



Unlocking the Full Value of Energy Projects Using JUSTIFI Making the Business Case Session 2

Sarah Cooney

National Laboratory of the Rockies

September 29, 2026



U.S. DEPARTMENT
of ENERGY

Presenter for Sessions 2 and 3



- 25+ years in manufacturing
- Six Sigma and Lean practitioner
- Sectors: chemicals, pharmaceutical, and automotive
- Leadership roles:
 - V.P. Operations
 - Plant Manager
 - Operations Manager
 - Production Supervisor
 - Product Chemist

Making the Business Case—Learning Objectives (Sessions 2 and 3)

Session 2—Beyond Energy Cost Savings: Foundation for Multiple Benefits & JUSTIFI

- Understand energy productivity and multiple benefits
- Connect energy productivity to improving business performance
- Identify multiple benefits using continuous improvement
- Use JUSTIFI software to improve payback period
- Review practice assignment for JUSTIFI working session in session 3

Session 3—Power Up the Business Case: Deep Dive Quantifying Multiple Benefits Using JUSTIFI

- Create JUSTIFI practice project
- Generate JUSTIFI results reports
- Know where to find JUSTIFI and resources

Beyond Energy Cost Savings: Foundation for Multiple Benefits & JUSTIFI

Agenda Topic	Purpose & Key Activities	Time
Getting Started & Welcome	Start meeting	10:00-10:05 am
Introduction	Elevator pitch and key terms	10:05-10:10 am
Multiple Benefits Value Proposition	What research tells us	10:10-10:15 am
Finding Multiple Benefits	Using continuous improvement tools to find multiple benefits	10:15-10:45 am
JUSTIFI Live Demo	Live JUSTIFI demo	10:45-11:15 am
Session 3 Assignment	Camper Canopies Worksheet and Practice	11:15-11:20 am
Questions	Q&A	11:20-11:30 am

Elevator Pitch: Why JUSTIFI?

Unlock ROI in Energy Productivity Projects with JUSTIFI

High-Impact Projects Stall. Investors Lack Confidence.

Manufacturers leave millions on the table because traditional ROI tools ignore the full value of energy productivity's multiple benefits.

Use JUSTIFI- Capture Value:

- **Quantify All Benefits.** JUSTIFI measures not just energy cost savings, but also improvements in productivity, safety, and quality, translating all impacts into clear financial metrics for faster, smarter investment decisions.
- **Build Stronger Business Cases.** Including multiple benefits in project evaluations can cut payback times by half or more.
- **Accelerate Adoption.** Its open-source, user-friendly platform removes barriers, enabling rapid uptake and broader impact. Customizable for all types of projects.

JUSTIFI Changes the Game.

JUSTIFI is a no-cost platform that quantifies financial, operational, and strategic benefits to strengthen business cases and accelerate approvals.



Project Summary							Top Projects	3
On the 6/04/2026 visit, we found 4 projects that will result in a \$552,799 annual financial impact.								
This visit also includes \$37,840 in additional one-time incentives that will help reduce implementation costs!								
	Utility Cost Savings			With Operational Impacts				
	Implementation Cost (\$)	Financial Impact (\$/yr)	Simple Payback (yrs)	Implementation Cost (\$)	Financial Impact (\$/yr)	Simple Payback (yrs)		
1. Injection Molding	\$1,000,000	\$6,059	165	\$962,160	\$449,299	2.14		
2. Improved Compressor Efficiency	\$112,661	\$1,287	87.54	\$112,661	\$94,087	1.2		
3. Replace with radiant heat	\$27,700	\$7,255	3.82	\$27,700	\$7,525	3.68		
Additional Projects/Impacts	\$4,000	\$49	81.63	\$4,000	\$1,888	2.12		
Total	\$1,144,361	\$14,650	78.11	\$1,106,521	\$552,799	2		

Illustrative example based on ITAC results

Scan to open



<https://justifi.ornl.gov/#/welcome>

Full Value of Energy Projects

- Many energy projects are undervalued.
- Shift from selling energy cost savings to positioning strategic operational investments.
- **JUSTIFI**, the Department of Energy's free software, helps build comprehensive business cases that show the strategic value of energy productivity projects by identifying and quantifying **multiple benefits**.



Key terms—Introduction

- **Energy productivity:** Economic value created per unit of energy use.
- **Multiple benefits:** Operational and strategic improvements that accompany energy productivity projects.
- Overlooking multiple benefits leads to undervalued projects and missed cost-savings opportunities.



Graphic by Katie Carney, NLR

Multiple Benefits Value Proposition

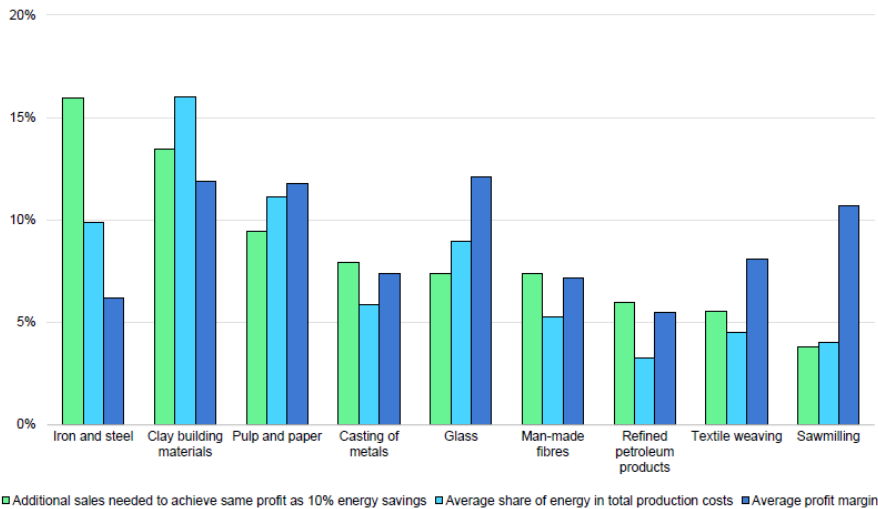
Evidence and examples: Why multiple benefits change payback.

IEA Analysis Indicates

10% energy savings is equivalent to profit achieved with 4%–16% increase sales.

For firms with high energy costs and thin profit margins, saving 10% in energy is equivalent to the profit achieved with a 4% to 16% increase in sales

Comparison of additional sales required to match costs savings through energy efficiency, EU countries, 2012-2022



IEA. CC BY 4.0.

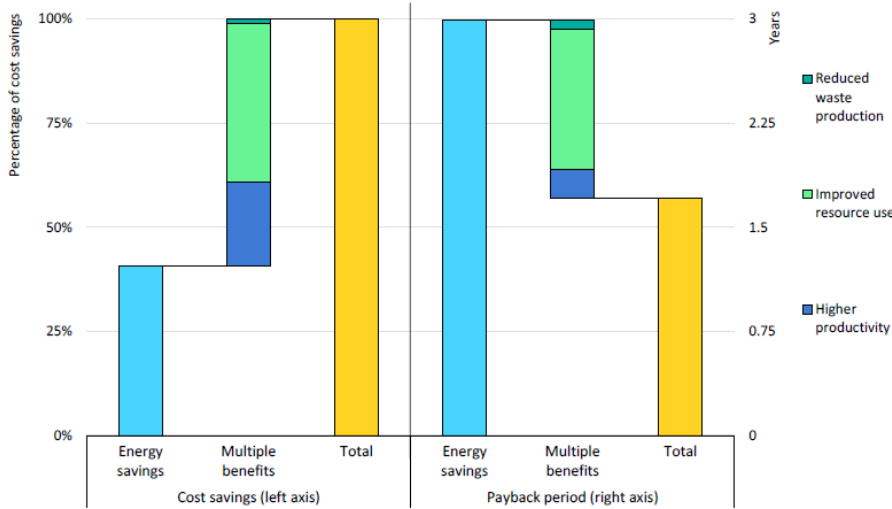


Source: IEA, *Gaining an Edge, The Role of Energy Efficiency in Industrial Competitiveness* (2025), pp. 24,26, <https://www.iea.org/reports/gaining-an-edge>

Every dollar save on energy improvements can deliver over a dollar in wider benefits.

Every dollar saved on energy efficiency improvements can deliver over a dollar in wider benefits

Average cost savings and payback periods of 3 300 energy efficiency measures in SMEs, United States, 2002-2024



IEA. CC BY 4.0.



Metal Fabricator—JUSTIFI Assessment

JUSTIFI Executive Summary Report

Executive Summary Report

Project Summary

On the **10/23/2025** visit, we found **1** projects that will result in a **\$423,814** annual financial impact.

		Utility Cost Savings		With Operational Impacts	
	Implementation Cost (\$)	Financial Impact (\$/yr)	Simple Payback (yrs)	↕ <u>Financial Impact</u> (\$/yr)	Simple Payback (yrs)
1. Battery 1100 kW	\$1,600,000	\$71,784	22.29	\$423,814	3.78
Total	\$1,600,000	\$71,784	22.29	\$423,814	3.78

Operational impact modeled; shared with permission

Metal Fabricator—JUSTIFI Assessment

JUSTIFI Executive Summary Report- with the incentive applied.

Impact on Project Payback

	Energy Cost Savings			With Operational Impacts		
	Implementation Cost (\$)	Financial Impact (\$/yr)	Simple Payback (yrs)	Implementation Cost (\$)	Financial Impact (\$/yr)	Simple Payback (yrs)
Battery 1100 kW	\$1,600,000	\$71,784	22.29	—	\$423,814	—
Assessment Total	\$1,600,000	\$71,784	22.29	—	\$423,814	—

Operational impact modeled; shared with permission

BESS Project Implemented

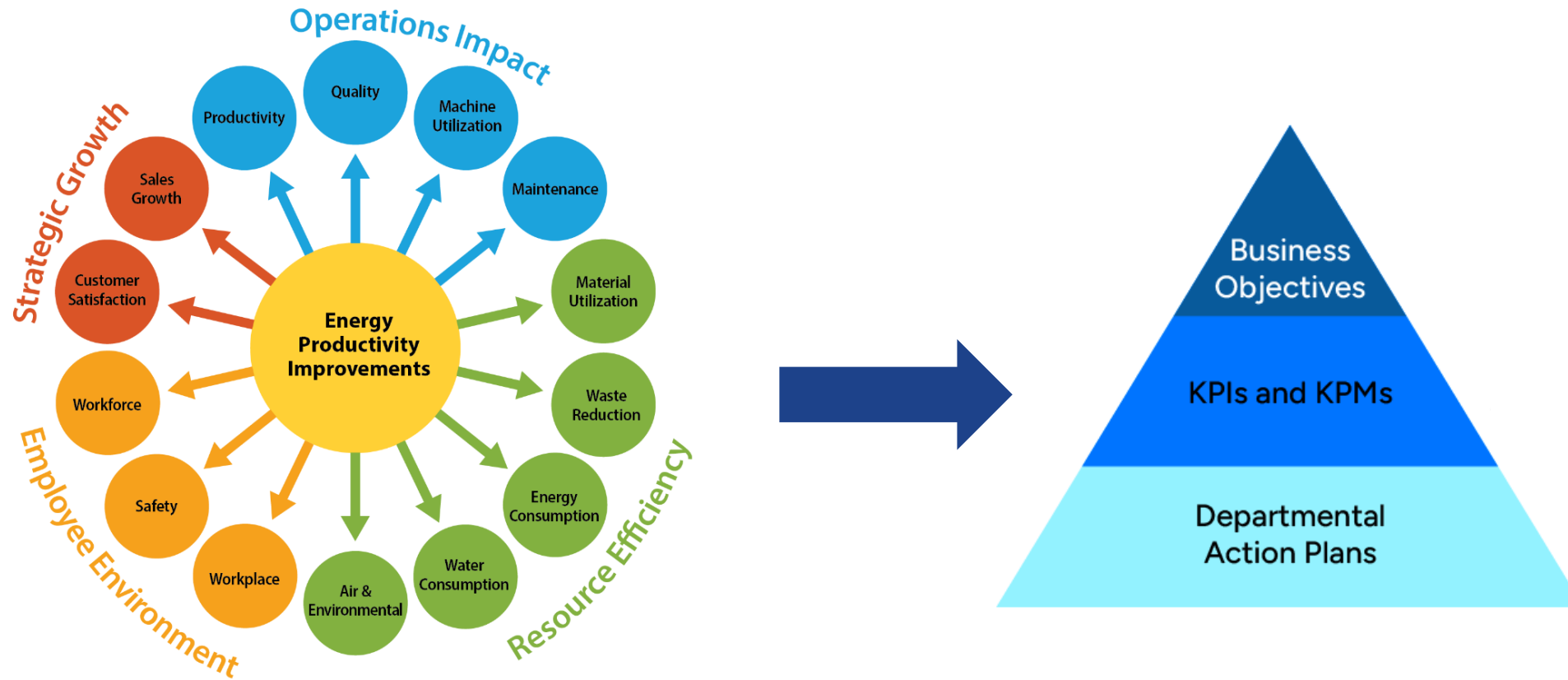
“We have installed our batteries, and they are up and going. So far, so good! The batteries have yet to let a power surge or brownout through, which has protected us against very expensive downtime and damage to our CNC machines.”

Production Manager, SMM (April 2026)

Shared with permission.

Building the business case

Multiple Benefits are Aligned with Performance Metrics



Graphic by Katie Carney, NLR

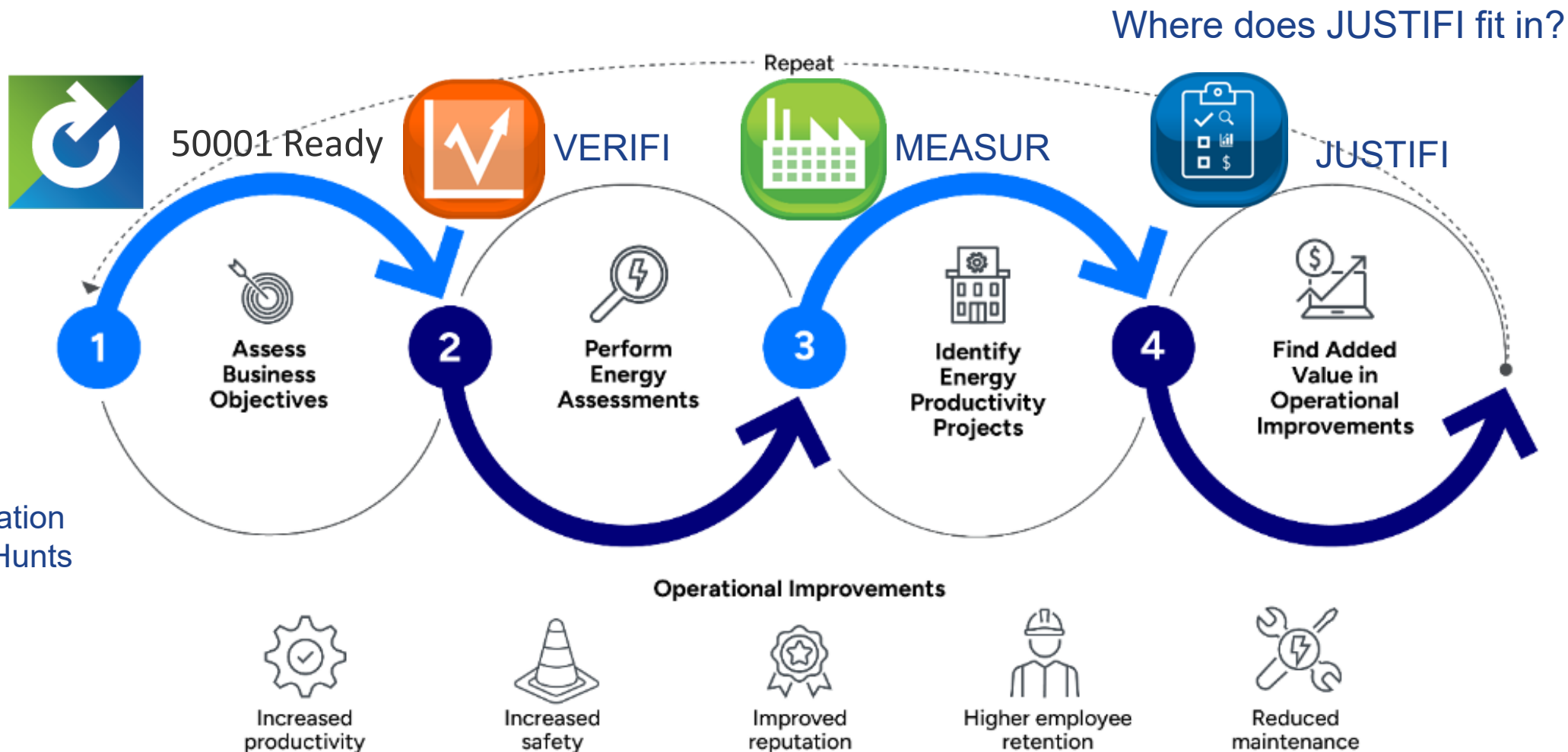
Finding Multiple Benefits Using Continuous Improvement

Three tools: DMAIC, Turtle, and Fishbone

JUSTIFI in an Industrial System Energy Assessment

Industrial Systems

- Process Heating
- Compressed Air
- Pumping System
- Steam System
- Fans
- Motors
- Process Cooling/
Industrial Refrigeration
- Energy Treasure Hunts



Graphic by Katie Carney, NREL

Building the Business Case

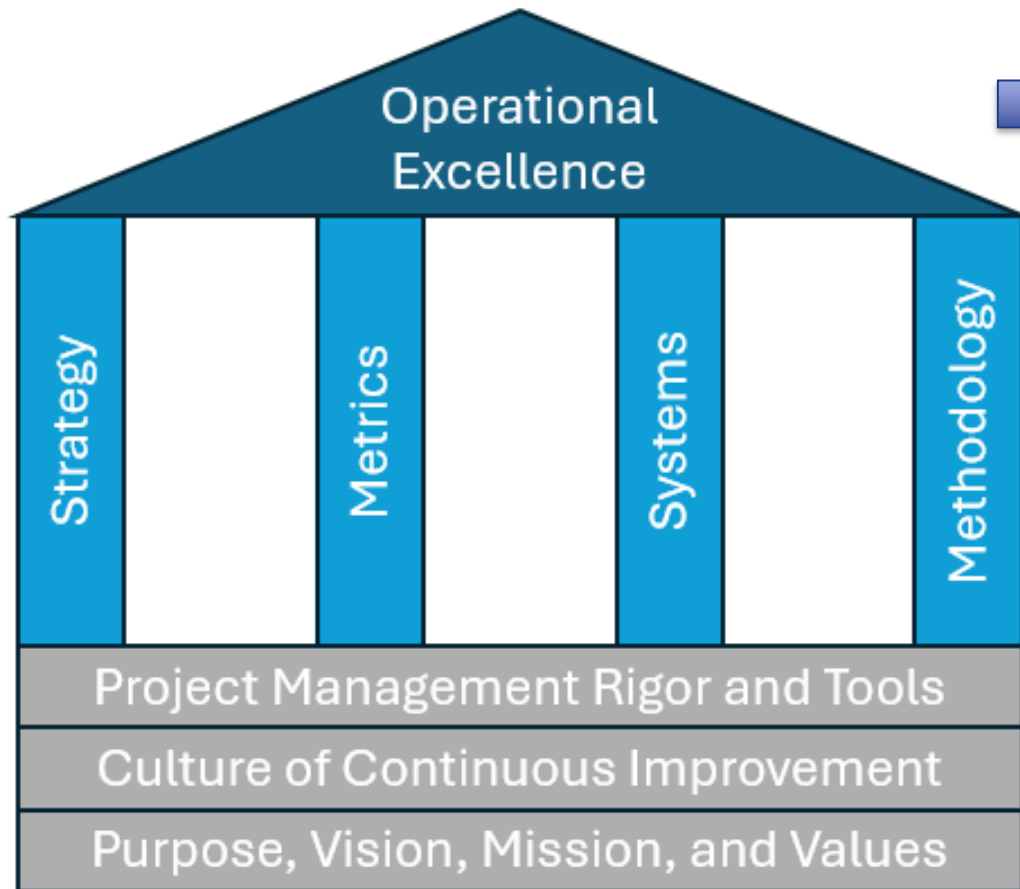
How do energy projects compete for capital?



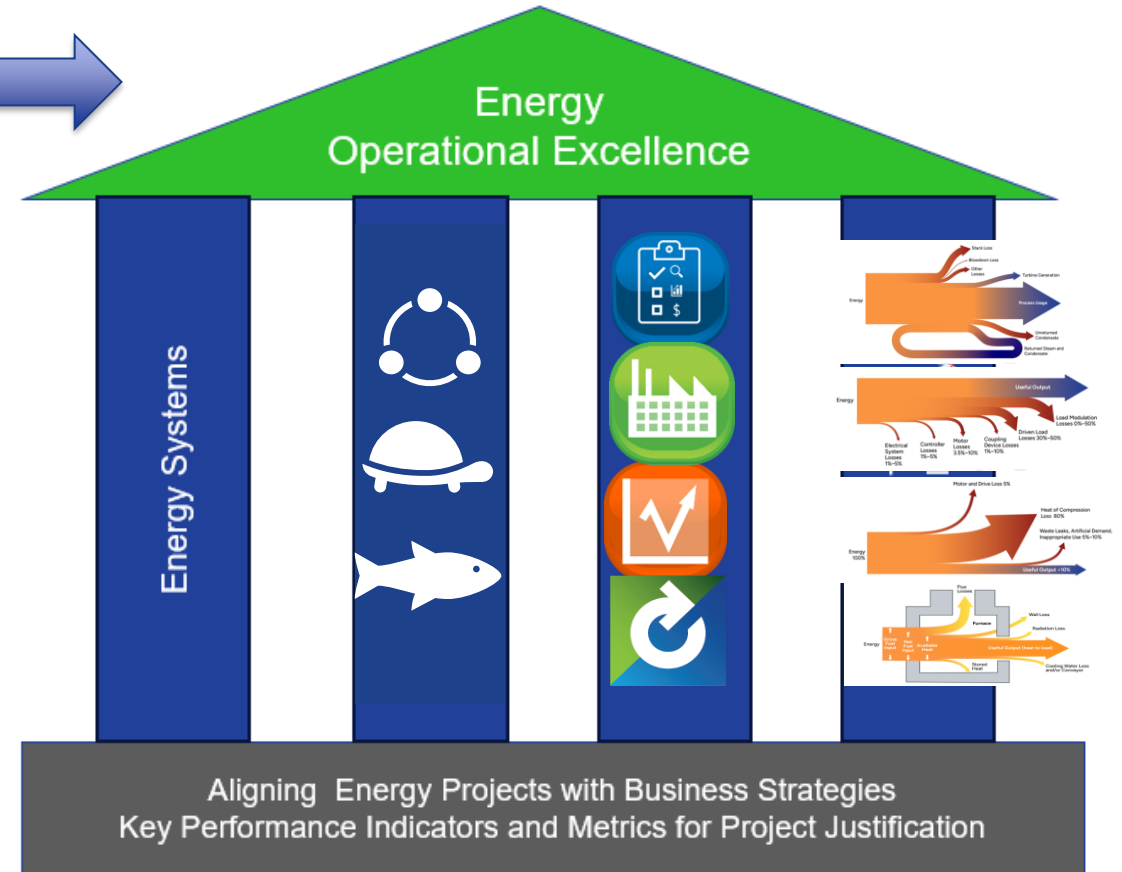
- Energy initiatives undergo the same rigorous evaluation and approval process as that of other capital investments, competing for funding and strategic fit.
- To unlock these benefits, a structured approach is essential—operational excellence and continuous improvement tools make this possible.

Energy Projects Advance Operational Excellence

Better Plants Resources Assist Energy Project Implementation



Classic View



Integrate Energy Productivity

Graphics by Sarah Cooney, NLR and Kristina Armstrong, ORNL

JUSTIFI Integrates Basic Continuous Improvement Tools

To find multiple benefits:



Follow the define, measure, analyze, improve and, control (DMAIC) process.



Map Connections with Turtle Diagram.



Use Cause and Effect Fishbone Diagram.

DMAIC Process



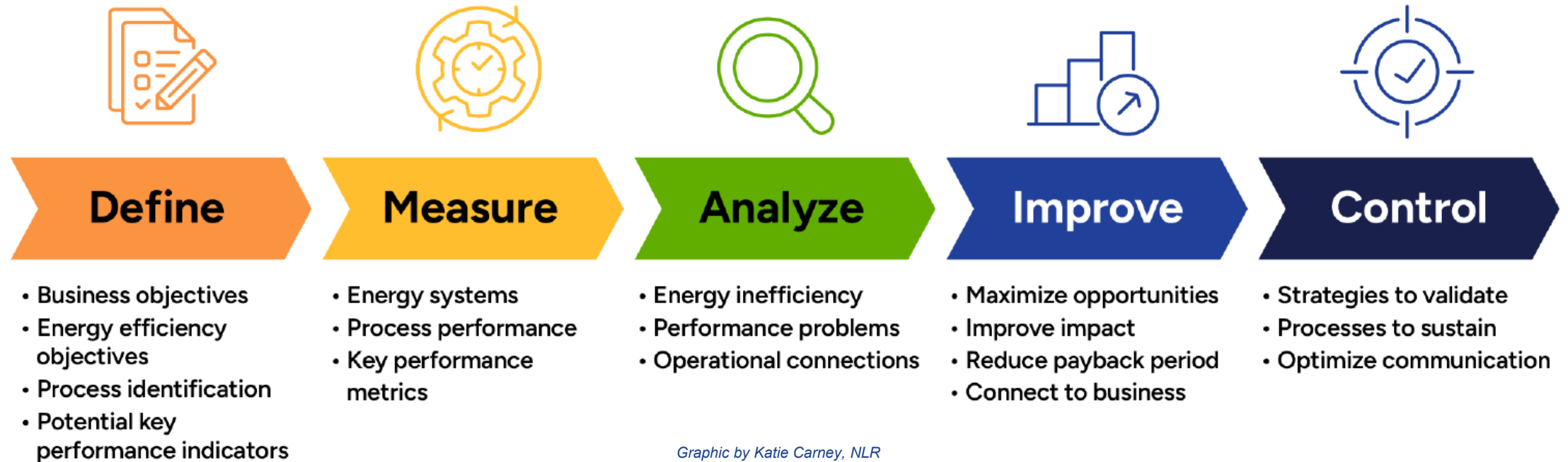
Graphic by Katie Carney, NLR

Effective Tools since late 1980's

- Invented 1986 at Motorola (Six Sigma) Based on 1920's Plan-Do-Study-Act cycle.
- Widely adopted in all industries.
- Process which engages stakeholders.
- Linear but also iterative
- Best outcomes from cycling back through steps.
- Some overlap between steps.
- This is a guiding tool, not prescriptive.

DMAIC Process for an Energy Assessment

Steps of an energy assessment naturally fit into this process.
You do them already as best and effective practices!



Graphic by Katie Carney, NLR

DMAIC Process Integrated into JUSTIFI

JUSTIFI software is designed to integrate all the best DMAIC practices into 3 simplified phases.



Information Captured in JUSTIFI

- Value proposition of facility, stakeholders, KPIs/KPMs
- Energy project ideas, multiple benefits, and valuation of those benefits
- Designed and custom reports
- Project presentations



Why Use a Turtle Diagram?

- **Organizational Overview**

Used to give assessors a roadmap of an energy assessment and processes when getting started.

- **Clarity**

It provides a simple, single-page view of complex interdependencies without getting bogged down in massive flowcharts.

- **Continuous Improvement**

Helps teams spot missing resources, unclear instructions, or missing performance measures.

Turtle Diagram for Energy Assessments

Understand Energy Projects Connections to Operational Improvements

Instructions:

Input - Enter energy into the "Input" box (e.g., electricity, natural gas).

Process - Enter basic manufacturing processes and equipment consuming this energy covered in the assessment.

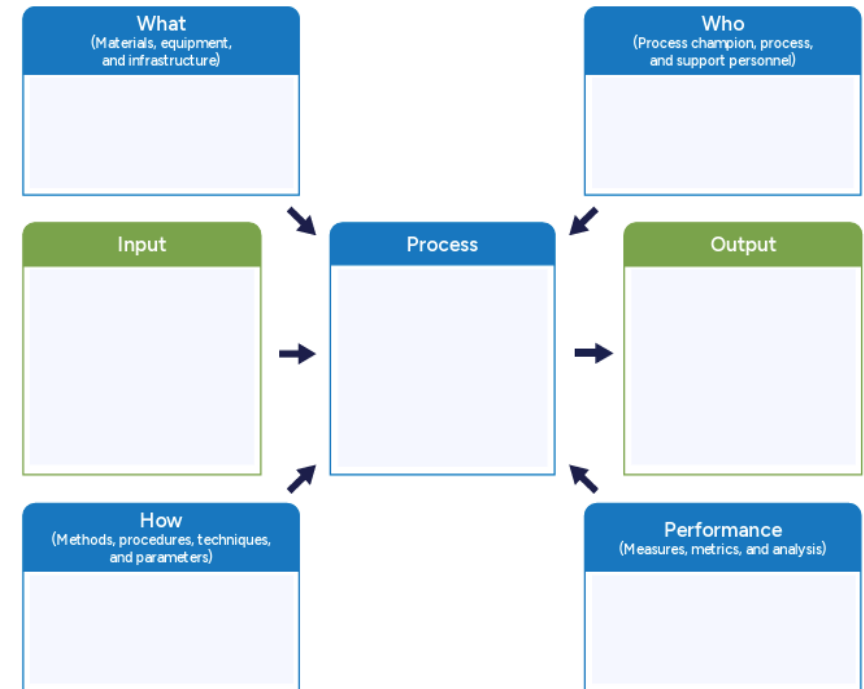
What - List energy equipment (e.g., boilers, compressors, ovens) by industrial systems impacted by the energy assessment.

Who - Enter the process champions and support personnel for those processes.

How - Enter relevant operating procedures or standards guiding operations.

Performance - List performance metrics associated with those processes, such as productivity, yield, defects, and downtime.

Output - Enter basic process outputs, such as what is made or converted.



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Scan for NLR Multiple Benefits Resources Website

<https://www.nlr.gov/manufacturing/multiple-benefits-of-manufacturing-energy-productivity>

Why Use a Fishbone Diagram?

- **Targets Full Picture**

Teams often think of the most obvious impacts. This forces you to look deeply at systemic impacts.

- **Structurally Categorizes Brainstorming**

Instead of random brainstorming, the diagram forces your team to consider potential predefined categories.

- **Uncovers Complex, Interconnections**

A fishbone diagram maps out overlapping cause and effect variables

- **Prevents "Groupthink" and Quick Judgments**

Teams often jump straight to the easiest conclusion. By visualizing the categories, the diagram highlights areas the team might ignore.

Energy Productivity Cause-and-Effect Fishbone Diagram

Instructions:

1. Write down energy project idea near the head of the fishbone diagram.
2. Reflect on opportunities to talk to all or some of the contacts in these areas (bones).
3. Add areas that are missing.
4. Talk to contacts in these areas and ask them how this project could improve operations.
5. Collect data on quantifying the operational impacts.



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"Give a man a fish, and you feed him for a day.
Teach a man to fish, and you feed him for a
lifetime."

Chinese philosopher [Lao Tzu](#).

Resources

JUSTIFI, templates, training presentations, user guide, and case studies.

ORNL Industrial Resources Website



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Identify and quantify **multiple benefits** from implementing energy improvement projects.

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Teaching example—Cocoa Co.

We'll walk through pre visit, data collection, and evaluation phases.

First a little about Cocoa Co. and some practice exercises.

JUSTIFI Example: Cocoa Co.



Photo from Microsoft stock image

Value Proposition: “Quality you never forget!”

Performance Metrics: Safety, Quality, On Time Delivery, and Cost

Goals: Increase Revenue 20%, Reduce Defects 10%, and Reduce Cost 20%

Details

- Small manufacturer (SMM), making high-quality chocolate bars and candies. Quality drives customer loyalty. ISO certified. People from all over central Ohio enjoy touring the chocolate factory.
- This example will be on a steam assessment in Columbus, Oh facility.
- Chocolate bar line has high defect rate.
- Plant manager problems: safety incidents, needs to reduce costs, and produce more.

General Information	Annual Energy Information
HQ: 100 Woodruff Ave, Columbus, Ohio 43228	Electricity: 12,834,720 kWh
Facility: 123 Chocolate Ln, Cincinnati, Ohio 45214	Electricity Cost: \$0.13/kWh
Building Age: 50 years	Peak Demand: 5910 kW
Building Area: 28,000 ft²	Demand Cost: \$2.50/kW
# of Employee: 135	Natural Gas: 72,189 MMBtu
Sales: \$153M/y	Natural Gas Cost: \$6/MMBtu
Production: 21.7 Mlb/y	

Synthetic for teaching purposes

1st Practice Exercise

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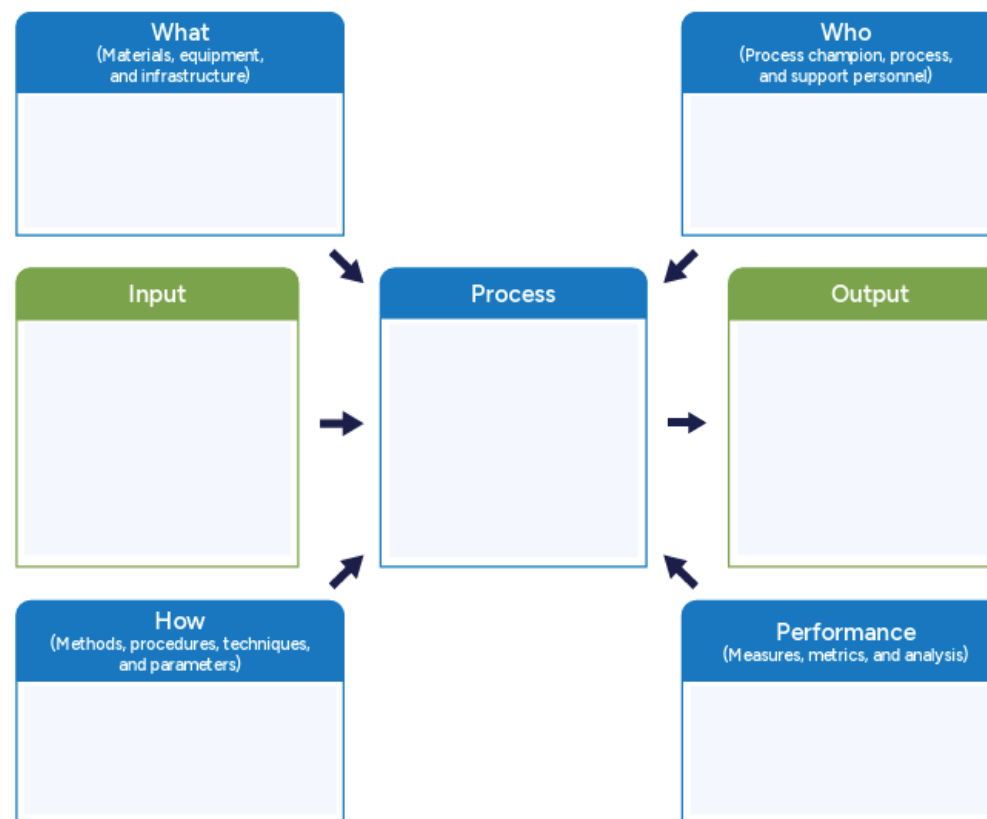
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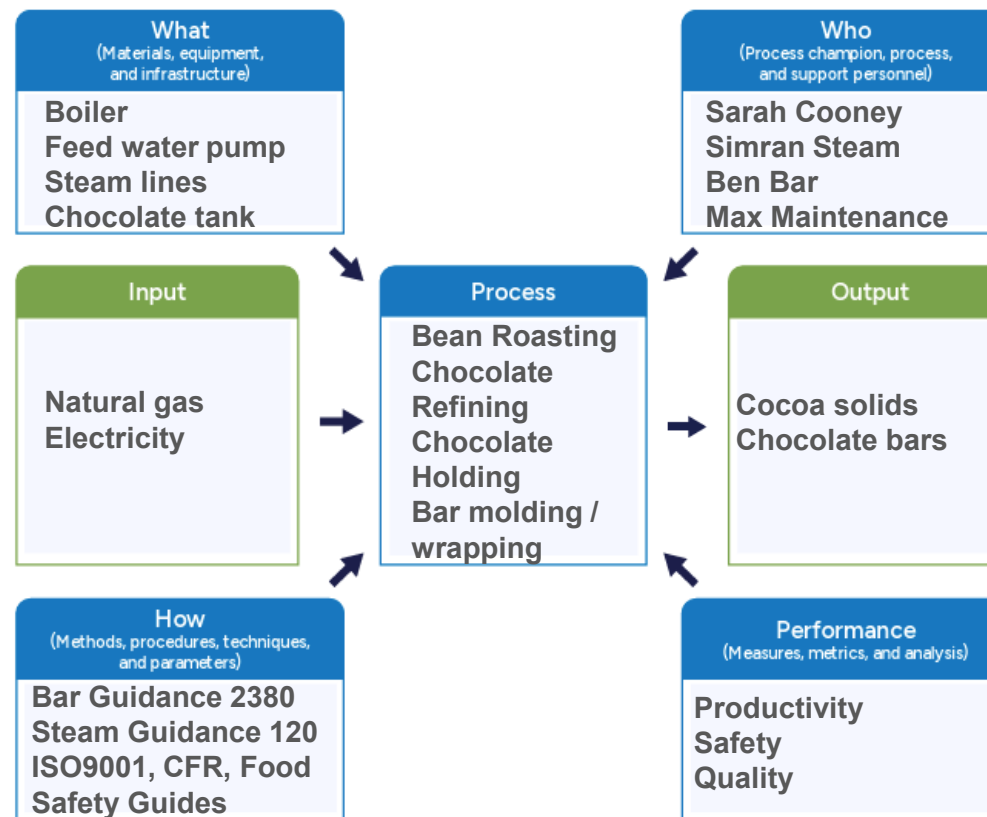
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2nd Practice Exercise

Energy Productivity Cause-and-Effect Fishbone Diagram

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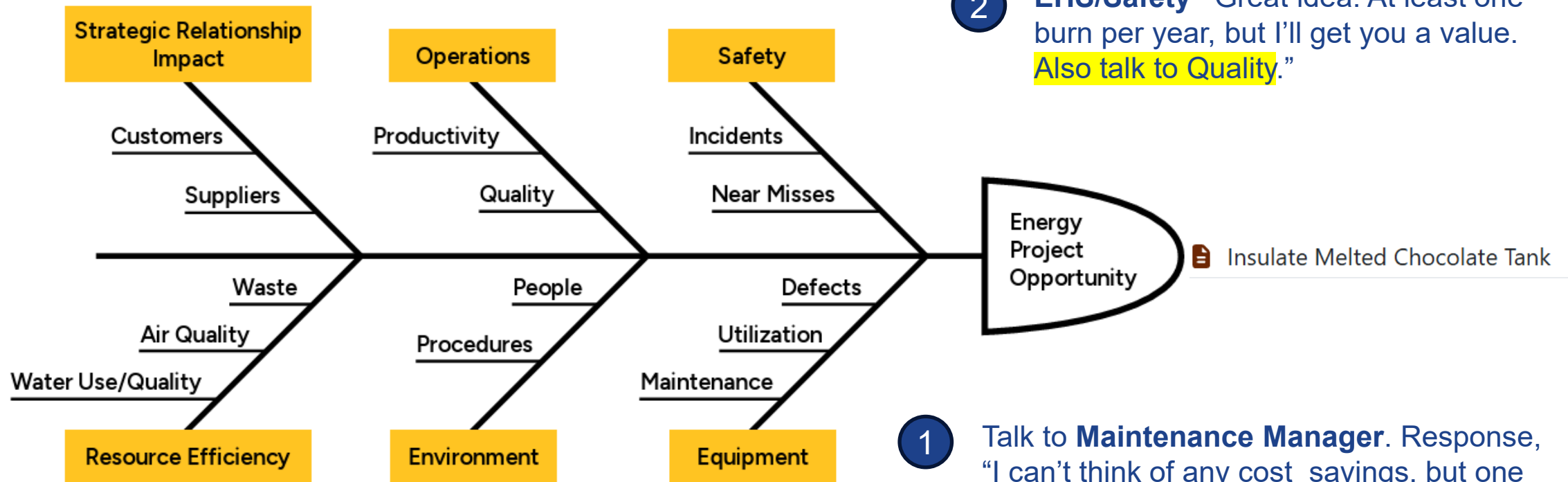
2nd Practice Exercise- Fishbone Diagram

3

Quality “You are using a fishbone diagram? That’s a good idea. Defects will go down 35% if we can insulate the tank. If we increase safety, maybe more tours. Talk to **marketing manager**.”

2

EHS/Safety “Great idea. At least one burn per year, but I’ll get you a value. **Also talk to Quality.**”



4

Marketing manager says that **tours** could increase by **\$2,000**

1

Talk to **Maintenance Manager**. Response, “I can’t think of any cost savings, but one of our maintenance guys got burned last year. **Go talk to EHS/Safety.**”

JUSTIFI Link- Let's get started!

JUSTIFI

v1.0.0

Settings

Feedback & Support

Upload Data

Download Backup Data

Welcome to JUSTIFI!

Use this tool to identify, estimate potential and report on operational and strategic improvements (Multiple Benefits) that can be found while conducting energy assessments.

Find Multiple Benefits

Use the setup wizard to work through the process of finding Multiple Benefits. In the wizard you will create and provide details for a company and facility. Then you will add energy assessment details that will allow you to discover additional operational and strategic benefits.

Setup Wizard

JUSTIFI Portfolio

View the companies, facilities and assessments inside of your JUSTIFI application from the portfolio window.

My Portfolio

Multiple Benefits Resources

Example Case Studies

[Cocoa Co. Example Data](#)

Click the above link to add an example company to your portfolio. This will allow you to view a completed example energy assessment visit to a fictional chocolate company's facilities.

[Canopy Training Example](#)

Click the above link to add a training example of replacing an air compressor and fixing air leaks at a fictional company.

[Multiple Benefits Knowledge Library](#)

The Multiple Benefits Knowledge Library provides resources for industrial practitioners and decision makers seeking to capture the full value of energy productivity projects. The library helps users identify

<https://justifi.ornl.gov/#/welcome>

Better Plants
U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT
of ENERGY

JUSTIFI live demo

<https://justifi.ornl.gov/#/welcome>

Session 3 Practice Assignment

- We will send the practice assignment worksheet to you after today's training session.
- Complete the Camper Canopies worksheet to practice JUSTIFI navigation and answer questions on the worksheet. (1 hour)
- **For extra credit** continue learning by entering a project of your own and work through JUSTIFI modeling for your facility.
- Camper Canopies Results will be reviewed in next week's session.
- If you have questions, email Sarah.Cooney@nlr.gov.

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Wrap up

Questions?

Post your question in chat or use “Raise Hand.”