannot remember where I left my energy hat!

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 <u>MUTE</u> 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

- Review Homework from Session THREE
- Quick List of Acronyms
- The 50001 Ready navigator
- Session 2 & 3 Review: Tasks 1 - 9
    - Laying the Foundation
    - Where Does all my Energy Go?

Quick List of Acronyms

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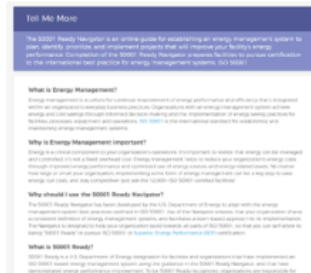- PDCA = Plan, Do, Check, Act

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

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- Today's Content

Tasks 10 - 13

50001 Ready Navigator: Today's Tasks

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24. Corrective Action
25. Continual Improvement

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%
- Frame Paint, 18.3%
- Shelf Paint, 9.0%
- Facility Chillers, 12.5%

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?

Task 10: Improvement Opportunities

Task 10: We identify and prioritize energy performance improvement opportunities and have processes in place to update them.
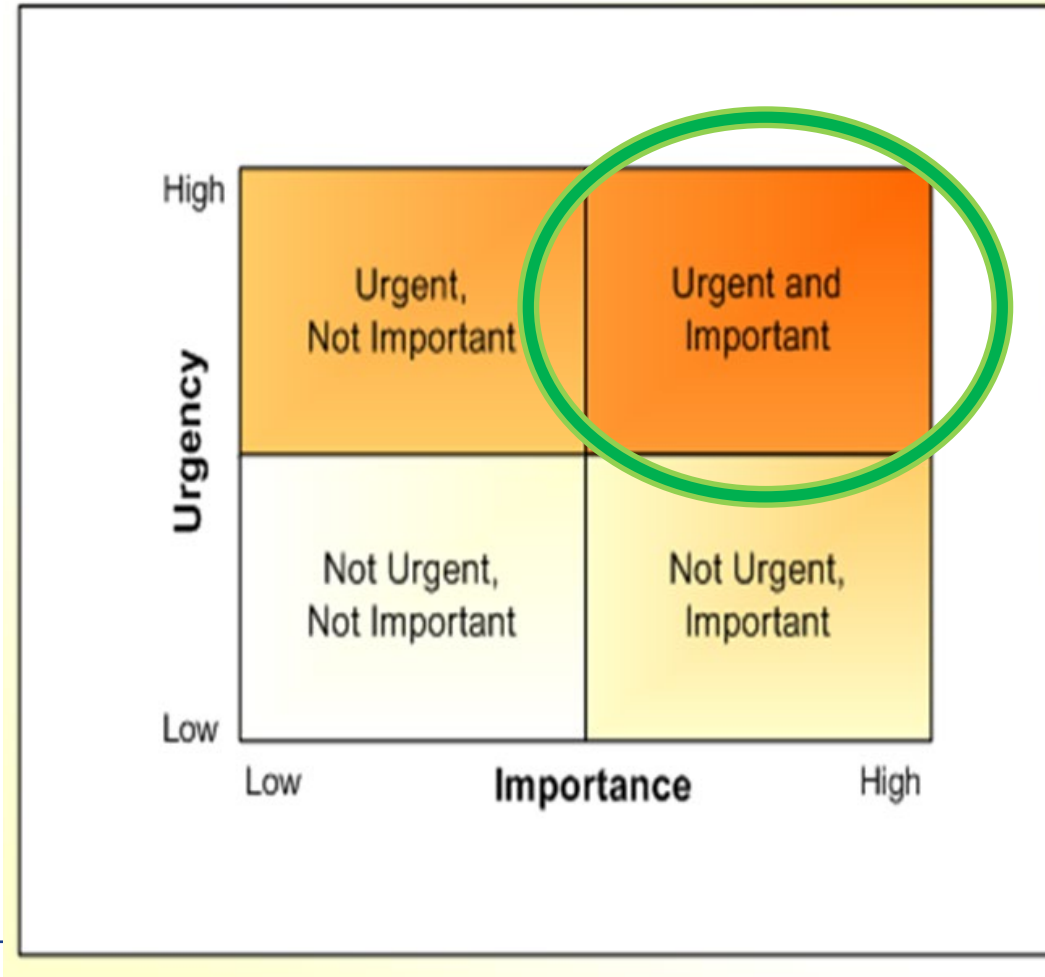
Task 10: Searching for Ideas

Cast a wide net

Search throughout the systems that support the SEUs

Search for low hanging fruit

Involve operations and maintenance personnel

Document list

Keep a comprehensive "rolling roster" of opportunities

Hold frequent brainstorming sessions

Prioritize

Develop criteria and assign these a weight to use in ranking ideas

Use input from top management and interested parties
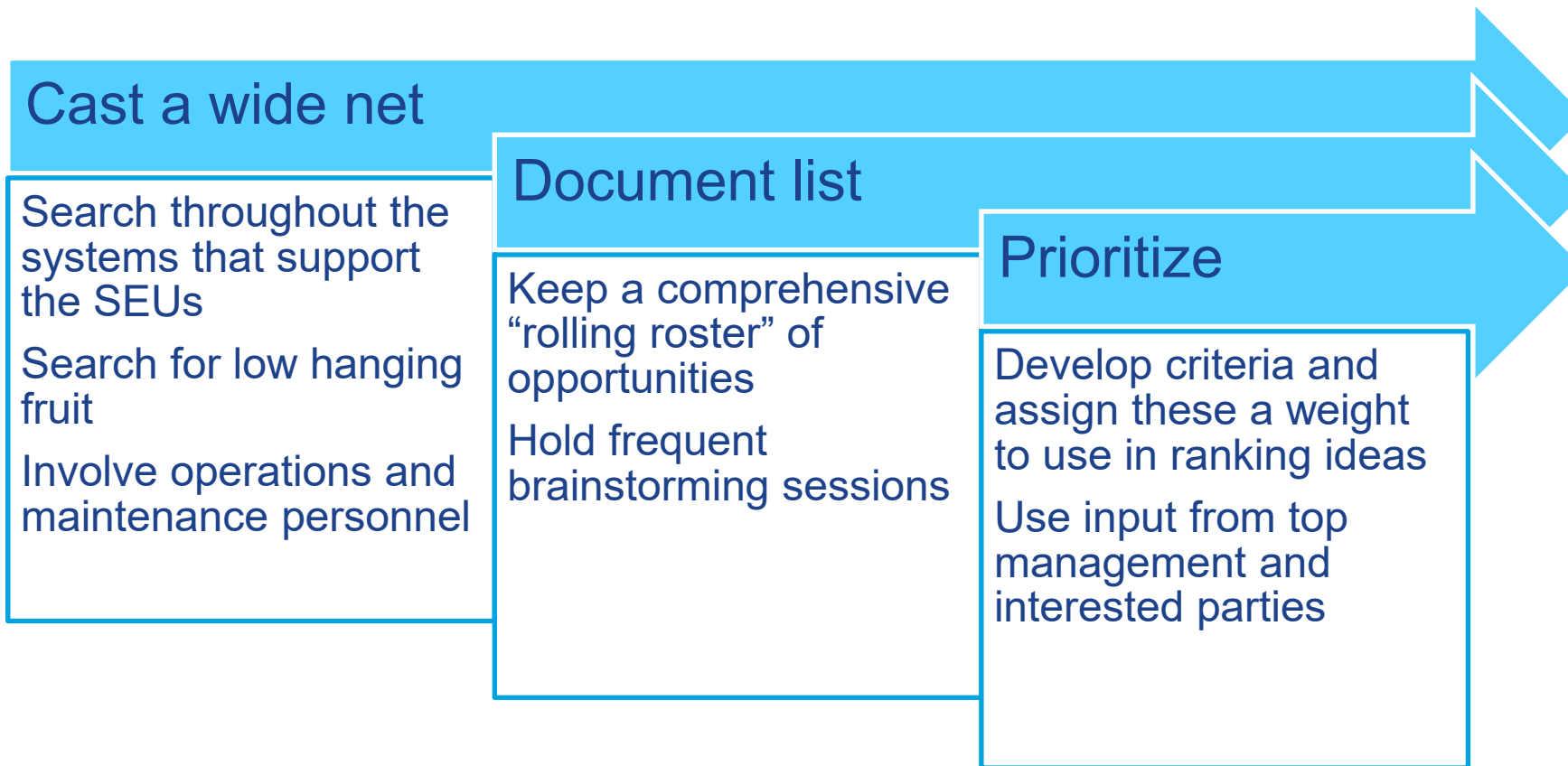
One way to help sort out energy projects.

Task 10: Example of Scoring Criteria

Opportunity Description	Opportunity Rating				
	Criteria #1 Anticipated annual energy savings	**Criteria #2** Expected time required for implementation	**Criteria #3** Simple Payback	**Criteria #4** Environmental, Health, or Safety Impact	**Total Rating**
Inspect and upgrade insulation on all steam piping	2	3	4	4	96
Install VFDs on chilled water pumps for chillers #1 - #3	3	4	3	2	72
Replace All T-12, T-8 & T-5 fluorescent lighting with LED lighting	2	2	2	3	24

Task 10: Example of Ranking Criteria

1. Over 5 years
2. 19 months-5 years
3. 7-18 months
4. 0-6 months

1. Over $100,000
2. $50-100,000
3. $20-$50,000
4. $10-$20,000
5. Under $10,000

Payback Period

Capital Cost

EH&S Impact

Completion Time

1. None
2. Some
3. Lots
4. Home Run

1. Over 3 years
2. 2-3 years
3. 1-2 years
4. Under 1 year
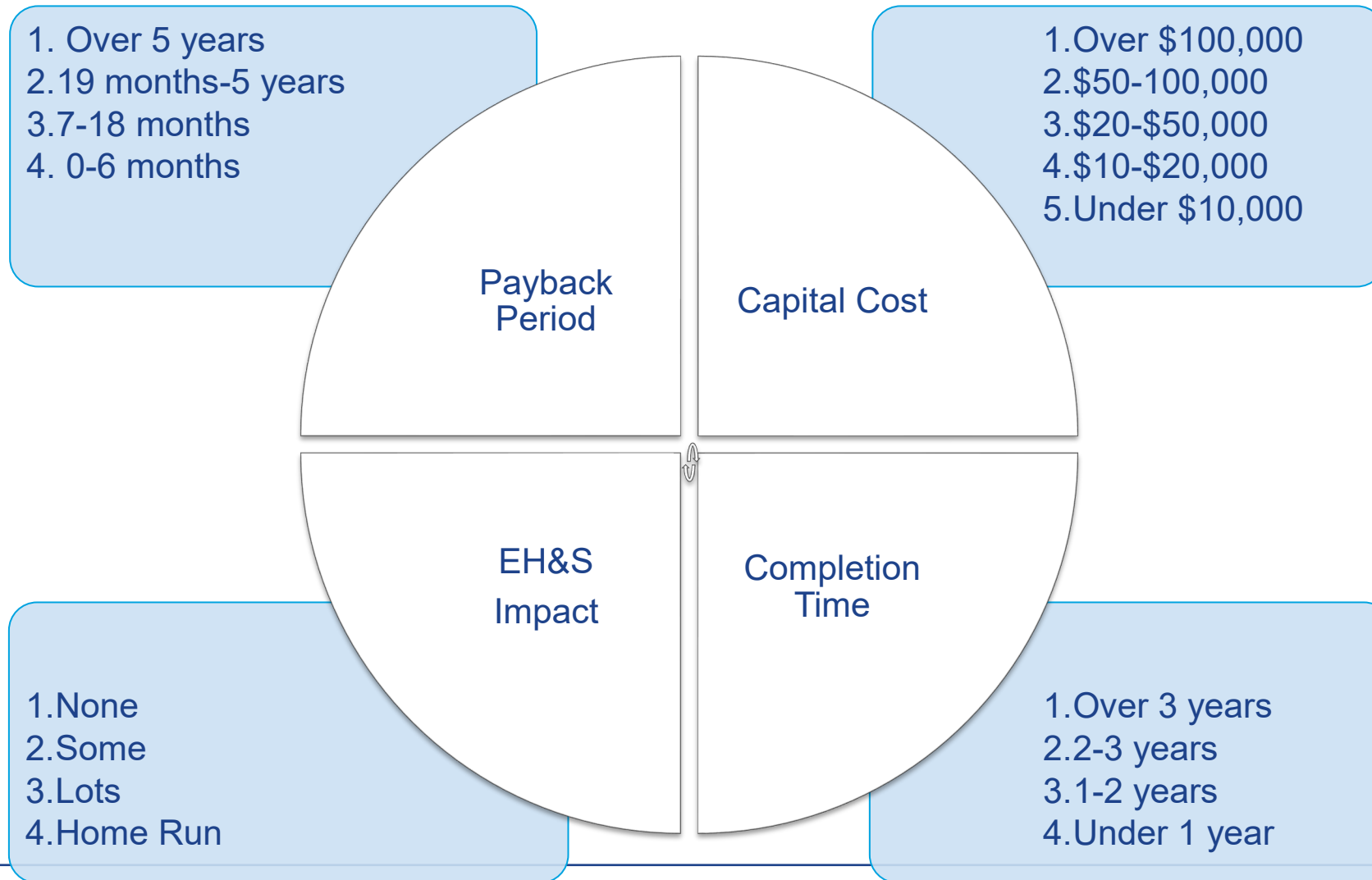
Task 10: Engage Stakeholders

Energy Manager

Site Design

Safety

Compliance

EnMS Team

Production Team

Facilities
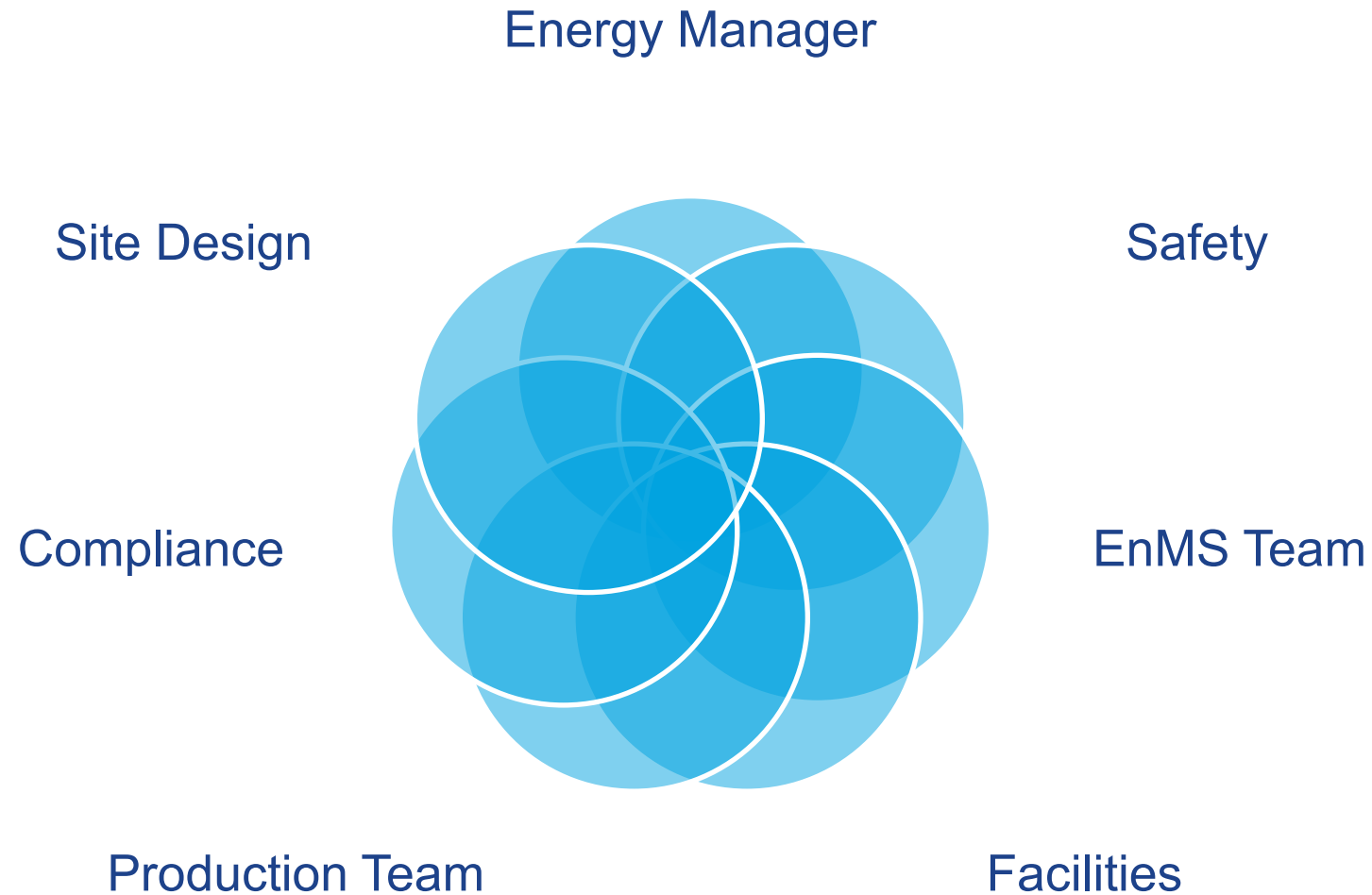
Task 10: Update Opportunities

- At defined intervals
- After major changes
- Move projects up and off the list, as needed
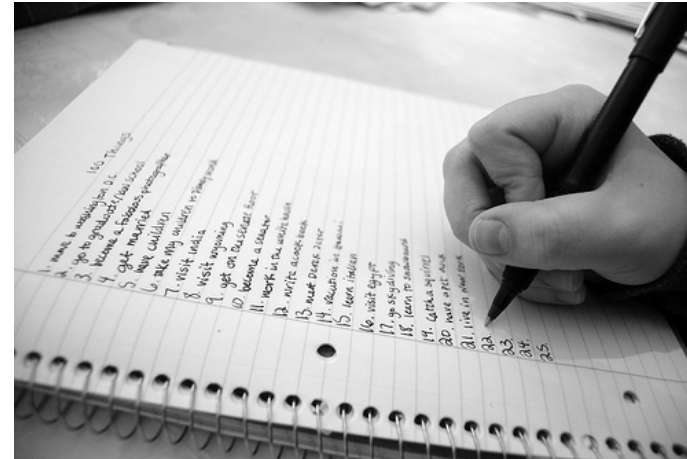
- Prioritize opportunities
- Select opportunities for implementation
- Create action plants to meet objectives and targets

Task 10: Relationship to SEUs

- The ISO 50001 standard <u>does not</u> require every SEU to have an active improvement project

  o SEUs often do, but it is not required

SEU   Projects
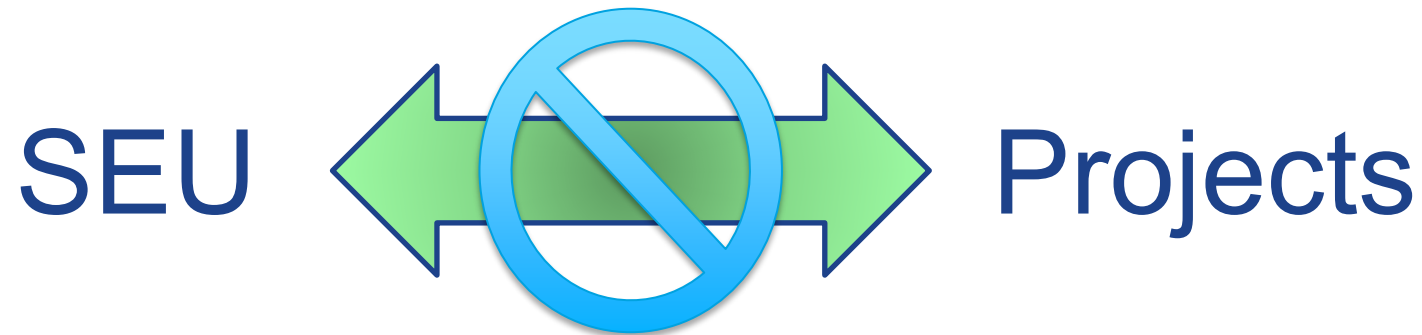
- Likewise, every improvement project <u>is not</u> required to be connected to an SEU

  o Again, they often do, but it is not required

Task 10: Playbook

Activity

- Look at Task 10 in 50001 Ready
- Look at the Task 10 Playbook

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50001 Ready Navigator Playbook

Task 10: Improvement Opportunities

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. Developed and documented a methodology and criteria for how your organization will identify, prioritize, and update energy performance improvement opportunities.
2. Applied the methodology and criteria you developed to identify, prioritize, and update energy performance improvement opportunities.
3. Updated the list of prioritized improvement opportunities at specific intervals and when major changes in facilities, equipment, systems or energy-using processes take place.

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Polling Question

2) Think about how you currently select energy improvement projects. Do you have a process and a set of criteria you use to prioritize these projects? What level of effort would it take to get this type of process set up for your organization?

A. We already have a robust selection system with an established set of criteria

B. We are close, just need a little tweaking

C. We have some criteria, but we do not have a consistent process

D. It would take a significant effort to get this set up and implemented

E. "Toto, I don't think we are in Kansas anymore!"

Task 11: Energy Performance Indicators and Baselines

Task 11: We have identified energy performance indicators (**EnPIs**) and energy baselines (**EnBs**) to measure and monitor our energy performance and to demonstrate energy performance improvement.

We have a methodology for determining and updating them.

Task 11: Questions to Ask

- How will you select appropriate EnPIs?
  - What do you already measure and use?
  - What will help you to determine your overall energy performance?
  - Who currently collects and monitors this information?
  - Who will approve the selection of EnPIs?
- Do you have historic baseline data for your EnPIs?
- Do you have relevant variable data for your EnPIs, as applicable?
- Do you have good historical data for establishing EnBs?

- **Energy Performance Indicators (EnPIs)**
  - Measure or unit of energy performance as defined by the organization
    - kWh per square foot for a building
    - Total MMBTUs per pound of steam for a large central boiler
    - Total kWh per ton for a chiller
  - EnPIs can be a simple metric, a ratio, a model, or other item
  - EnPIs are tracked, recorded and trended over time

- **Energy Baseline (EnBs)**
  - Quantitative historic reference data providing a basis for comparison to determine energy performance

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Task 11: EnPI Examples

You can have EnPIs for sites, buildings, facilities, systems, processes, or equipment

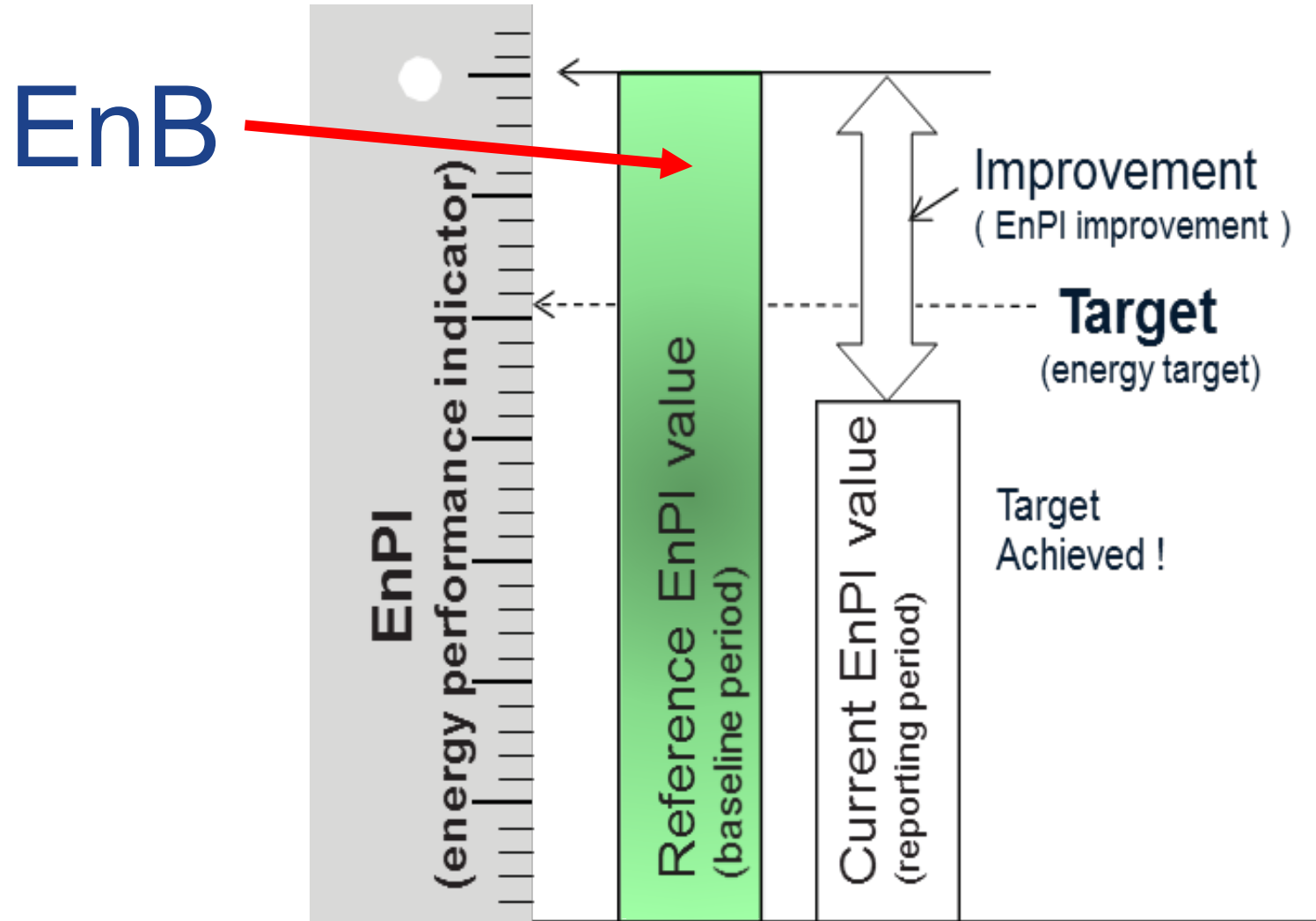|	
• Value	▪ Chiller energy consumption (metered) ▪ Air Compressors energy consumption (MCC metered)
• Ratio	▪ Energy consumed per occupant ▪ Total energy per brick
• Regression-based Performance Model	▪ Occupancy + weather + humidity + production, etc.…. = energy performance

Task 11: Energy Performance Indicator Tool

Excel tool that translates energy data into regression-based performance metrics:

$$y = a_1x_1 + a_2x_2 + \ldots + b$$

Input:

- Monthly energy consumption (utility) data
- Relevant Variable data
- (weather, climate, occupancy...)
- SEU meter data

Output:

- Performance indicator defined by related variables
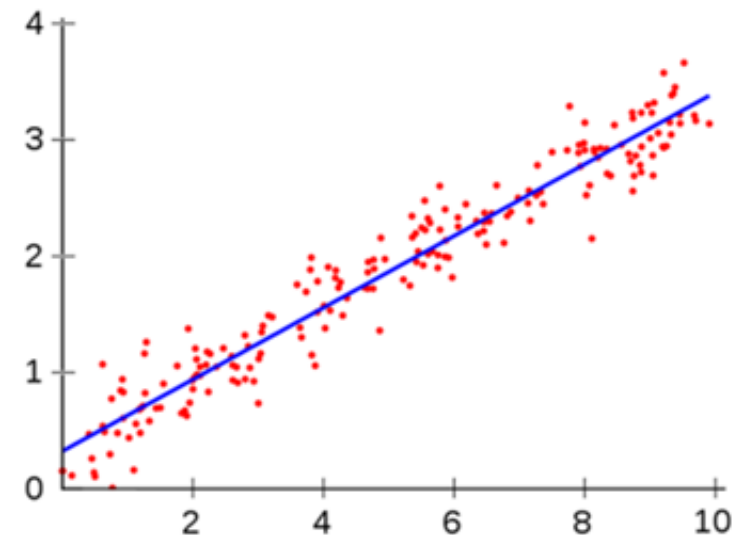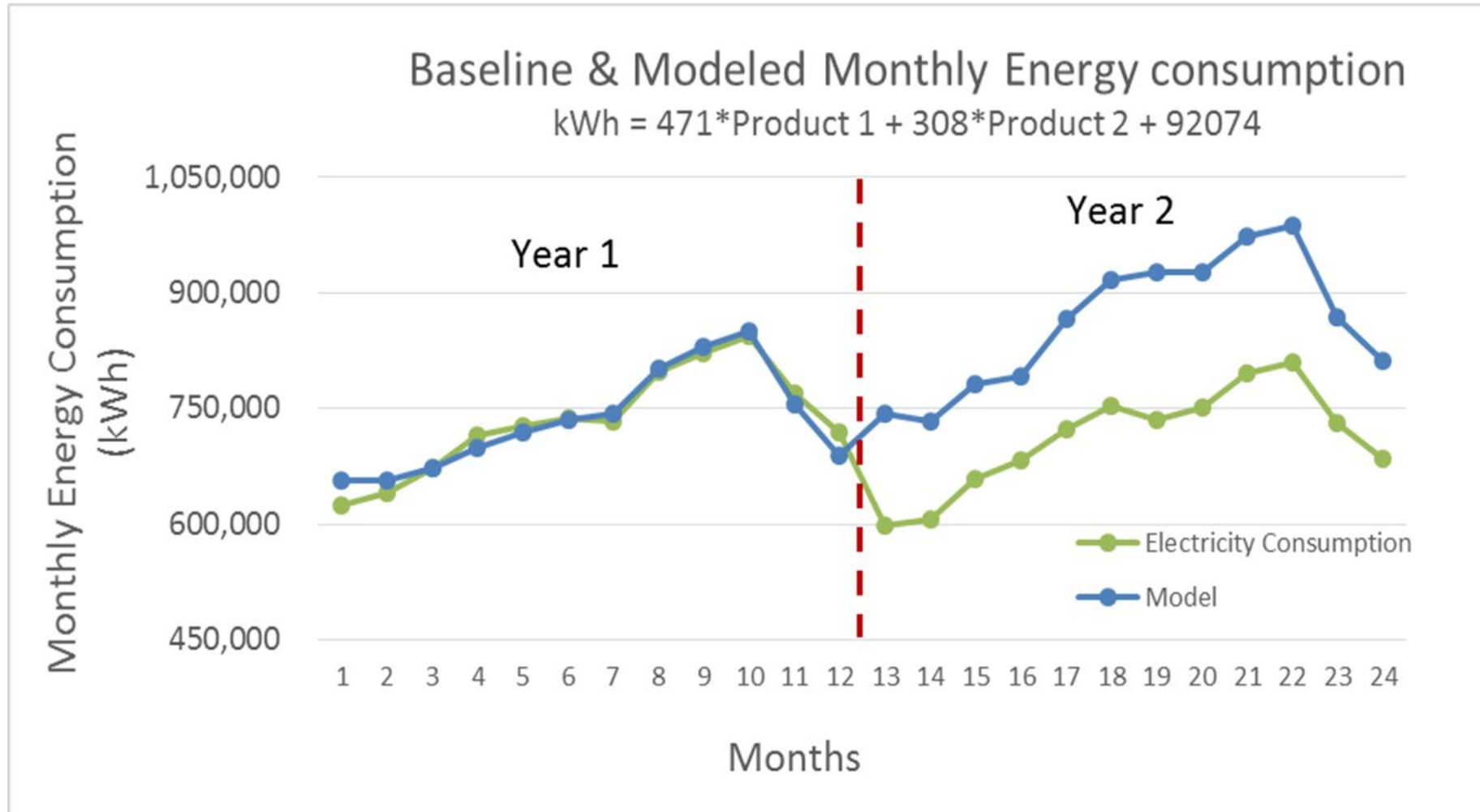
NORMALIZATION

- **P value: likelihood the data is actually random, not related**
  - Lower is better
- **R^2 value: how well does the relationship fit the data?**
  - 1.000 is a perfect fit

For this graph:
- The data looks to be related = Low P value
- The data has a good fit = High R^2 value

Baseline & Modeled Monthly Energy consumption

kWh = 471*Product 1 + 308*Product 2 + 92074
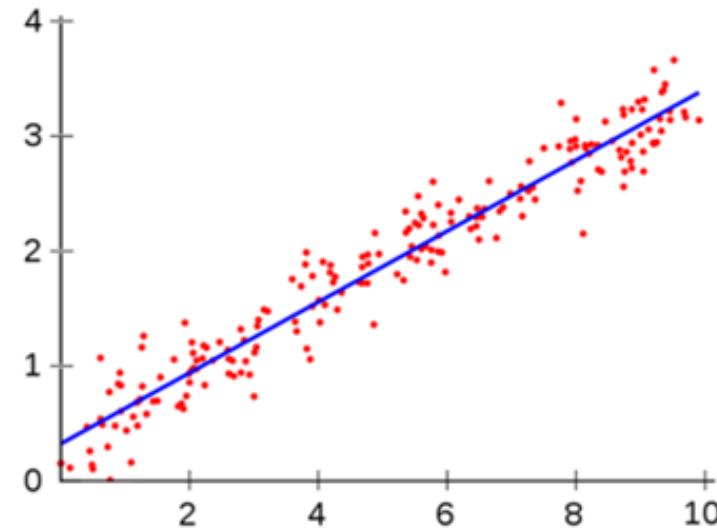
Task 11: Playbook

Activity

- Look at Task 11 in 50001 Ready

- Look at the Task 11 Playbook

50001 Ready Navigator Playbook

Task 11: Energy Performance Indicators (EnPIs) and Energy Baselines (EnBs)

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. Developed energy performance indicators (EnPIs) for your organization including an EnPI for each SEU. If relevant variables significantly affect energy consumption, normalized EnPIs.
2. Developed an energy baseline (EnB) for EnPIs in order to later determine energy performance improvement.
3. Communicated proposed EnPIs and EnBs to top management so they can ensure the EnPIs and EnBs are appropriate for the organization.
4. Recorded and regularly reviewed the method used to determine and update EnPIs and established the conditions under which adjustments to the baseline(s) will be made.
5. Compared EnPI values to their respective EnBs on a regular basis.
6. Implemented a process for ongoing monitoring, measurement and analysis of your EnPIs, EnBs, and energy performance improvement.

Polling Question

3) Establishing EnPIs and EnBs, and the analysis of their associated energy performance is very important. Where do you feel that your organization is with regards to establishing EnPIs/EnBs and using a methodology to determine their performance?

A. We have established EnPIs/EnBs and have a proven methodology for determining their performance

B. We are close, just need a little tweaking

C. We have some EnPIs/EnBs, but we do not have a consistent process

D. It would take a significant effort to get this set up and implemented
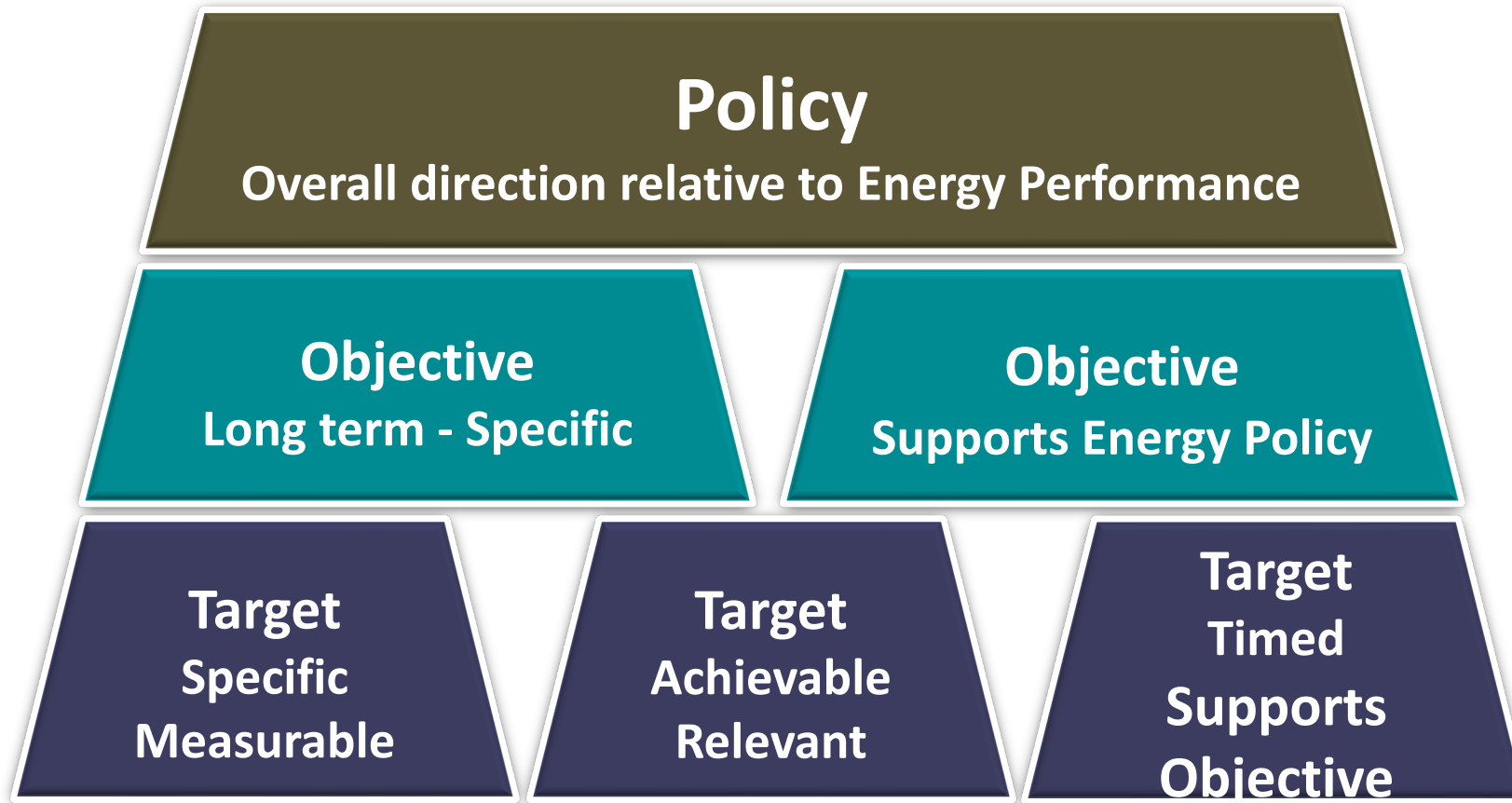
E. "MATH is a four-letter word!"
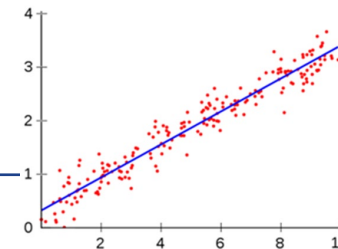
<u>Task 12:</u> We establish objectives and energy performance improvement targets.

Task 12: Performance Improvement Framework

Policy
Overall direction relative to Energy Performance

Objective
Long term - Specific

Objective
Supports Energy Policy

Target
Specific
Measurable

Target
Achievable
Relevant

Target
Timed
Supports
Objective

S   Specific

M   Measurable

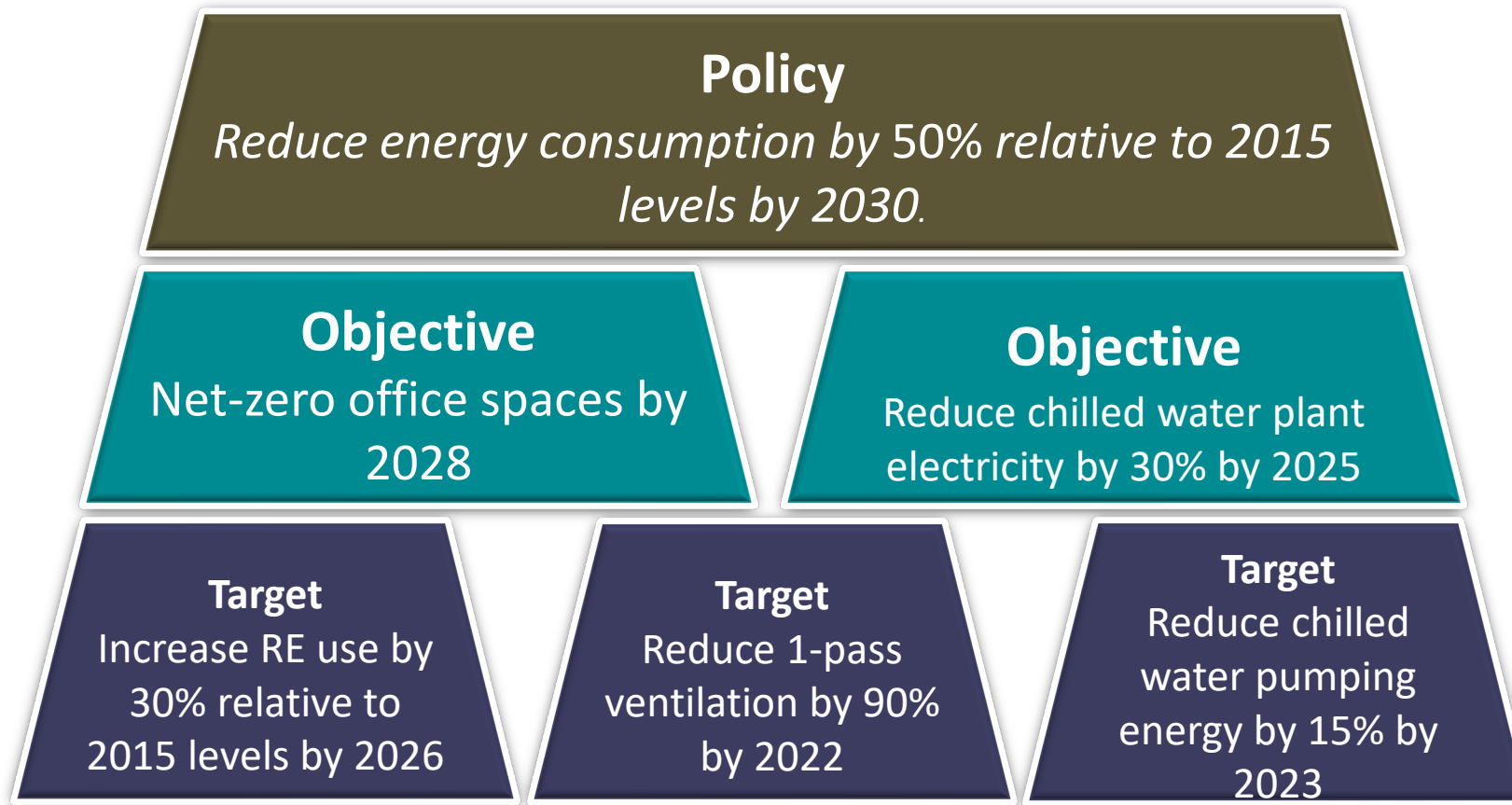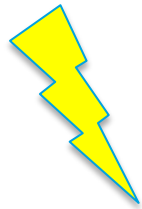A   Achievable   Reduce electricity consumption by 5 percent compared to a 2019 baseline by the third Quarter of 2023.

R   Relevant

T   Timed

Task 12: Performance Improvement Framework

Policy
Reduce energy consumption by 50% relative to 2015 levels by 2030.

Objective
Net-zero office spaces by 2028

Objective
Reduce chilled water plant electricity by 30% by 2025

Target
Increase RE use by 30% relative to 2015 levels by 2026

Target
Reduce 1-pass ventilation by 90% by 2022

Target
Reduce chilled water pumping energy by 15% by 2023
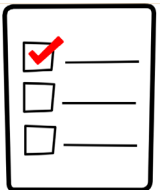
Task 12: Approval and Communicating

- Once the objectives and energy targets are established, they must be:

1. Approved by management

2. Communicated broadly across the organization

Who should know?

a. The energy team- detailed knowledge

b. Personnel who can affect the outcomes – detailed knowledge

c. All personnel in the organization should have an awareness

Task 12: Playbook

Activity

- Look at Task 12 in 50001 Ready

- Look at the Task 12 Playbook

50001 Ready Navigator Playbook

Task 12: Objectives and Targets

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. Developed and recorded your organization's objective and energy targets.
2. Obtained top management's approval of the objectives and energy targets and communicate appropriately.
3. Communicated the energy objectives and energy targets appropriately to your organization.

Task 13: Action Plans for Continual Improvement

<u>Task 13:</u> We develop action plans and implement improvement projects to achieve our objectives and energy targets.

Task 13: What makes a robust action plan?

Delegated roles

Timelines

Detailed steps for implementation

Detailed steps for verification

Quantitative assessment of success

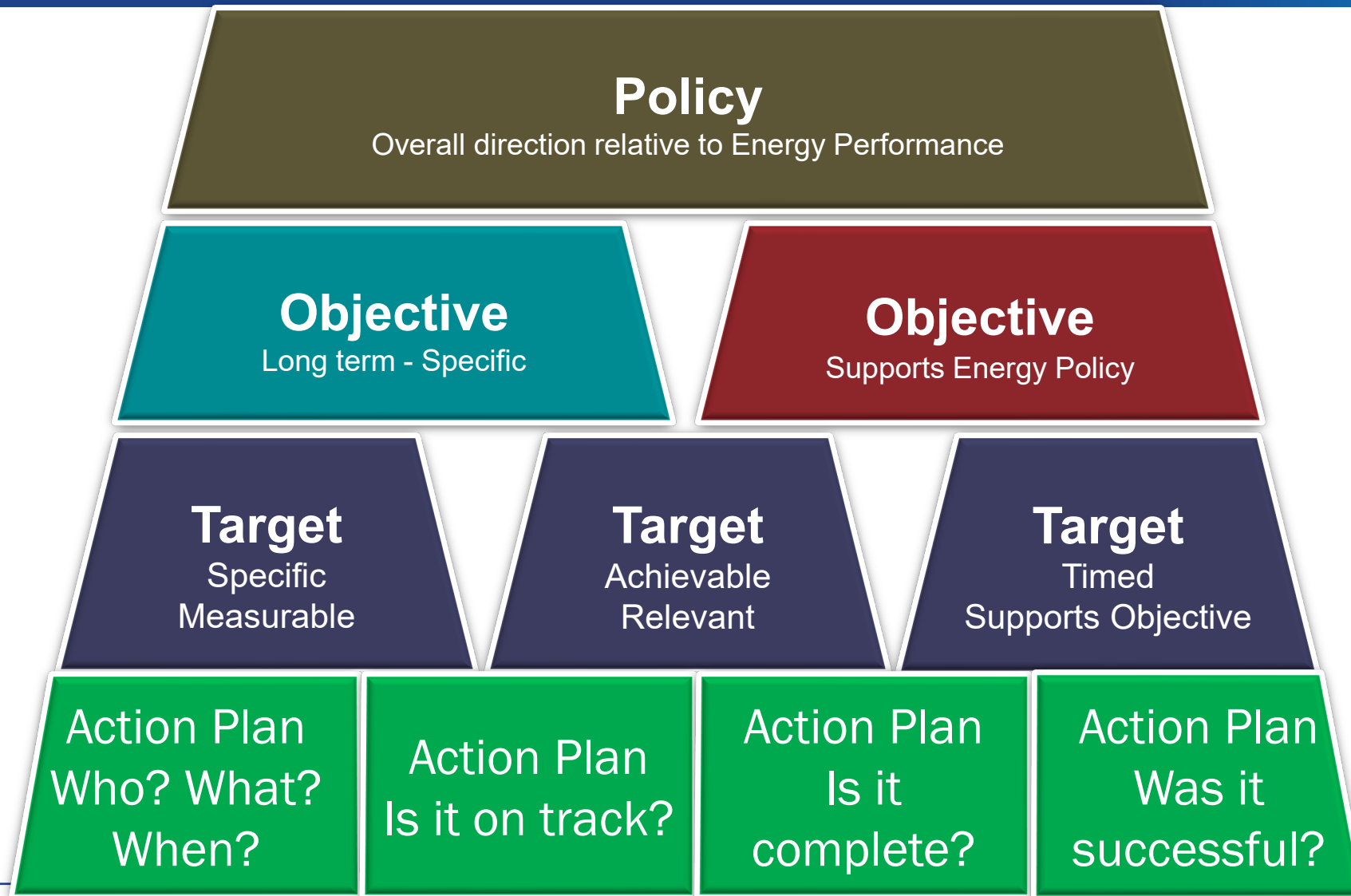Clear and accessible documentation

Task 13: Action Plans Require a Team Effort

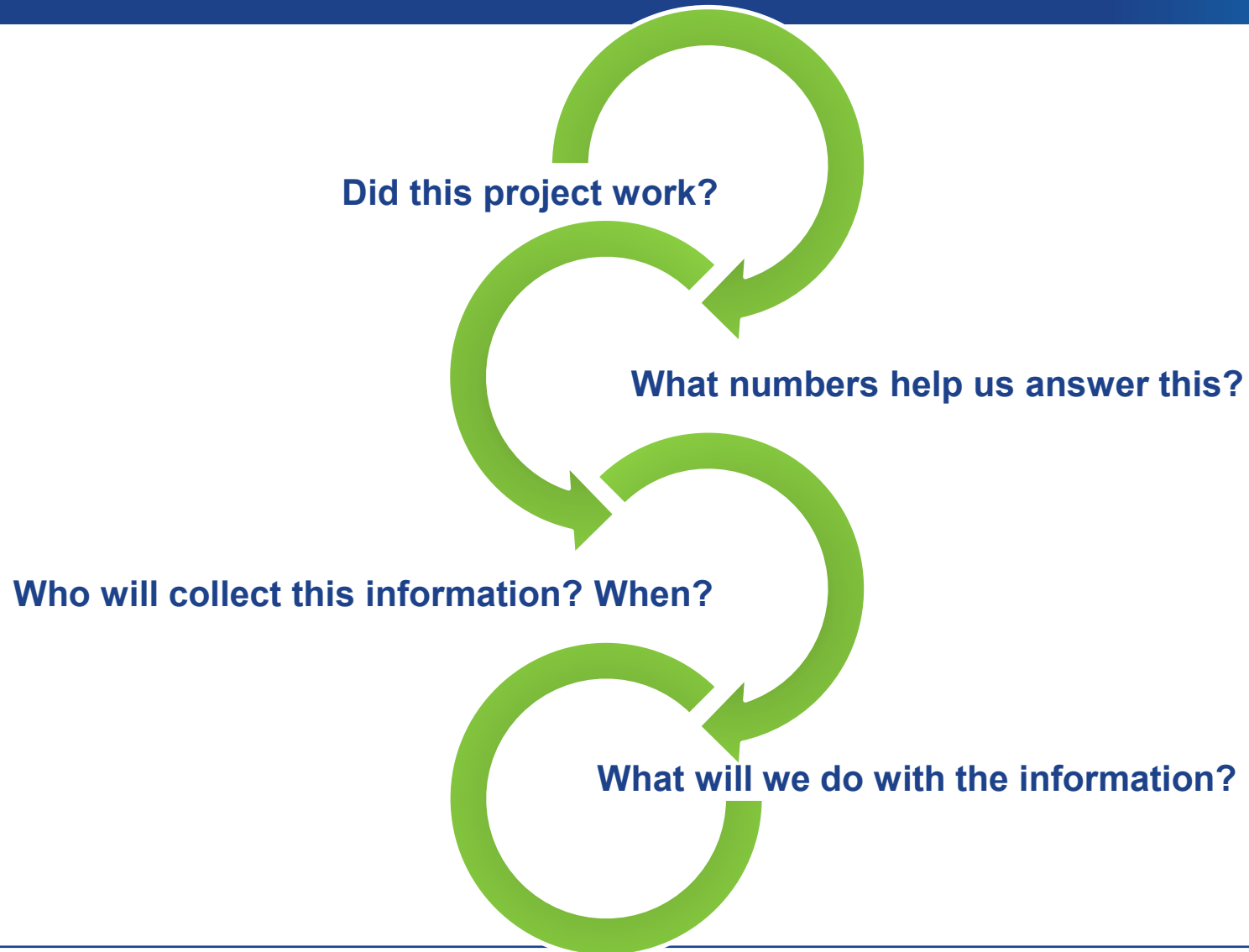Who impacts the success of the <u>action plans</u> to ensure completion of selected projects?

- Energy Team
- Contractors
- Procurement
- Maintenance
- Finance
- Management
- Facilities
- Compliance

Policy
Overall direction relative to Energy Performance

Objective
Long term - Specific

Objective
Supports Energy Policy

Target
Specific
Measurable

Target
Achievable
Relevant

Target
Timed
Supports Objective

Action Plan
Who? What?
When?

Action Plan
Is it on track?

Action Plan
Is it
complete?

Action Plan
Was it
successful?

Did this project work?

What numbers help us answer this?

Who will collect this information? When?

What will we do with the information?

Task 13: Playbook

Activity

- Look at Task 13 in 50001 Ready
- Look at the Task 13 Playbook
  - Look at the Action Plan template

50001 Ready Navigator Playbook

Task 13: Action Plans for Continual 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. Used your prioritized opportunities from Task 10 to select projects for implementation.
2. Apply any applicable criteria set by your organization to justify and gain approval of the project.
3. Developed action plans for meeting your organization's objectives and energy targets identified in Task 12.
4. Communicated expectations to relevant positions and review action plan progress.

Tasks 8-13: The Big Picture

- Building the <u>energy success pyramid</u> starts with a wide base of small actions that build to the completion of energy policy
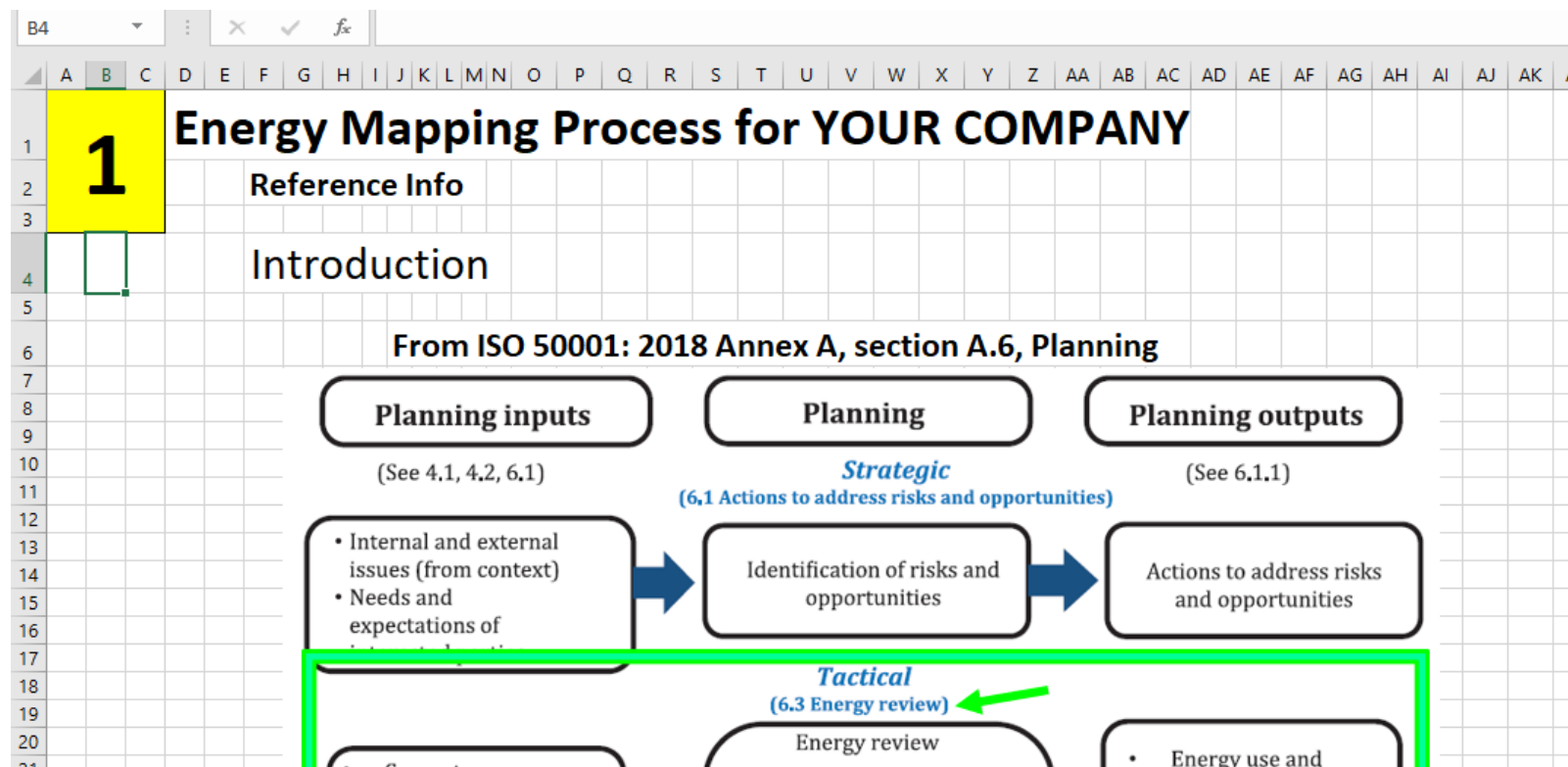
Policy → **Objectives** → **Energy Targets** → **Action Plans** → **Operational Controls**

Next Session
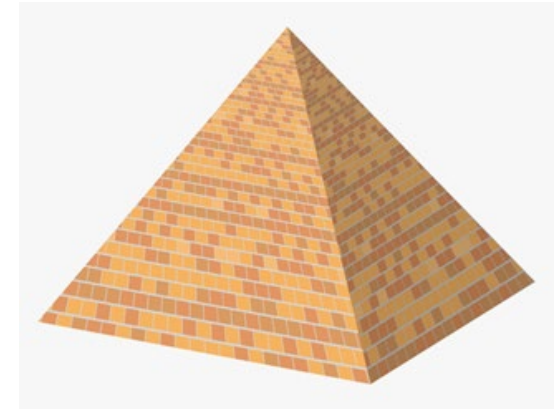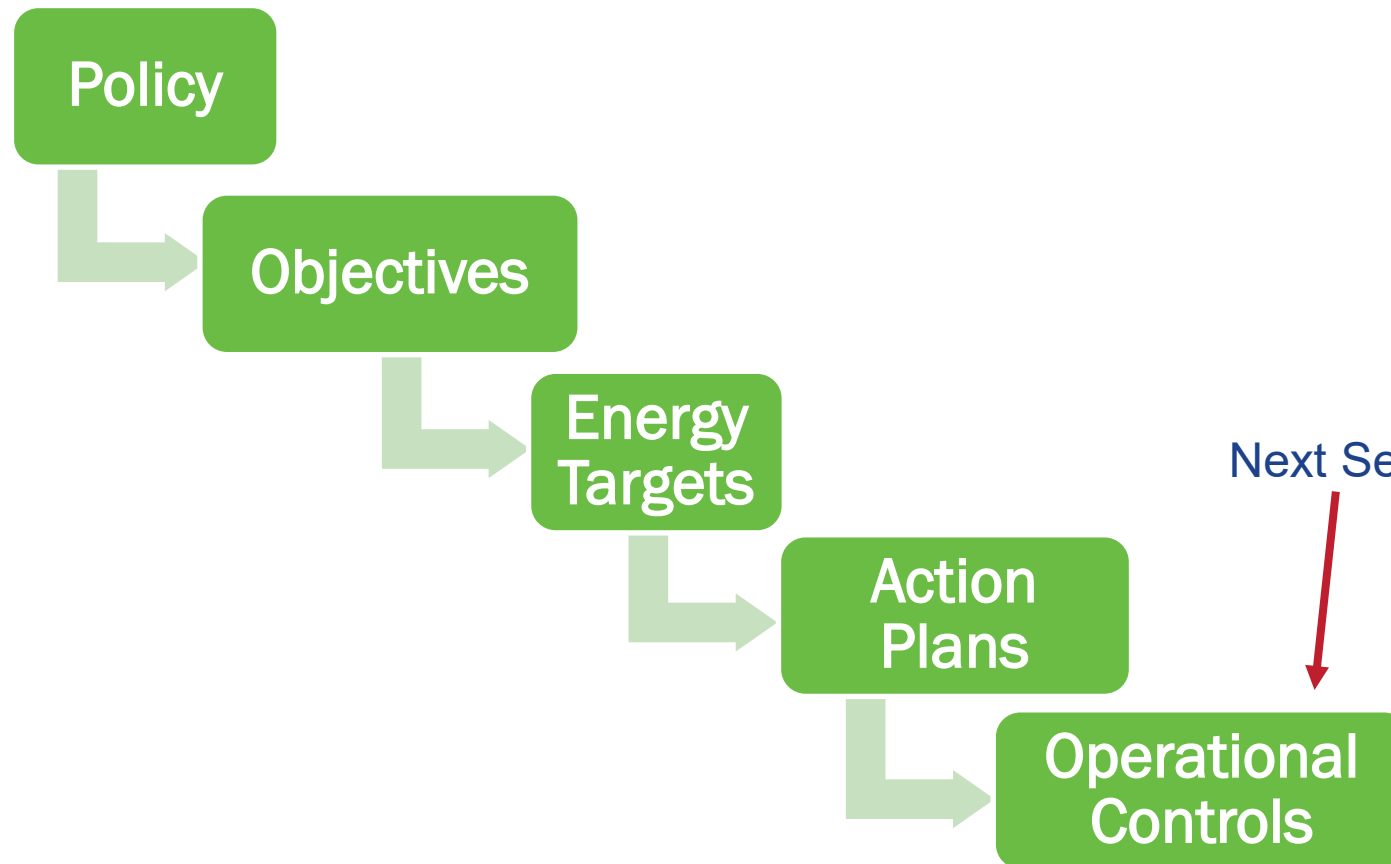
Activity

- Review the tabs of the Energy Mapping Template Tool

Polling Question 4

4) Thinking about Tasks 10-13:

   Task 10: Improvement Opportunities
   Task 11: Energy Performance Indicators (EnPIs) and Baselines (EnBs)
   Task 12: Objectives and Targets
   Task 13: Action Plans for Continual Improvement

Where do you feel your organization is relative to these four 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. "Toto, now I am sure we are not in Kansas anymore!"

- Review and Wrap Up

Webinar Training Schedule & Preparations
Kahoot Quiz Game
Q&A

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50001 Ready Navigator Tasks: Webinar #4, and then #5

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10. Improvement Opportunities
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Support

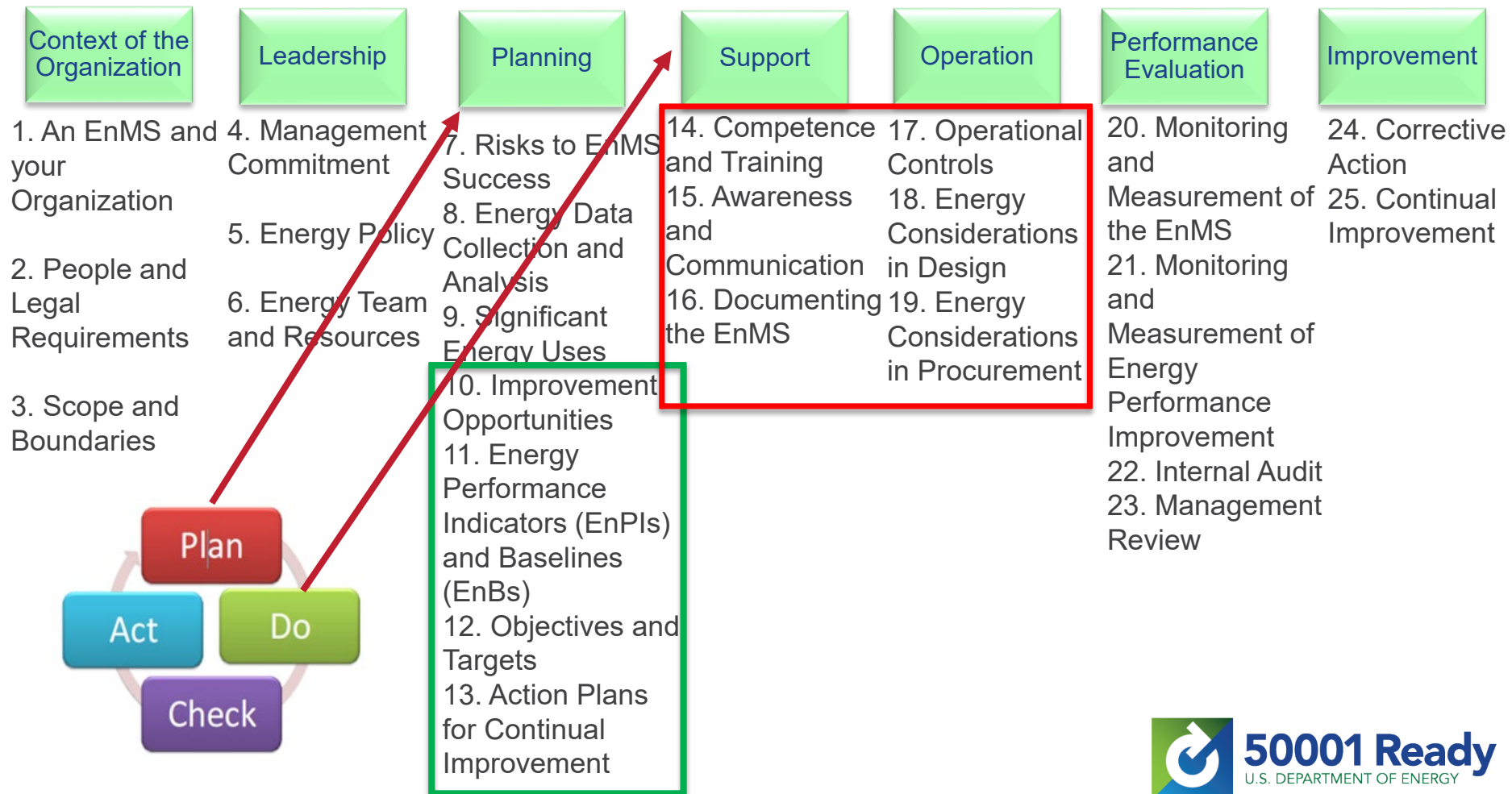14. Competence and Training
15. Awareness and Communication
16. Documenting the EnMS

Operation

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Performance Evaluation

20. Monitoring and Measurement of the EnMS
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Improvement

24. Corrective Action
25. Continual Improvement

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? – DONE – February 23

4. <u>Sorting out the Energy Data</u> – **TODAY** – March 2

5. Engaging Other Functions – **NEXT** - March 9
   a) March 9, 10:00 a.m. to 12:30 p.m.

6. Evaluating Performance – March 16

7. Ensuring Continual Performance Improvement – March 23

8. Wrap Up and Next Steps – March 30

Preparation for Session FIVE

BE PREPARED

- If desired, purchase the ISO 50001: 2018 standard

- Set up, use, and maintain your 50001 Ready account

- Prepare for Session FIVE:
  - Review tasks 14 - 19 in 50001 Ready
  - Download the playbooks for task 14 - 19, if desired
  - How do you determine competence of operators of SEUs (14)?
  - Is the entire site aware of energy policy and energy saving goals (15)?
  - Have you defined operational controls for SEUs and action plans (17)?
  - Are procurement and design functions currently engaged relative to energy efforts (18, 19)?

Between Sessions

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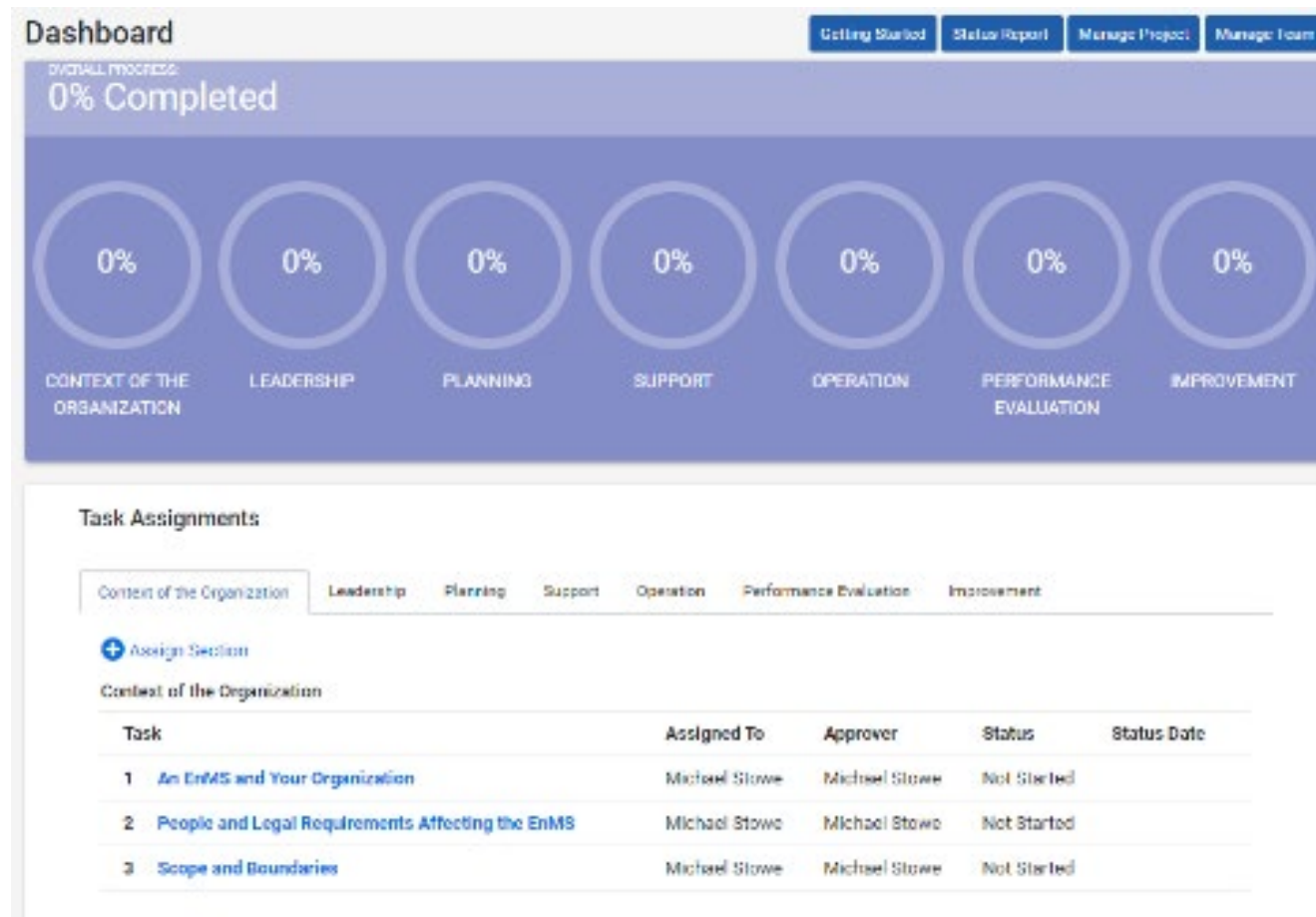
Overview of 50001 Ready - Resources

- 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 FOUR, and now having covered tasks 1-13, 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. "Life's tough on the Ponderosa!"

And now, our Kahoot Quiz Review Game

Question and Answer Time

Please Contact Us With Any Questions

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