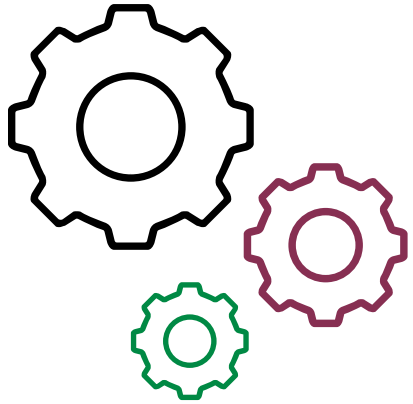


Low-Cost / No-Cost Flow Reduction

- Demand-Side Projects for Energy Efficiency

May 2025

Jon Jensen
Energy Conservation Manager
SMC Corporation of America

What to Look For ?...

01 – **Inefficient Air Delivery Mechanism**

02 – **Energy Intensive Applications**

03 – **Over-Pressurized Applications**

04 – **Idle - Mode Savings**

05 – **Ways to Sustain Your Efforts**

ENERGY SAVING SOLUTIONS

01

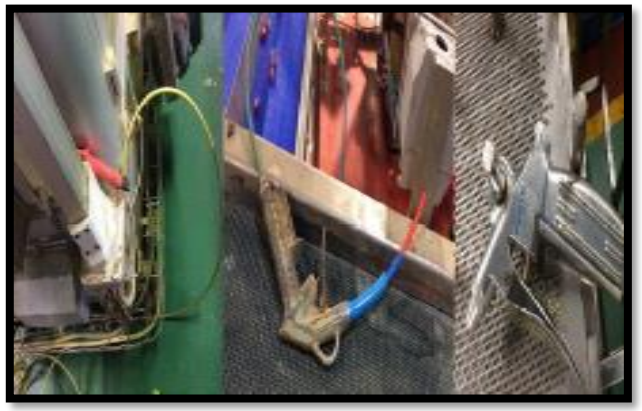
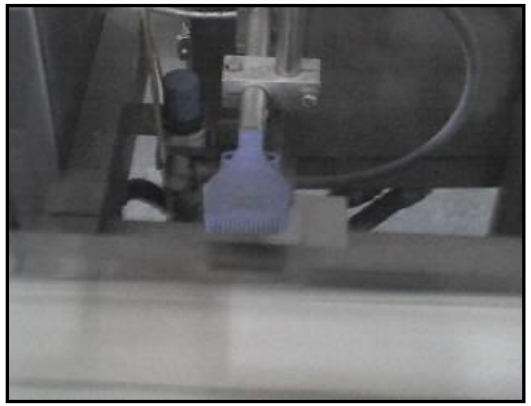
Inefficient Air Delivery Mechanism

ENERGY SAVING SOLUTIONS

COMMON APPLICATIONS:
BLOWING COMPRESSED AIR

- **Move, cool or guide product**
- **Dry and clean product or conveyor belts**
- **Cool electrical cabinets**
- **Mixing liquids**
- **Eject defective products**
- **Product transfer**




ENERGY SAVING SOLUTIONS

Open Tubing / Pipe

- ✓ No Regulator
- ✓ No Nozzle
- ✓ Too Far
- ✓ Misdirected

Air Knives / Air Nozzles

- ✓ High Pressure
- ✓ Not Automated
- ✓ Not Regulated
- ✓ Continuously blows when machine is not in use
- ✓ Mounted too far away

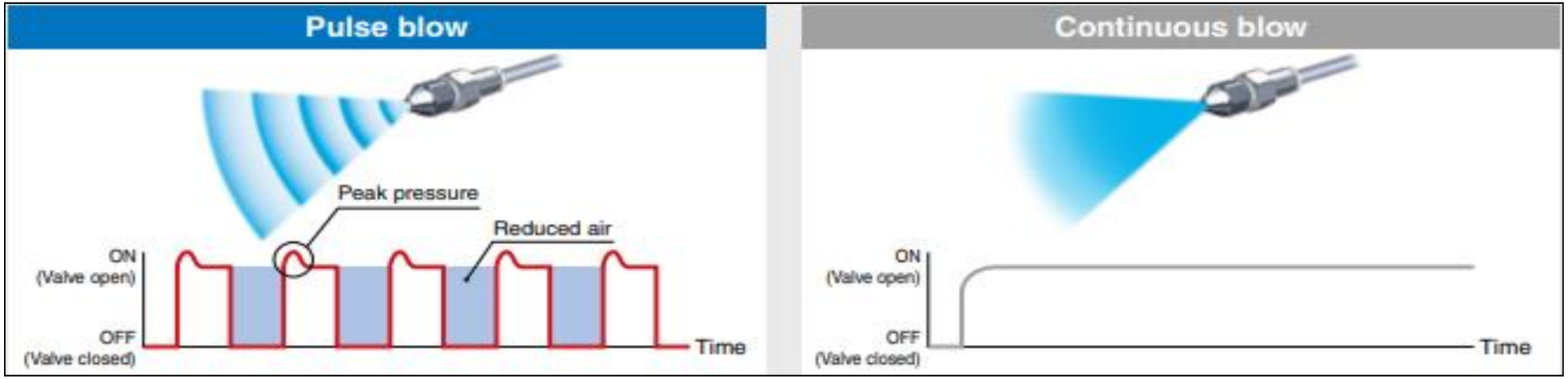
ENERGY SAVING SOLUTIONS

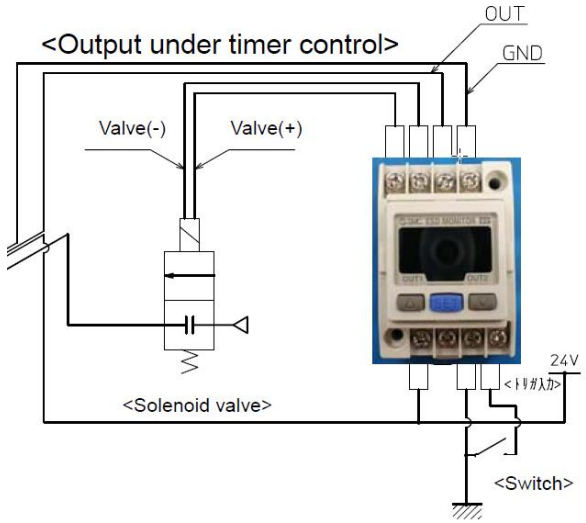
- ✓ Measure consumption

- ✓ Employ High-Efficiency air nozzles
- ✓ Consider Air Amplifiers
- ✓ Automate shut-off
- ✓ Operate at lowest effective pressure
- ✓ Consider pulses rather than continuous

ENERGY SAVING SOLUTIONS

AIR BLOW
SOLUTIONS





50% Savings is easily achievable, depending upon the application!

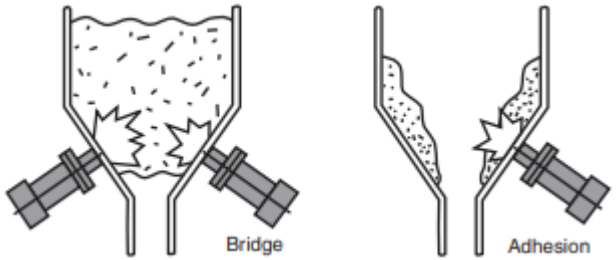
ENERGY SAVING SOLUTIONS

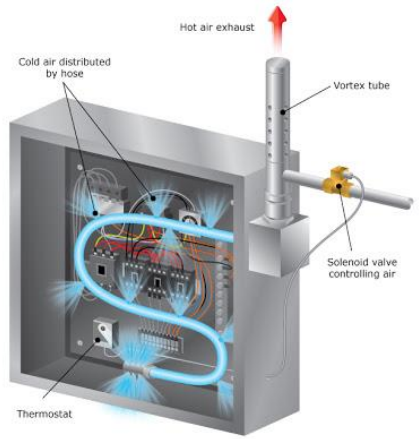
02

Energy Intensive Applications

ENERGY SAVING SOLUTIONS

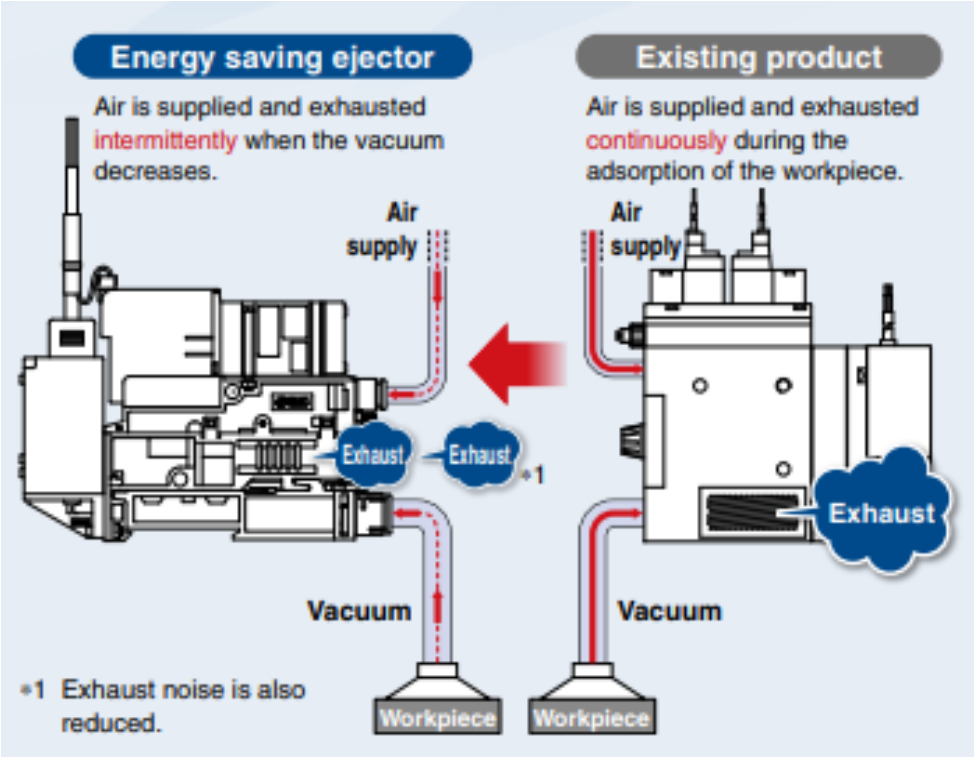
- Pneumatic Vibrators
- Air Guns
- Cabinet Cooling
- Product Reject
- Vacuum Venturis (more)





ENERGY SAVING SOLUTIONS

- Vacuum Generators
  - Use more efficient, multi-stage venturis
  - Cut-off air supply when vacuum is reached
  - Apply vacuum only when required
- Consider mechanical vacuum pumps
  - for long duration requirements



ENERGY SAVING SOLUTIONS

03

OVER PRESSURIZED APPLICATIONS

ENERGY SAVING SOLUTIONS

OVER PRESSURIZED APPLICATIONS

- Notice applications without pressure regulators fitted
- Pressure regulator is set to line pressure – most machines should operate below line pressure
- What is the OEM pressure requirement?
- Many machines can operate at or below 75 psig (0.5 mPa)
- Similar applications set at different pressures – Why?

ENERGY SAVING SOLUTIONS

Minimizing the machine's pressure

Reducing the pressure by **14.5 psi (0.1mpa)**,
can reduce power consumption by about **7%**

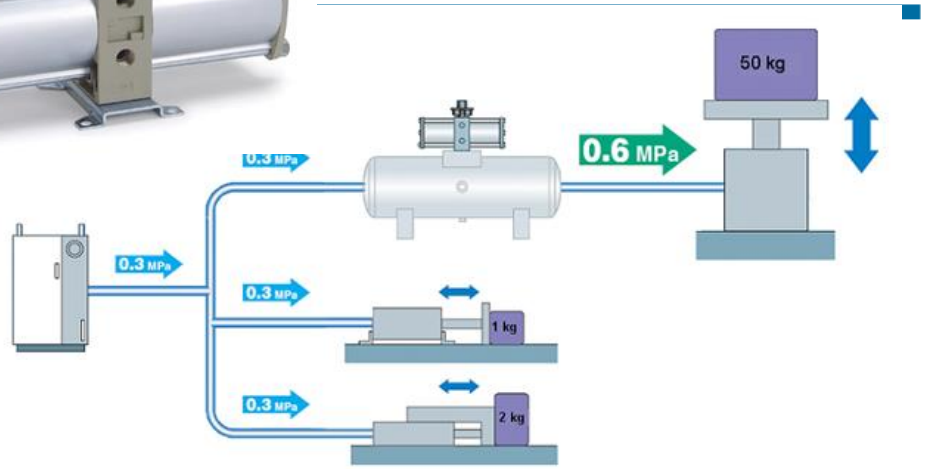
	Unit	Value	Optimization
Air Pressure	bar	7	6
Working time per day	h	16	16
Working days	days	5	5
Working time per year	h/year	4160	4160
Air consumption during operation	l/min	1300	1160
Air consumption per year	m³/year	324 480	289 536
Cost of 1 m³ of compressed air	€/m³	0,02	0,02
Compressed air cost per year	€/year	**6489,6**	**5790,72**

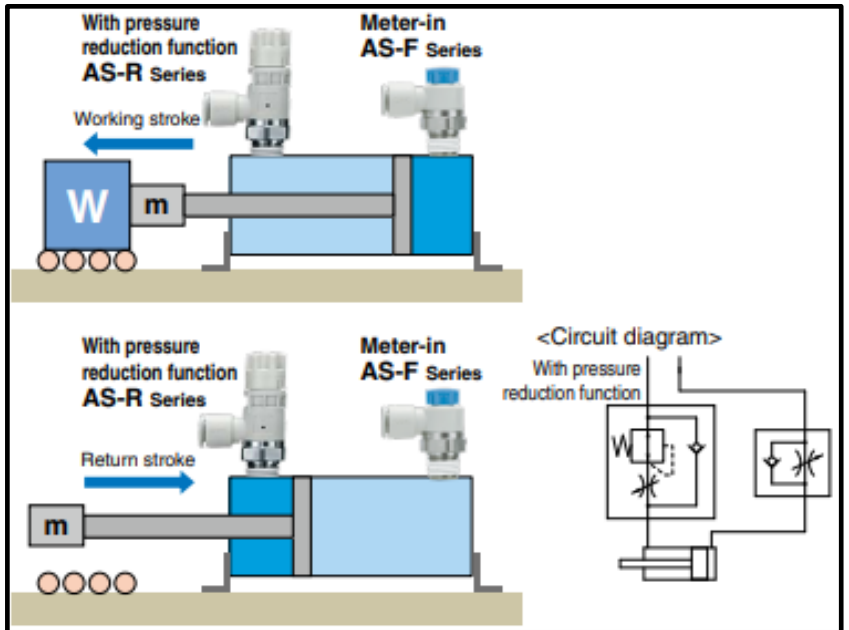
Savings ~ **$770 per year**

ENERGY SAVING SOLUTIONS

Design for minimum flow and pressure

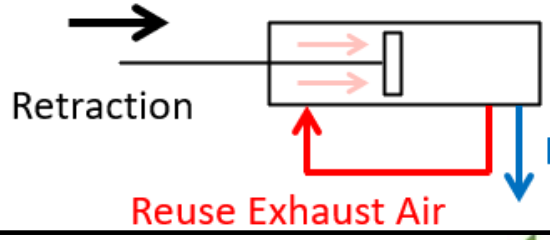
- Variable Pressure
- Minimum Pressure for application
- Actuator Return Stroke
- Exhaust Return Circuit





Exhaust Return Circuit is…

An air saving circuit reusing exhaust air for cylinders' retraction



ENERGY SAVING SOLUTIONS

04

IDLE MODE

ENERGY SAVING SOLUTIONS

IDLE MODE
SAVINGS

- Idle mode is when the machine has pressure supply ON and not in production.
- Flow through the machine indicates air leaks, which should be fixed.
- Leaks (and other air usage) leads to creation of artificial demand
    - Artificial Demand can lead to additional compressors starting up.

- ✓ Check if the pressure is removed or reduced
- ✓ Check for the presence of a shut-off valve
- ✓ If pressure supply is ON during idle mode…

  Measure the flow and estimate potential savings.

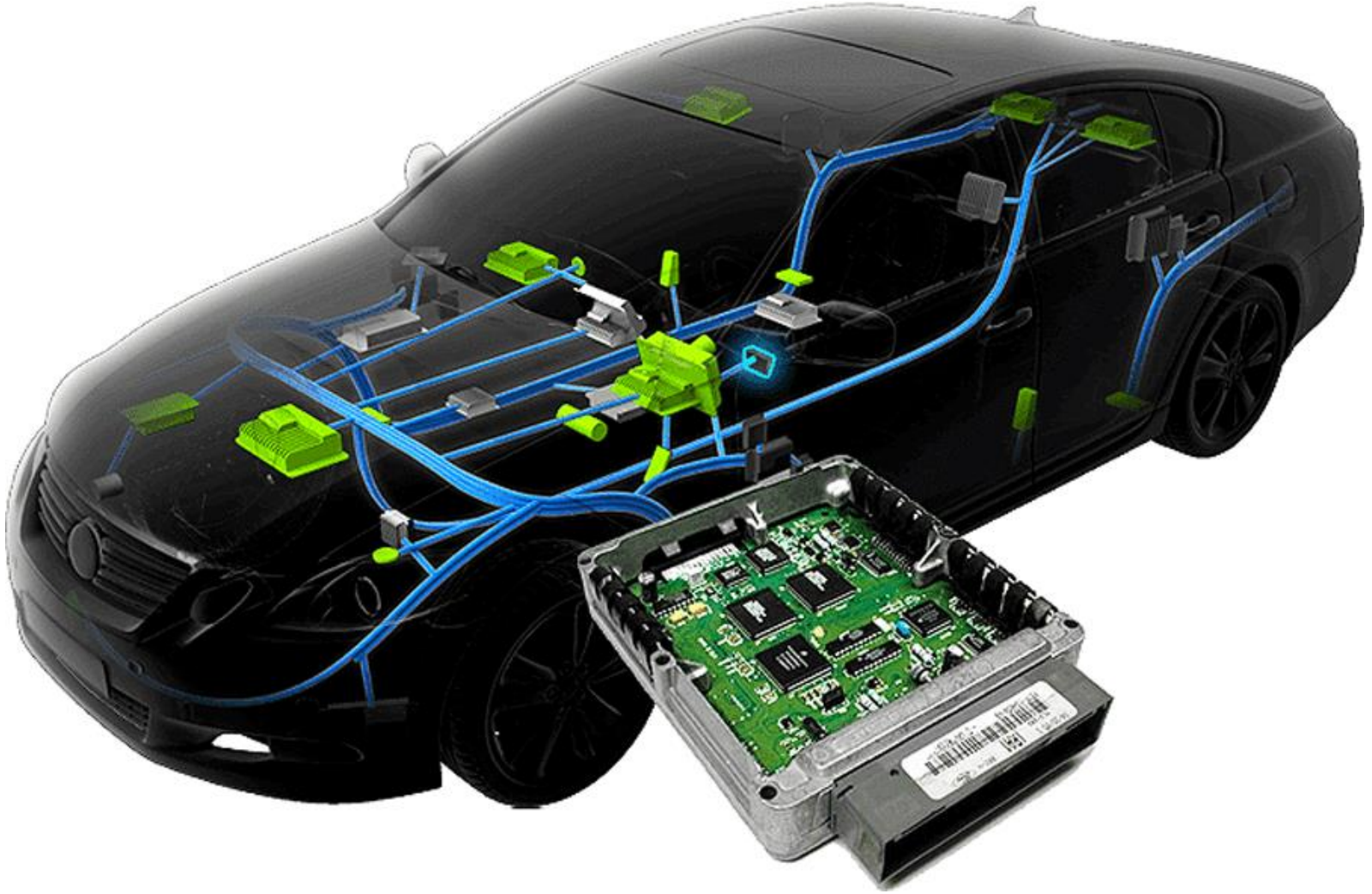
ENERGY SAVING SOLUTIONS

05

Sustaining Your Efforts

ENERGY SAVING SOLUTIONS

Sustainability



How do we make a production machine at least as smart as the average automobile?

ENERGY SAVING SOLUTIONS

Sustainability

Monitoring!

- General Monitoring & Visual Indication
- Dedicated “Leak Detection” Sub-Routine
- Monitoring & IIOT (Big Data - more)

Measure the consumption and set a baseline. When baseline is exceeded, investigate!

ENERGY SAVING SOLUTIONS

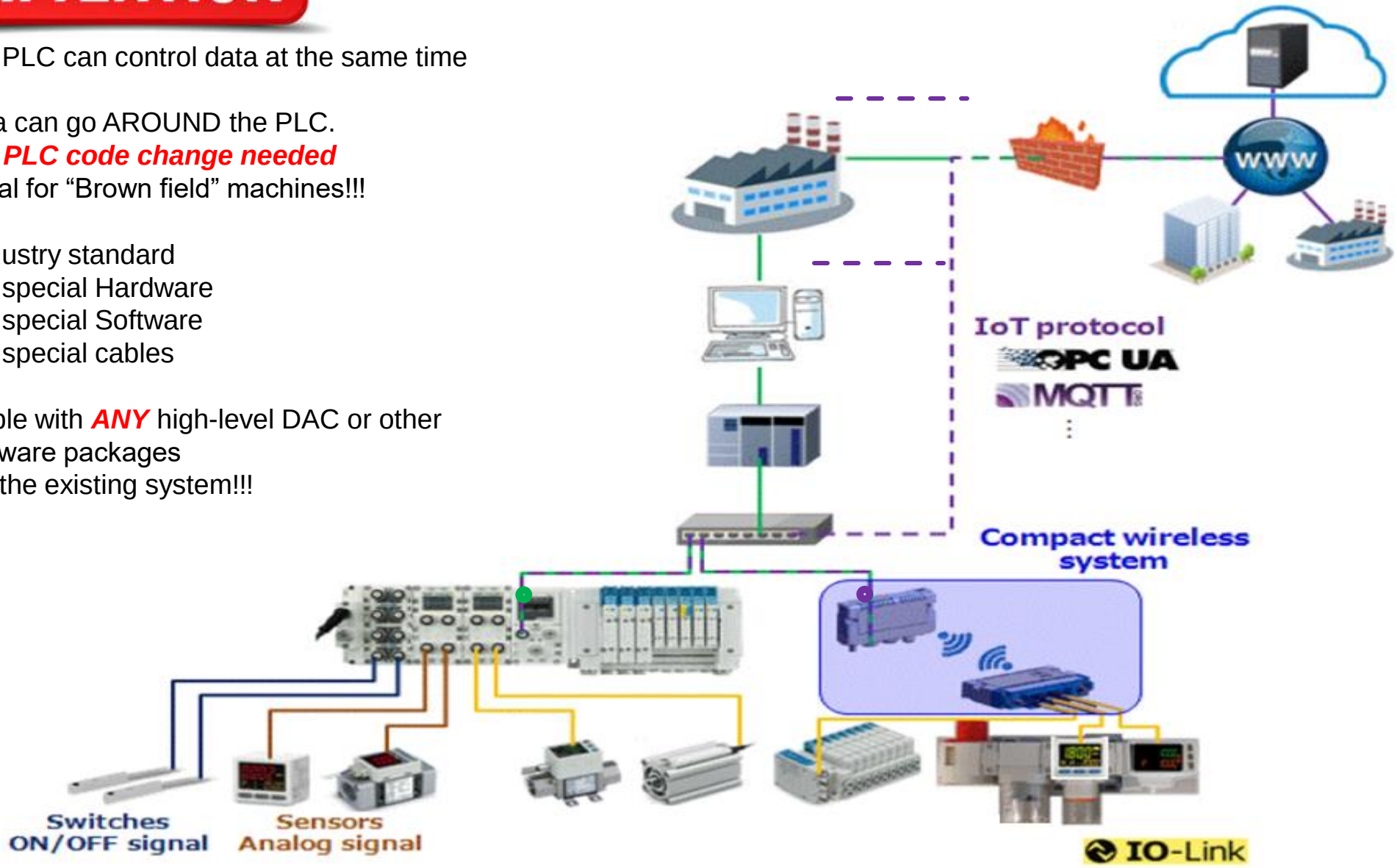
Sustainability with IIOT

- IIOT and PLC can control data at the same time

- IIOT Data can go AROUND the PLC.
  - ***No PLC code change needed***
  - Ideal for “Brown field” machines!!!

- Open Industry standard
  - No special Hardware
  - No special Software
  - No special cables

- Compatible with ***ANY*** high-level DAC or other “OT” software packages
- ADD TO the existing system!!!



Triple benefits of Machine-Level Monitoring

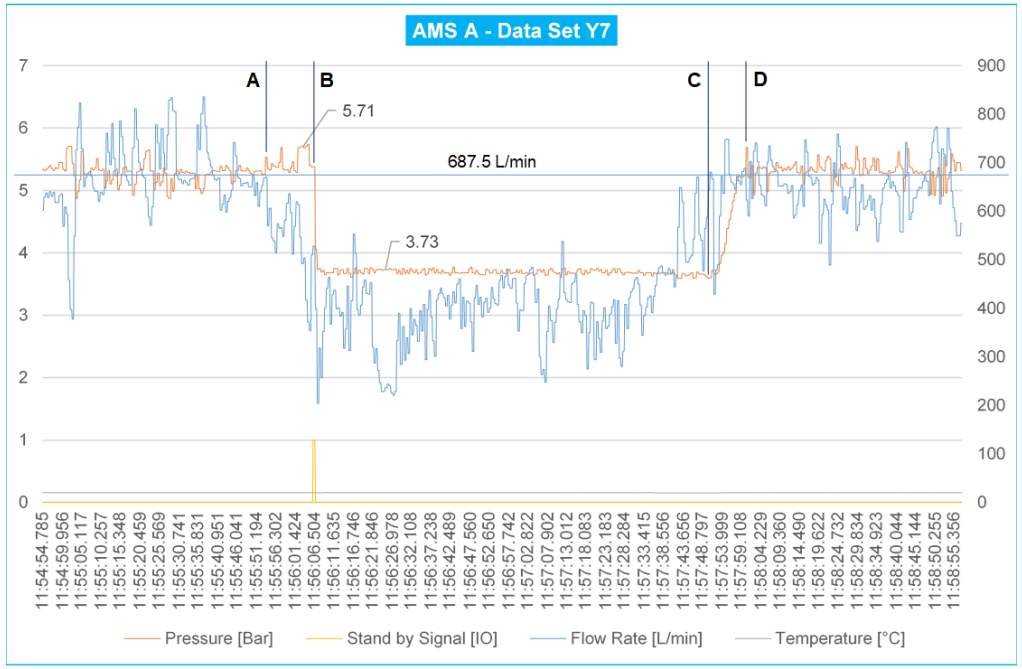
- Sustainability
  - Reduce air pressure “automatically” during non-production periods
- Predictive Maintenance or Condition Based Maintenance
  - Use pressure and flow data to “fingerprint” preferred operating conditions
  - Flag anomalies when pressure or flow is out of range
- Digitalization
  - Use data collection to benchmark machines and factories
  - Control machines and processes virtually.

Sustainability – reduce / shut off pressure

- Reduce pressure to achieve CO^2 reduction by using less compressed air
  - Integrate the “Stand-By” function previously discussed

  - Shut off air pressure for extended non-production (Isolation Mode)

Reduced Pressure



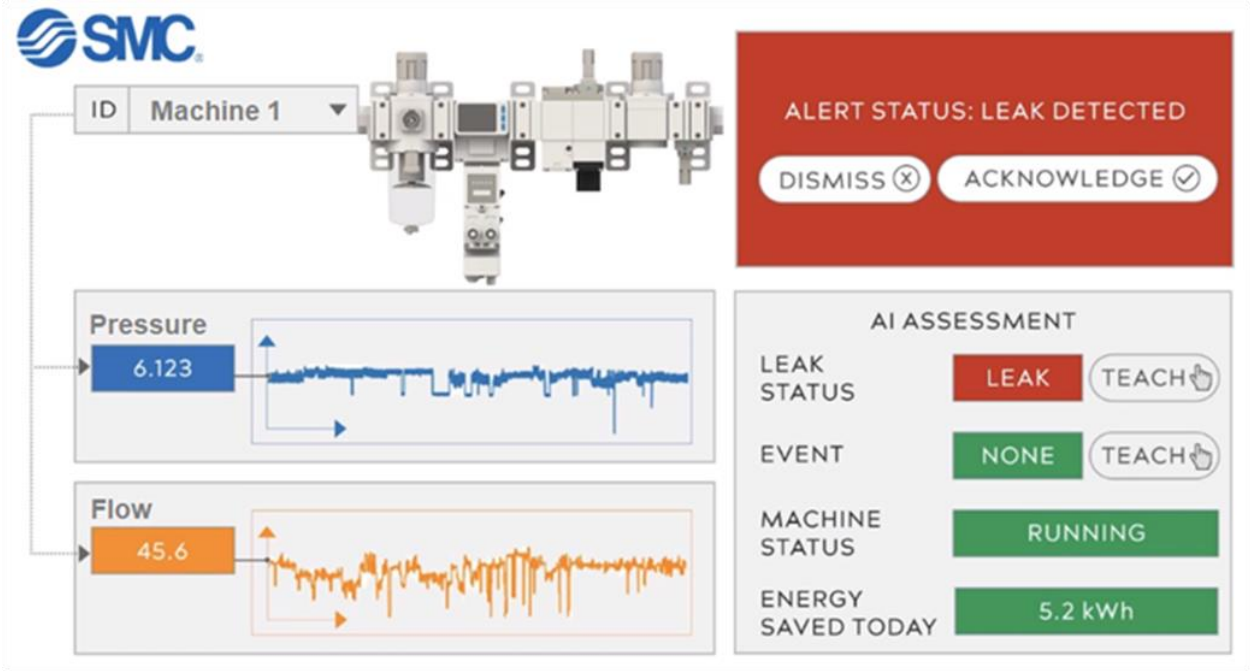
No Pressure

ENERGY SAVING SOLUTIONS

Predictive maintenance – Condition based

- Collect pressure, flow and temperature to establish baseline
  - Digital fingerprint machine
  - Record “unauthorized adjustments”
  - Flag anomalies in real time
    - Know before it fails
    - Schedule maintenance
  - Connect to fieldbus or Open Protocol
    - Integrate with existing systems

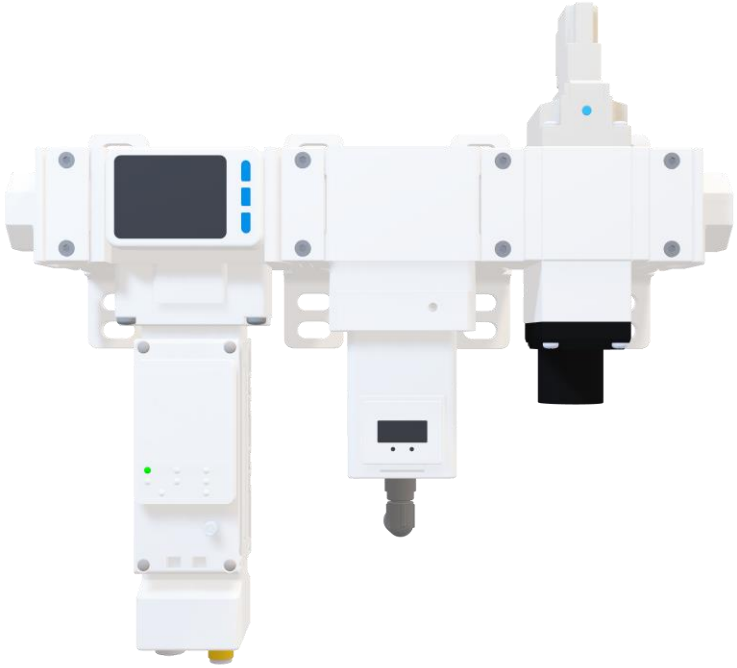
Provided by 3rd party analytics vendor



ENERGY SAVING SOLUTIONS

Digitalization

- Collect data
  - Benchmark like machines
- Control / Monitor systems remotely
  - Digital twin, virtual factory
- Send and receive
  - Flow, Pressure, Temp, IO and device status
  - Additional, non-pneumatic sensor data
    - Vibration, Dewpoint, Amperage, etc.



ENERGY SAVING SOLUTIONS

Key Take-Aways:

- Implement Energy Saving measures
- Apply correct product
- Design for lowest TCO
- Monitor to sustain improvements

ENERGY SAVING SOLUTIONS

thank you.

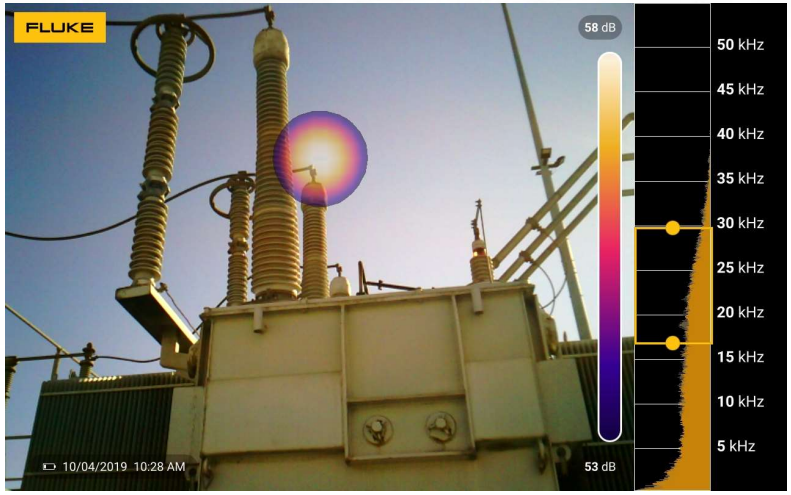
ENERGY SAVING SOLUTIONS

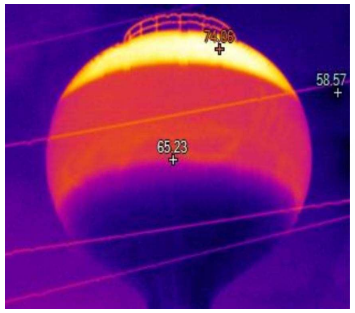
FLUKE®

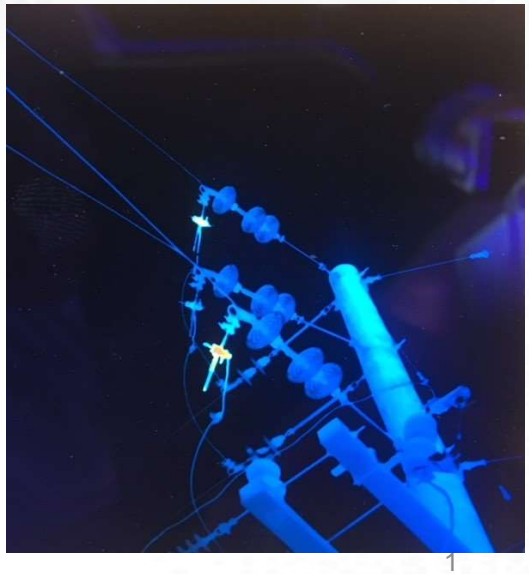
Keeping your world up and running.®

Werner Electric 2025 Power & Energy Summit

Acoustic / Thermal / PQ Overview







WHO IS FLUKE?

- Energy Efficiency
- Predictive Maintenance
- Calibration
- Clean Energy

- Energy Logging/Power Quality
- Thermal/Acoustic Imaging
- Vibration & Alignment
- Cabling & Networks

- Rugged
- Reliable
- Safe
- Accurate

Agenda

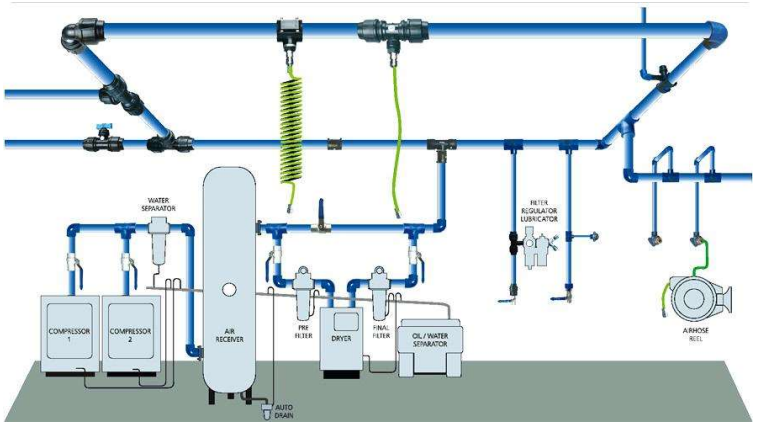
- Acoustic
- Power Quality
- Thermal
- Areas of opportunity

Has Anyone Used One of These?

Anyone Used This Technique?

Where it Started…

Scanning a facility means miles of piping, junctions and machines



Traditional methods:

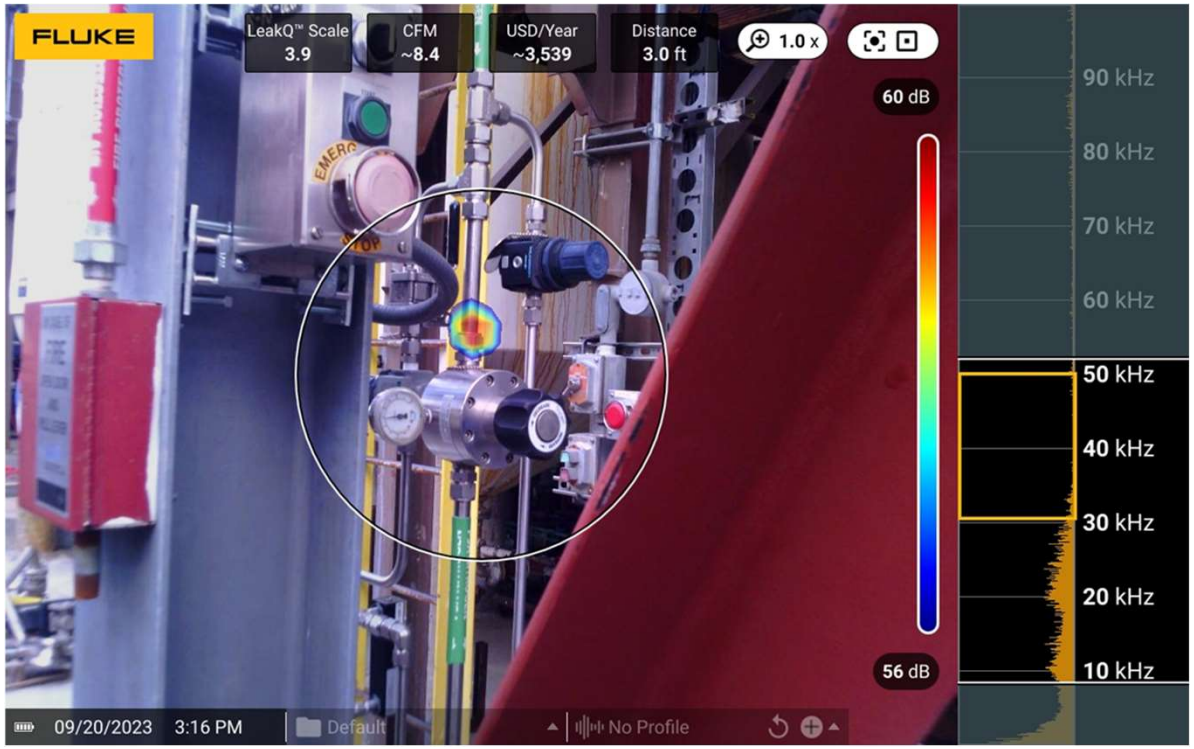
1. An educated ear, “snake hunting”
2. Soapy water
3. Ultrasonic leak detectors

Conventional	
Distance	Close access to leak source required → ladders or lifts required
Ambient sounds	Ambient sound reduces ability to detect → planned downtime required
Experience	Skilled/experienced staff required → outsourcing
Reporting	Multiple tools/equipment required: Conventional leak detector, photo camera, laptop, notebook → inefficient
Robustness	Sensitive and fragile equipment → not appropriate for day-to-day usage in industrial environments
Time	Time intensive → high labor costs

What is Acoustic Imaging?

Technology that creates a SoundMap (image) based on sound waves

The SoundMap is overlaid onto a visible image

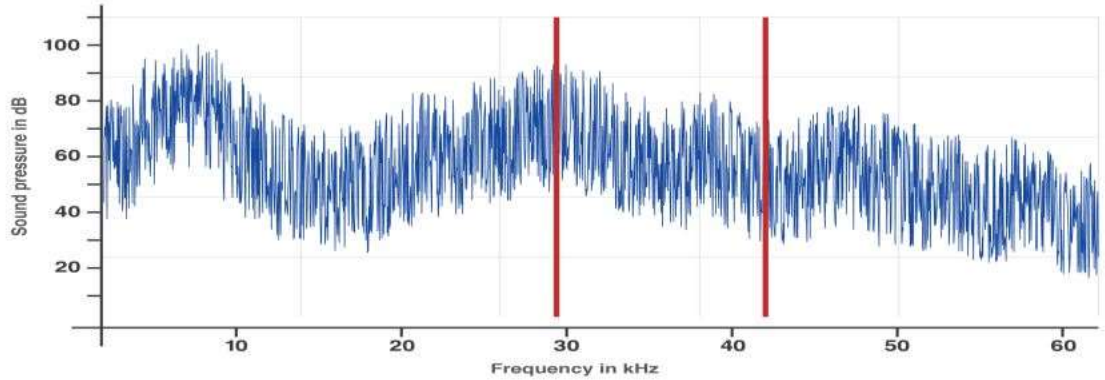


Sound noise 101

Practical considerations - Noise

Noise

- In the ii900 the signal or sound of interest to us is very often in the high frequency range.
- A high pressure leak will have a wide frequency spectrum. In a noisy factory there is likely to be a lot of low frequency sounds. We use the fact that a high pressure leak has sound in the **30-45KHz** band.



Fluke ii915 Precision Acoustic Imager

Video recording up to 5 minutes

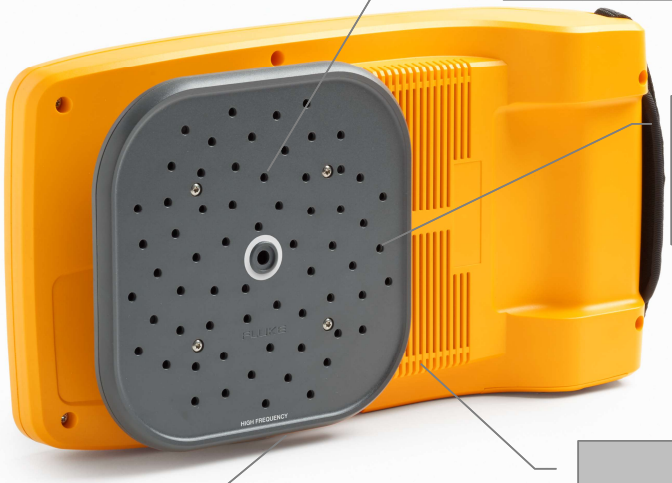
SoundMap™ image

7” LCD Touchscreen with backlight

64 Digital MEM microphones arranged optimally

LeakQ™ and PDQ™ for Leak and Partial Discharge quantification

Detection range of 300ft



>6 hours battery life

2 kHz to 100 kHz

Rugged design IP40 rated

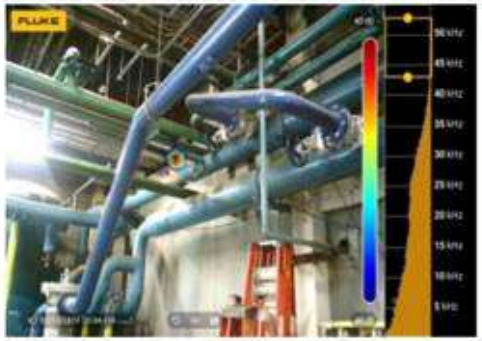
USB-C for direct PC and Fluke Connect Desktop connectivity

Benefits of Acoustic Imaging

FEATURE	CUSTOMER BENEFIT
Visualization of Leaks	Inspections are done 5 to 10 times faster by spotting leaks on the screen over live image.
Intuitive Interface	Little to no training required. First time users start finding leaks within minutes.
Reporting leaks by pictures	Easy tagging and communication of the exact location of leaks to teams fixing them
Based on sound	Independent of ambient temperature or air/gas temperature, no matter if indoors or outdoors
Ultrasonic range	Detects leaks even under noisy conditions
For Air, Vacuum, Gas or Steam	Detects leaks of any type of compressed gas, including vacuum leaks

Types of Leaks

Air Leak



Steam Leak

Vacuum Leak

Nitrogen Leaks

Exhaust Leak- Hazardous Gases

Target Application – Compressed Air, Gas, and Vacuum Leaks

SoundSight visually maps sound instead of heat

Fluke ii915

Detects 0.005CFM leak at 100psi from 33ft

- Acoustic Image that overlaps with live visual image
- Range of detection up to 300ft
- Saves SoundMap™ images and videos
- Frequency ranges/filters selectable by user
- Ultrasonic detection up to 100kHz
- 7” LCD Display, capacitive touchscreen

1a Prepare

Set Camera Operating Conditions

- Conditions are set in multiple menus
- Can be saved the way you like in a profile
- Are now saved in the individual .as2 file captures

It's critical to set operating conditions before going out for an inspection

2c **Inspect** **Switch from Image Mode to Desired Mode**

1 Capture Mode

Be aware of the capture mode at all times

2a **Inspect**

Start by scanning in Image Mode

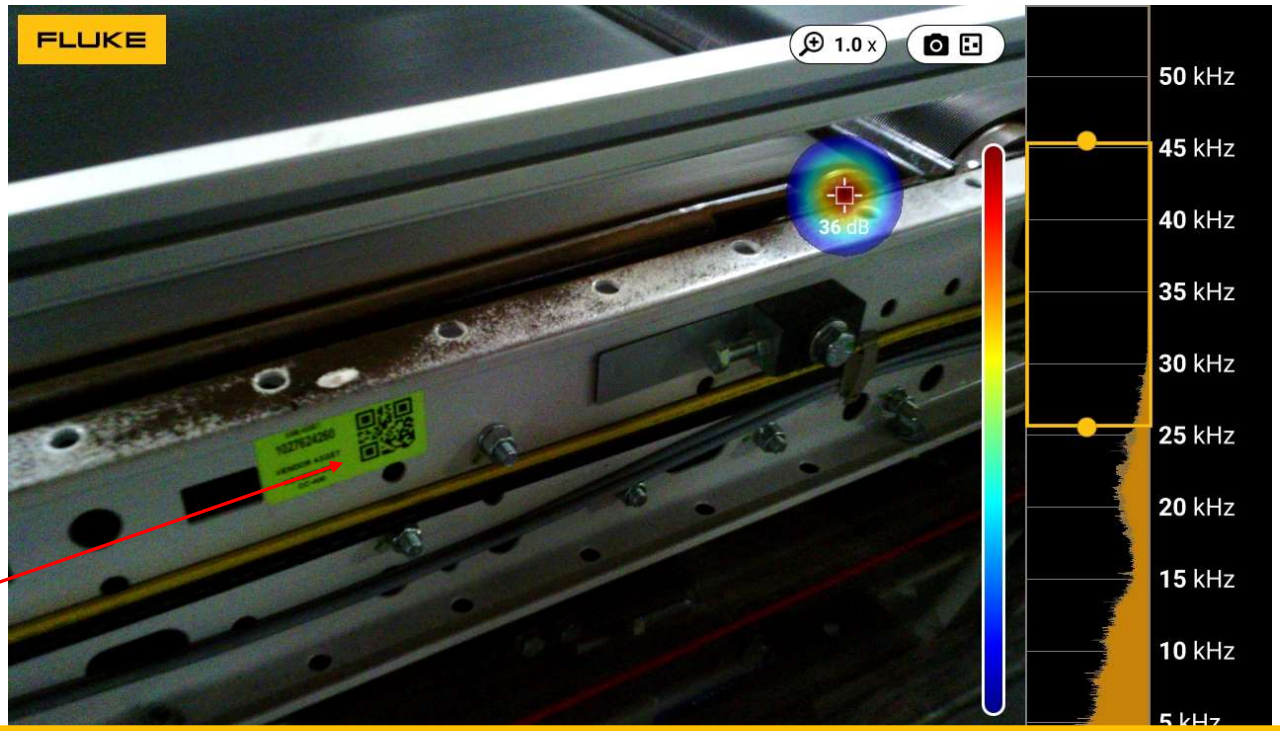
It's good practice to begin every inspection in Image Mode

2b **Inspect**

Be aware of surroundings

- Scan area of interest for sound that stands out
- Be aware of reflections
- Use different perspectives to get a different point of view and confirm true location of sound
- Visually identify what components could be emitting the sound
- Look for other visual clues

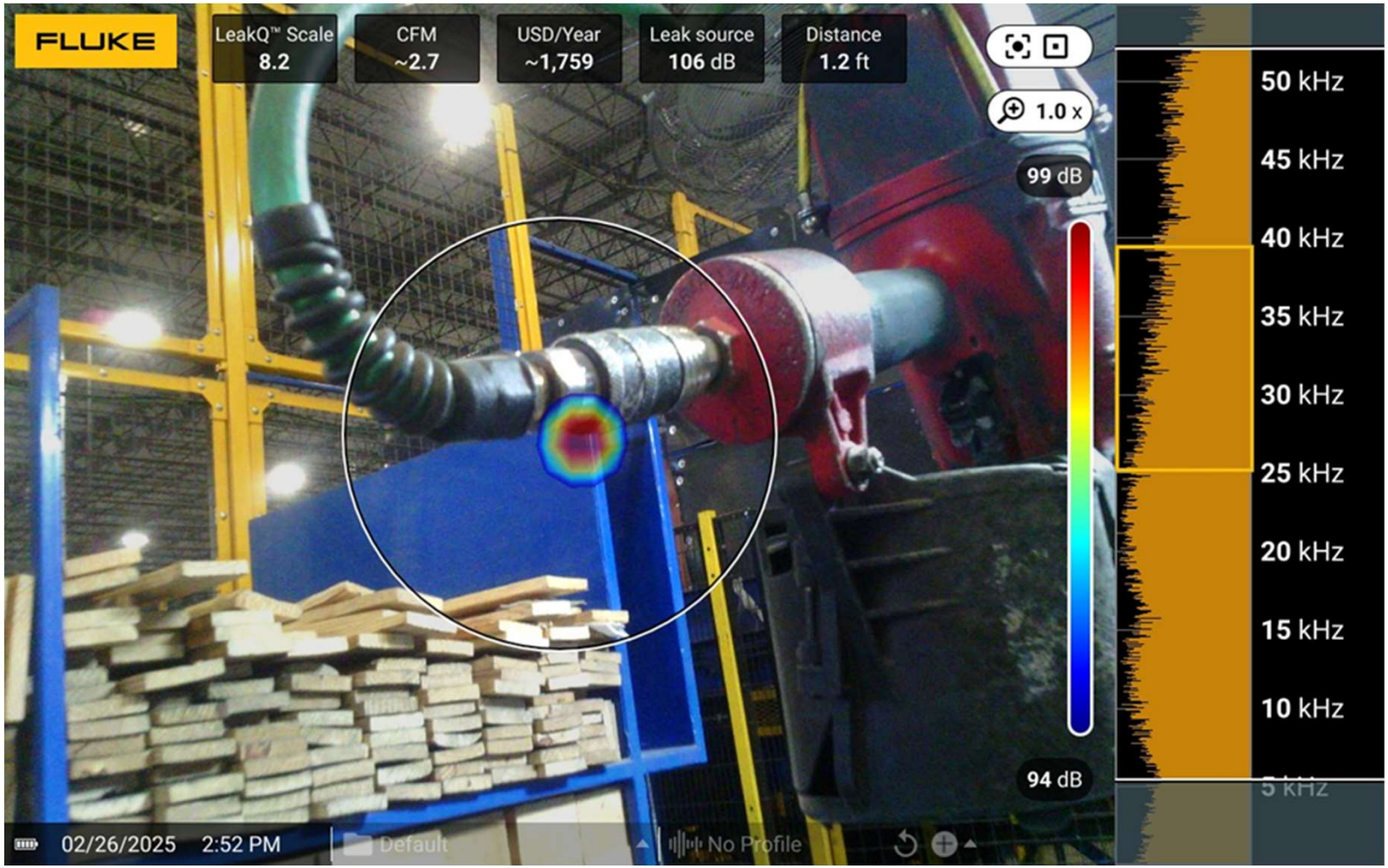
Notice QR code for tagging later



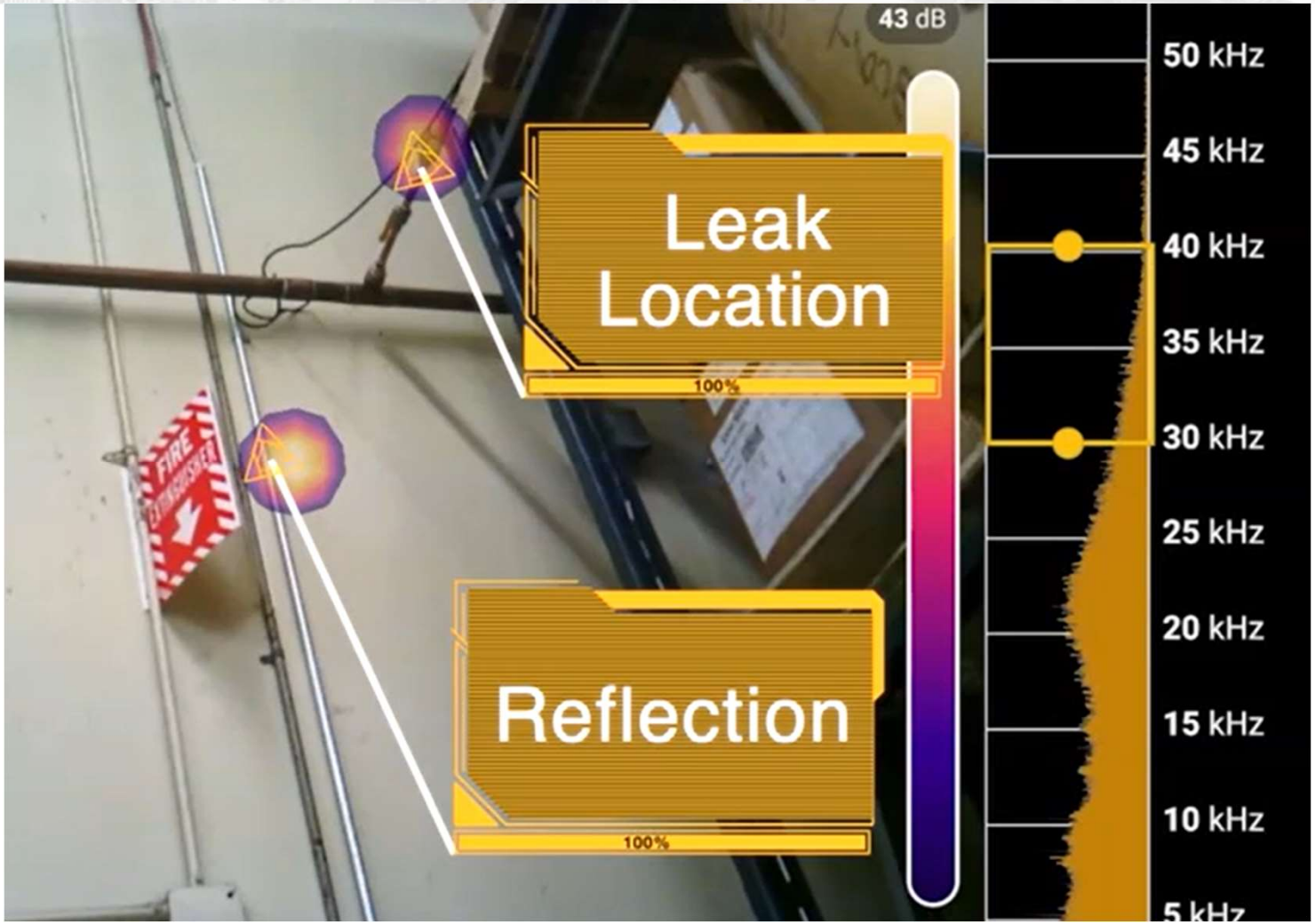
Use sight, sound and smell to provide clues to the situation

Image Mode – No Details Reported

LeakQ Mode – Additional Details



Reflections – Shoot from several angles



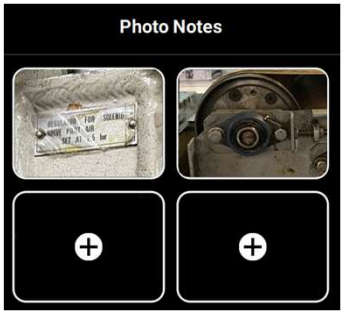
3 Annotations

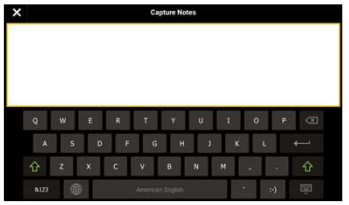
Notes

Various annotation and tagging options support the inspection.

1. QR Code recognition (visual recognition)
2. Text input (virtual keyboard on 7” display)
3. Photo Notes (attach photos for reference)

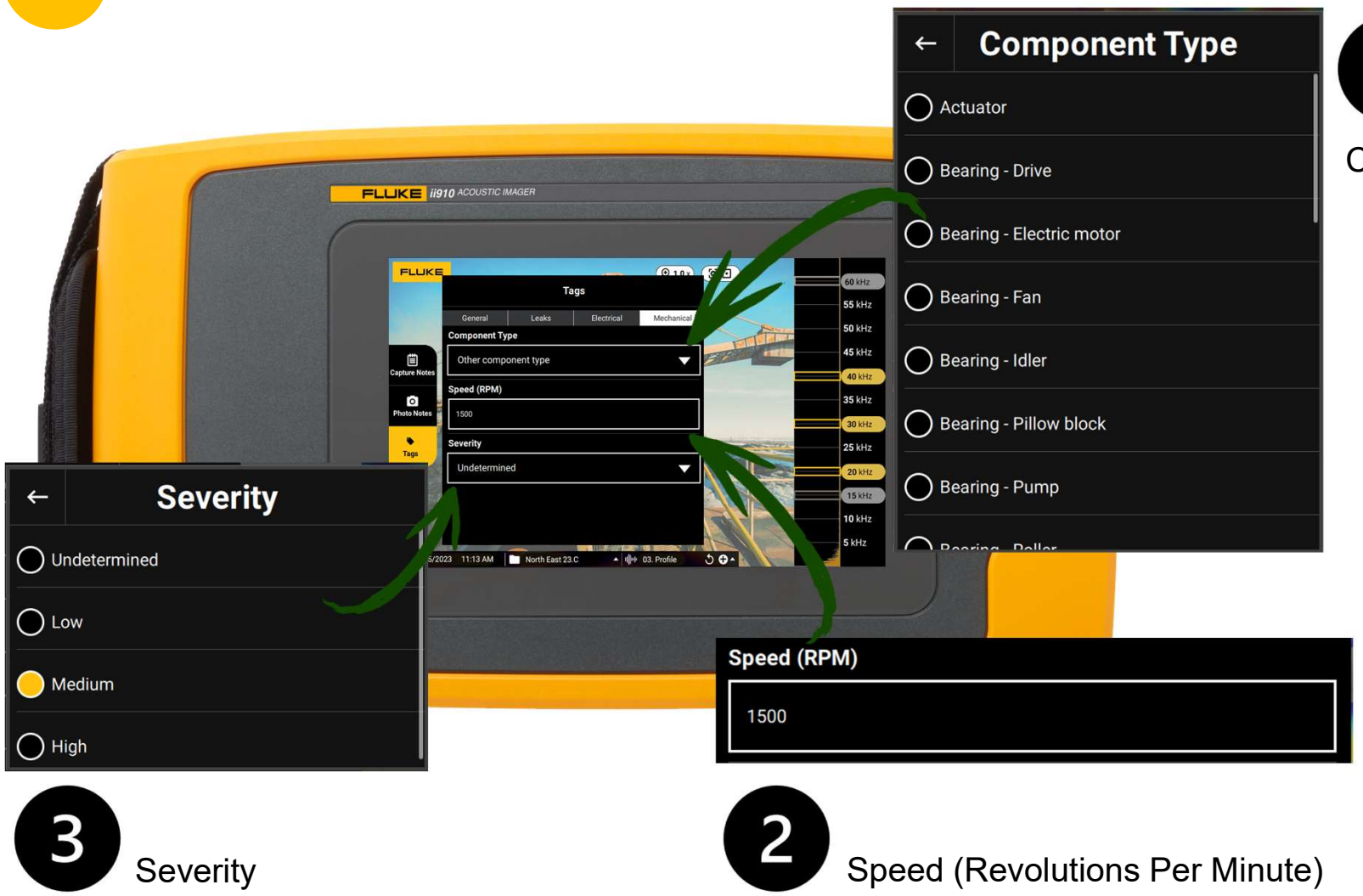
Describe the three options:
Text, Visual and Tagging





3 Annotations

Add Mode Specific Tags

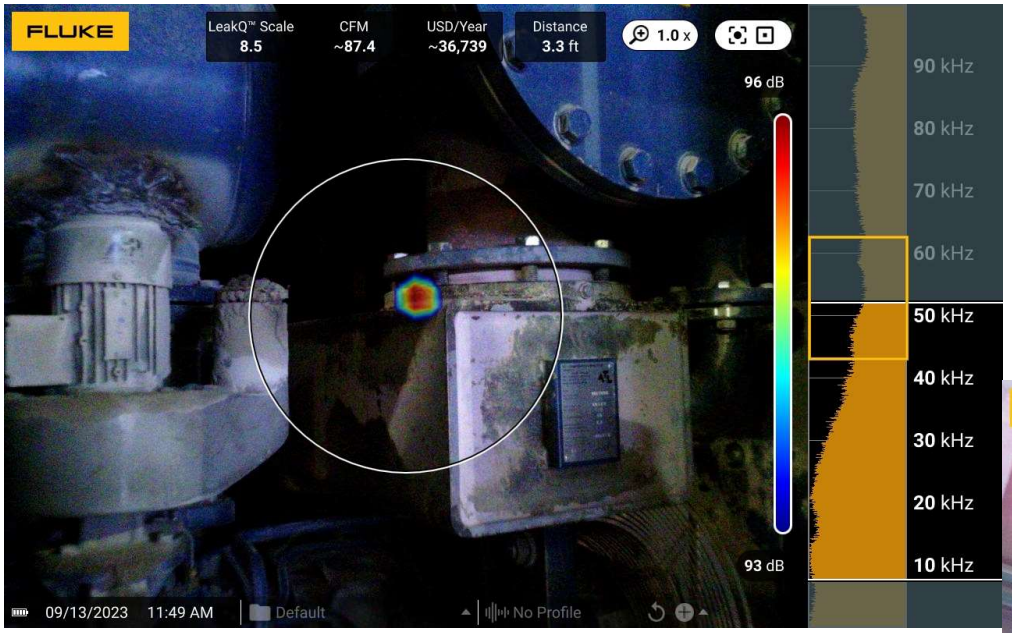


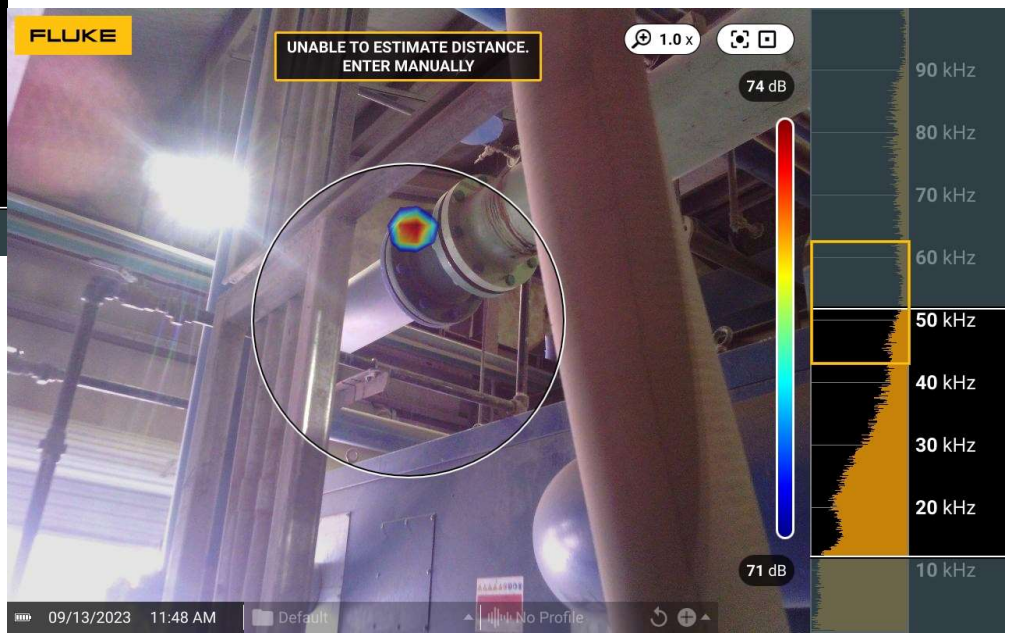
1 Component Type

2 Speed (Revolutions Per Minute)

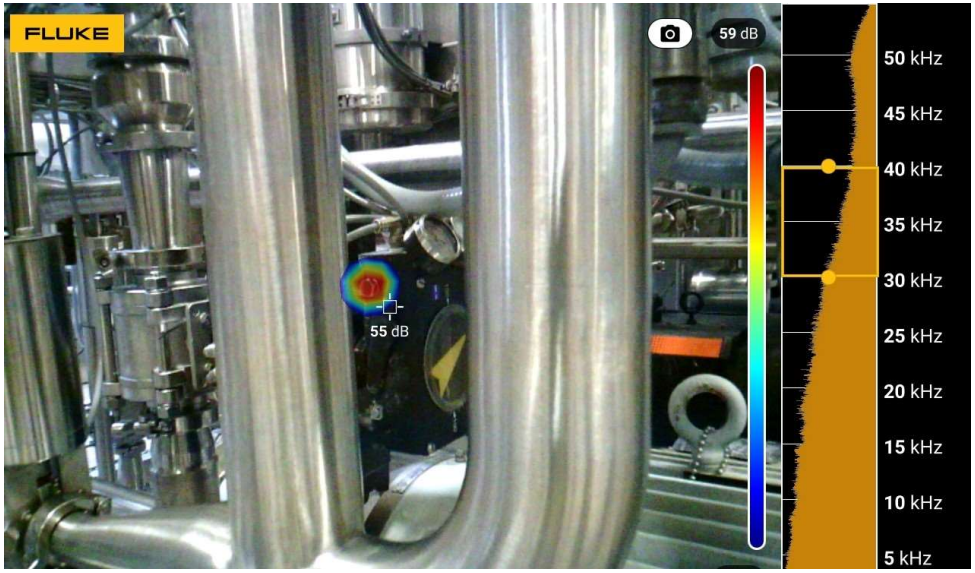
3 Severity

Acoustic Imaging Examples – Compressor Room





Valve Actuation Issue

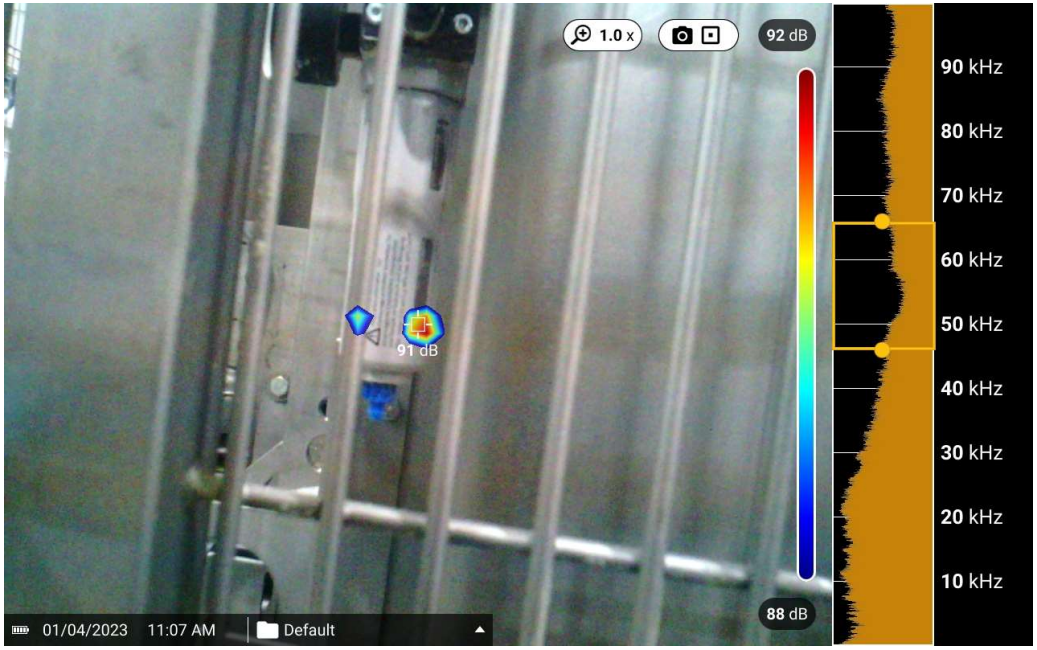


What am I looking at? Leak in compressed gas system

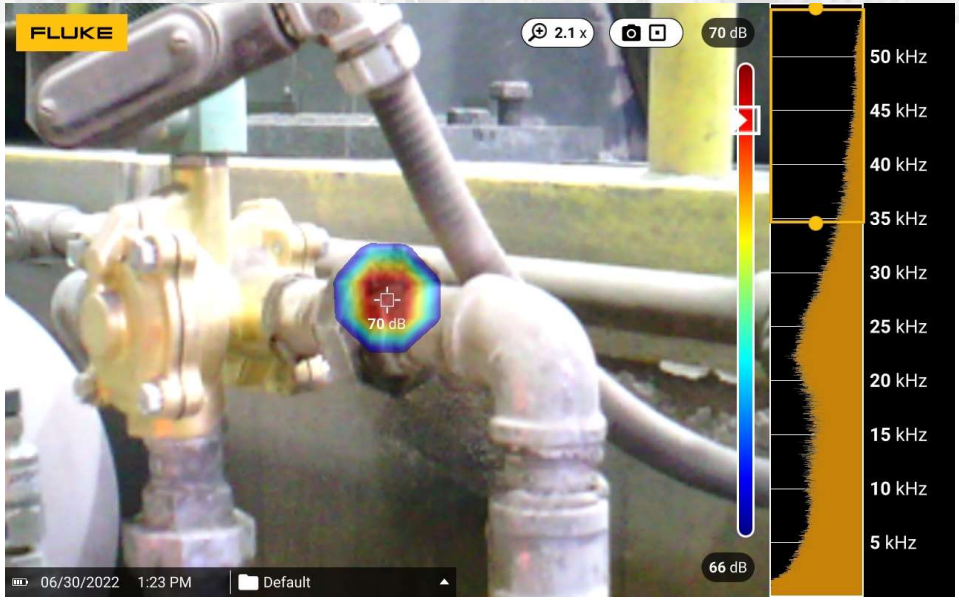
Why is this important? Customer didn't know they had a leak and had compensated by increasing control air pressure. The unintended consequence was exceeding max pressure in other devices. This further reduced reliability of the process and caused downtime

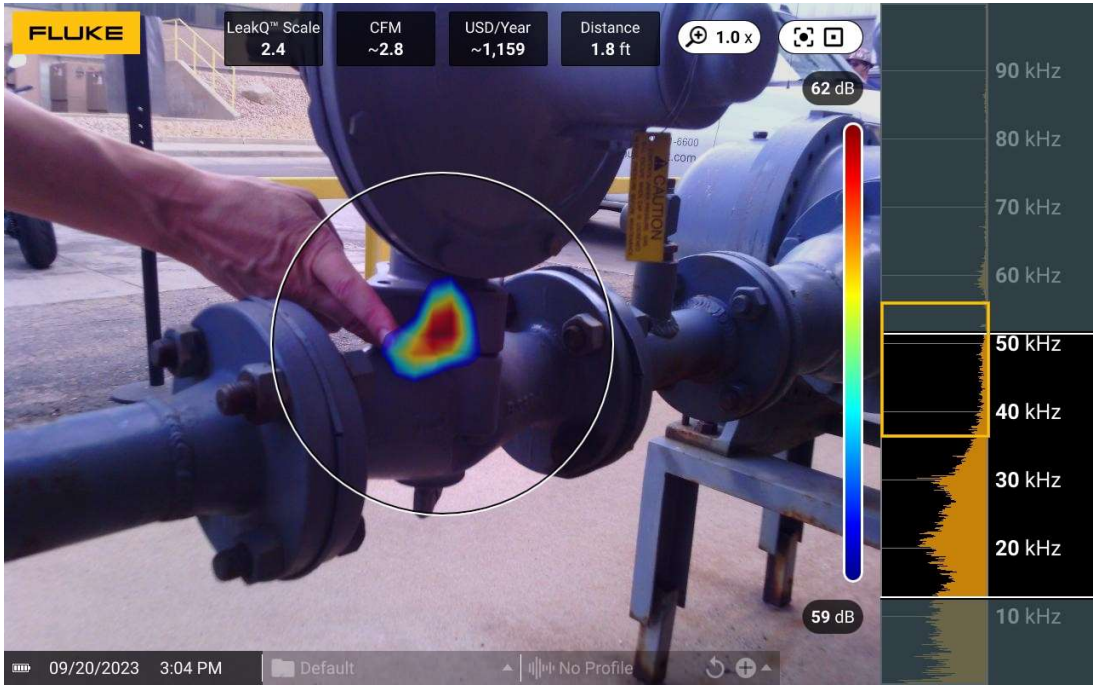
FLUKE®

Compressed Air Leaks Through Machine Guarding

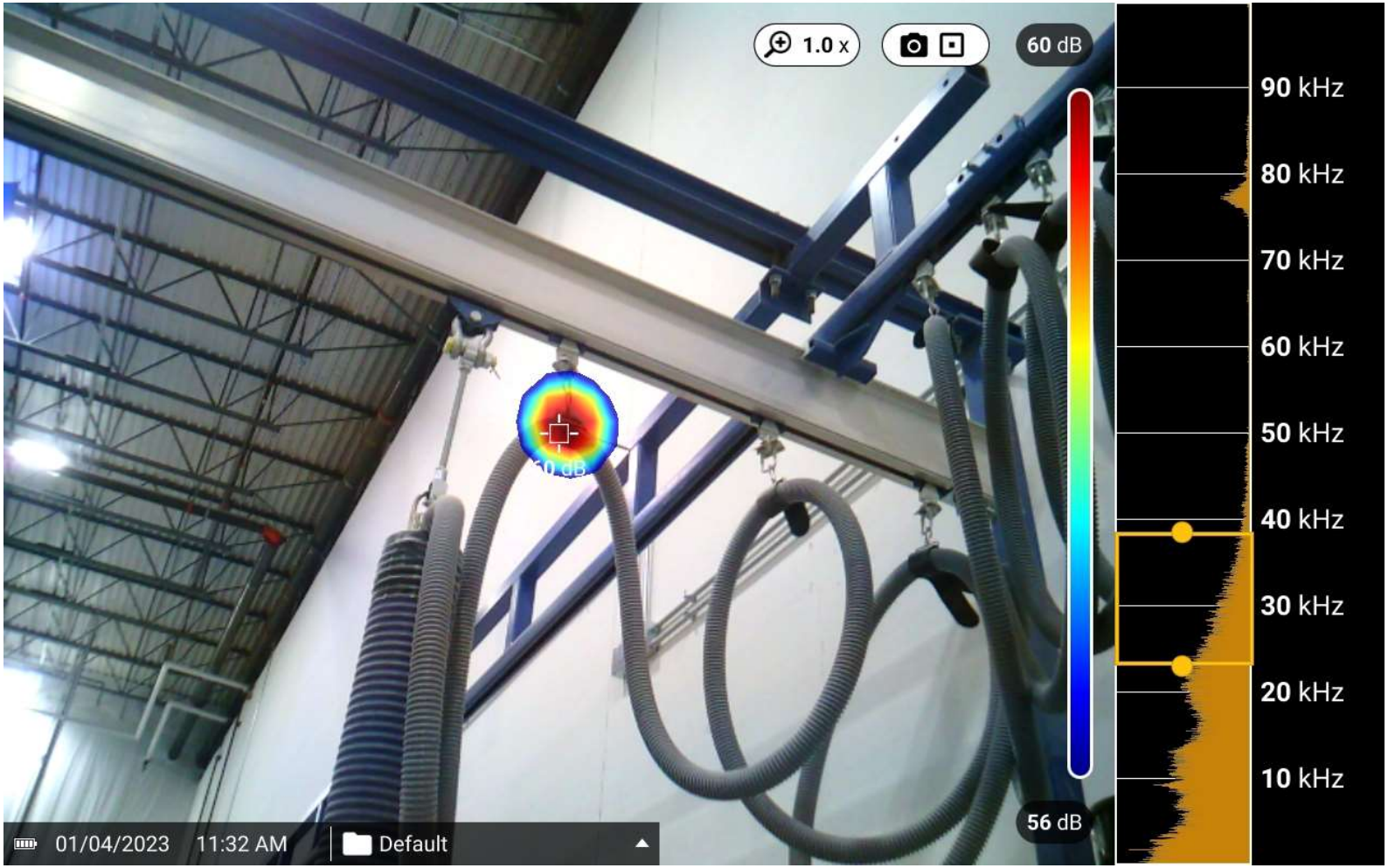


Natural Gas Leak – 15PSI



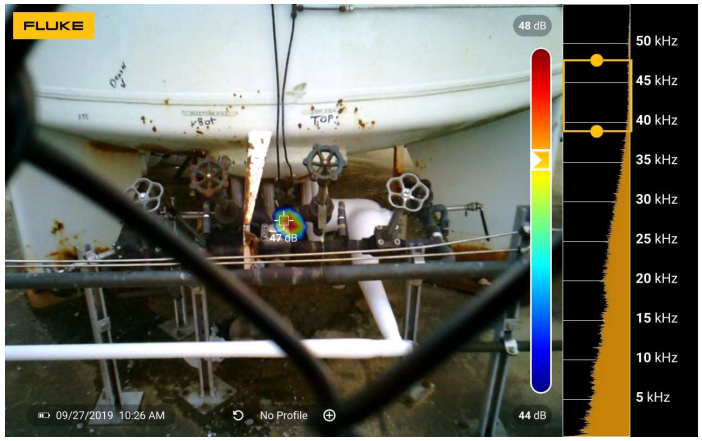


Overhead Material Handling Vacuum System



Cooling Ducts/Positive/Negative Pressure Systems Chambers

Nobel Gases (Argon)



What am I looking at? This is an argon leak in an outdoor holding tank. At this facility argon is piped from this storage tank into the facility and used in the production process.

Why is this important? Argon is an expensive gas and when valves are leaking, that is money flowing directly our the tank.

Robotics

What am I looking at? Pick and place robot with pneumatic suction cups.

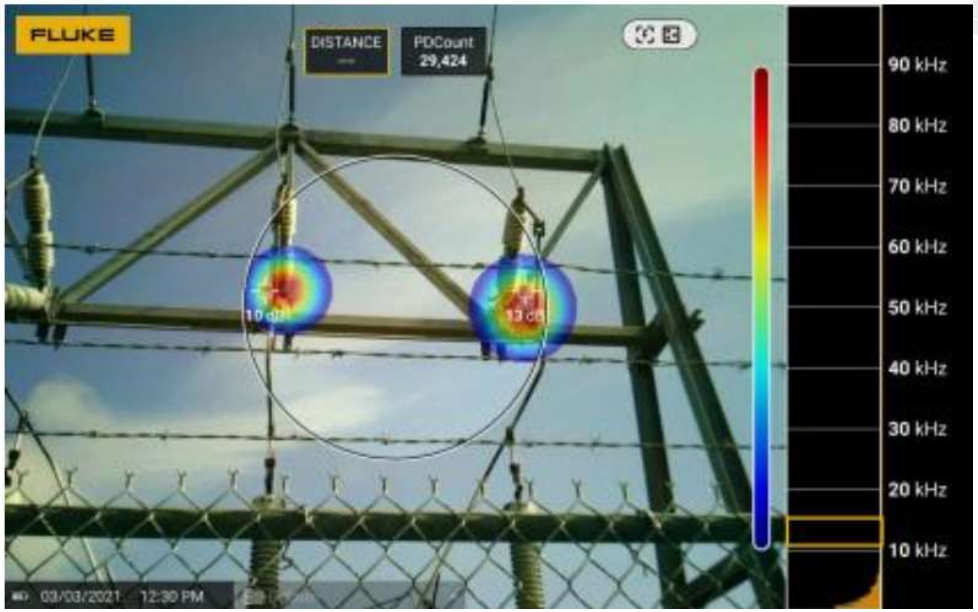
Why is this important? If the suction or actuator is weak the part could drop or not be placed in the right position
How do you know which cup to replace if there are many?
How do you check for leaks while in operation?

Additional Applications

- Electrical
- Mechanical

Fluke ii915 Precision Acoustic Imager

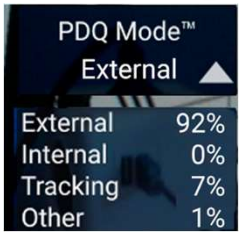
Electrical Applications – PD/Corona/Arcing



Discharge Type	External (Corona / Arcing):	100%
	Internal:	0%
	Tracking:	0%
	Other:	0%

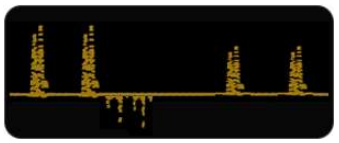
Discharge Type	External (Corona / Arcing):	20%
	Internal:	80%
	Tracking:	0%
	Other:	0%

Partial Discharge Enhancements



On-Device PD Classification

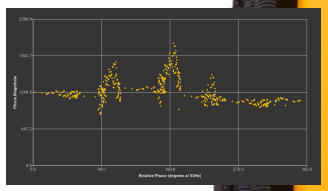
2



1

Real Time PRPD

Partial Discharge Enhancements



PRPD Plot

3

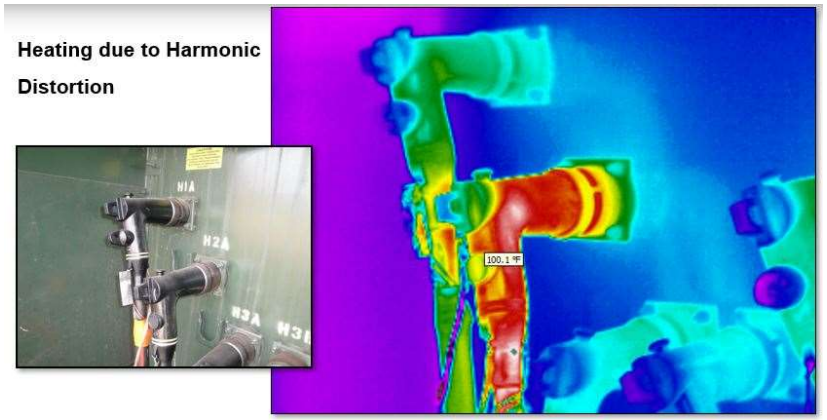
We are surprised by the things we find…

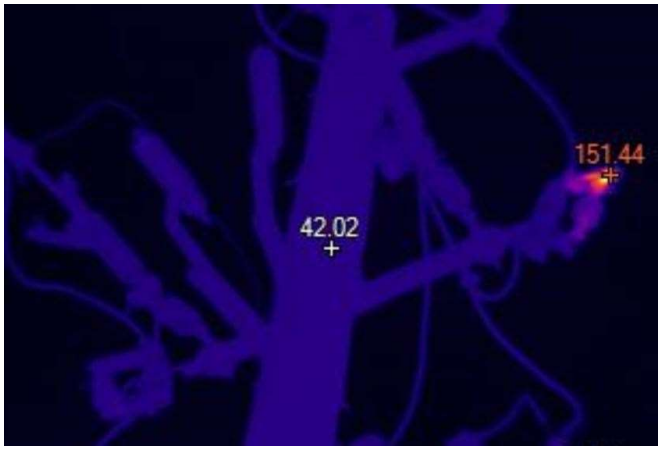
Premium Care exclusive features

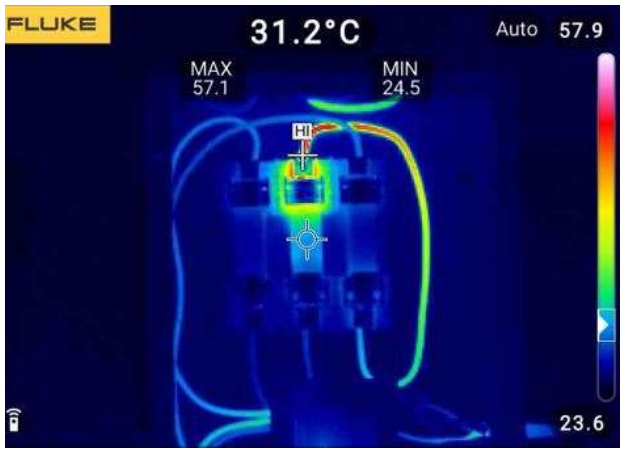
	Standard warranty	Premium Care-Standard	Premium Care-Gold
Repair manufacturing defects	•	•	•
Annual calibration or performance test		•	•
Accident damage and repair		•	•
Expedited calibration and repair		•	•
Expedited freight		•	•
Replacement of damaged accessories		•	•
Software updates		•	•
Priority tech support		•	•

Fluke Thermal

Looking for Energy Waste – Thermally



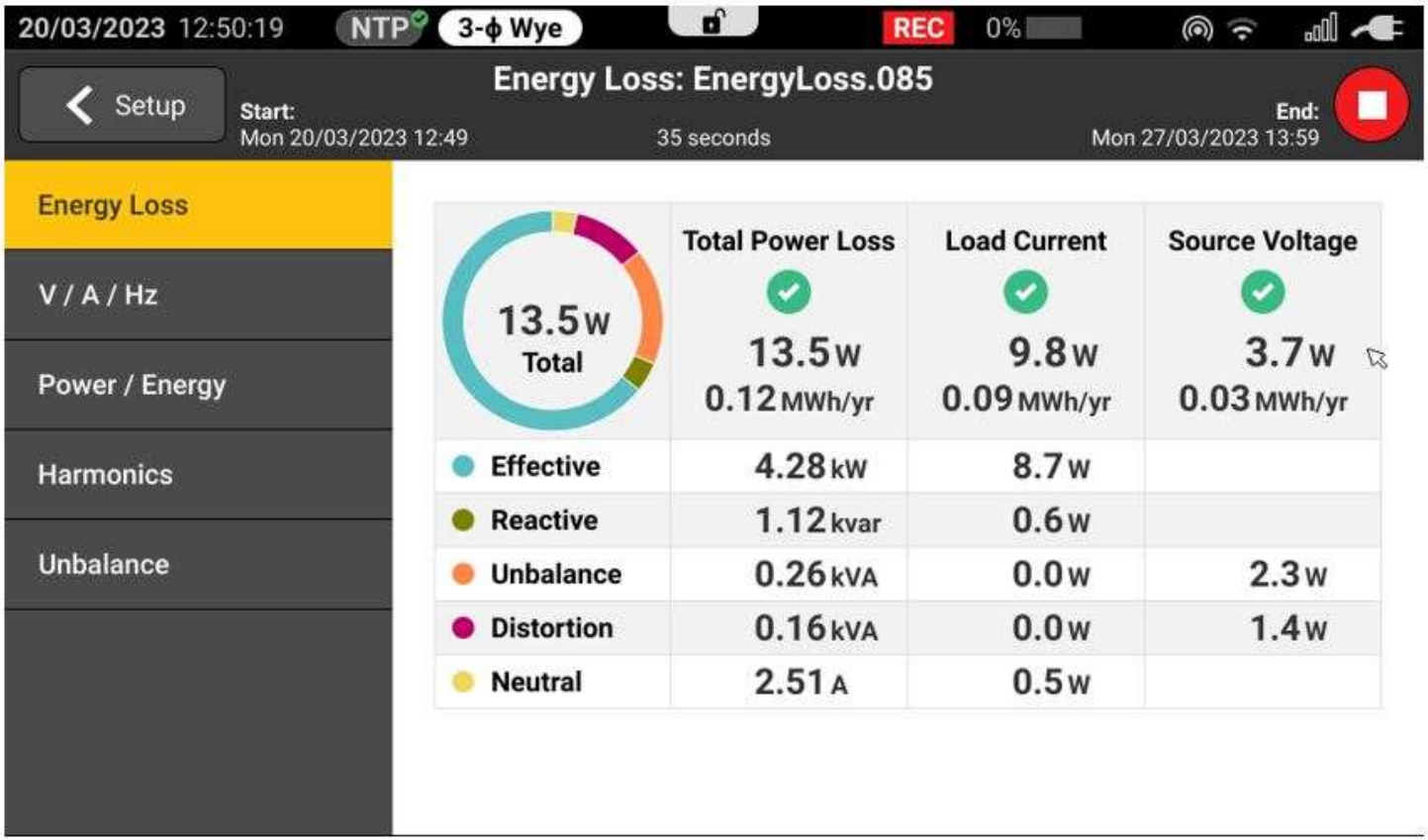




Fluke Power Logger / Quality / Scope Analyzers

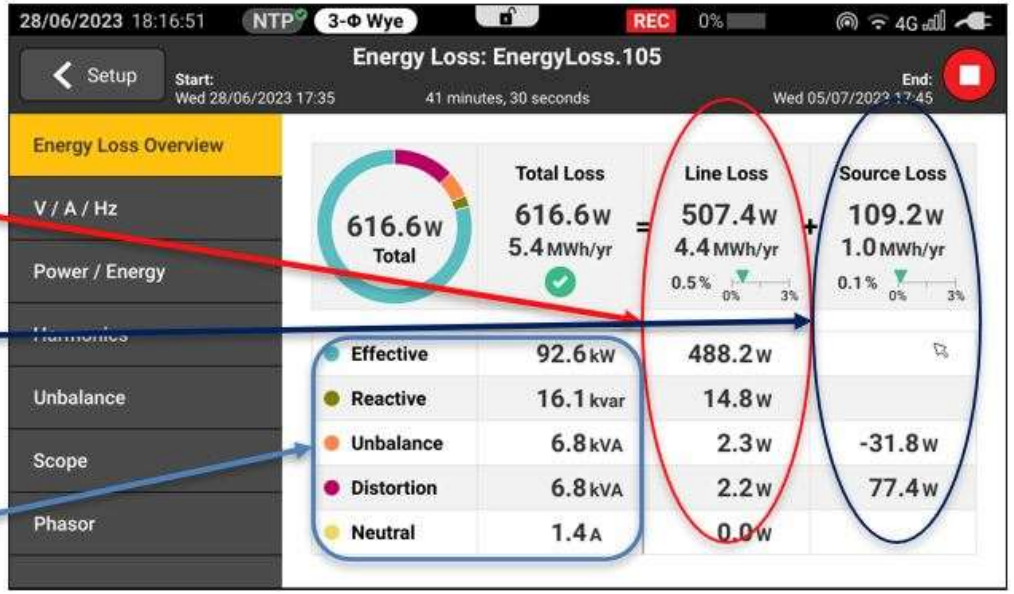
Energy Loss Calculator (ELC)

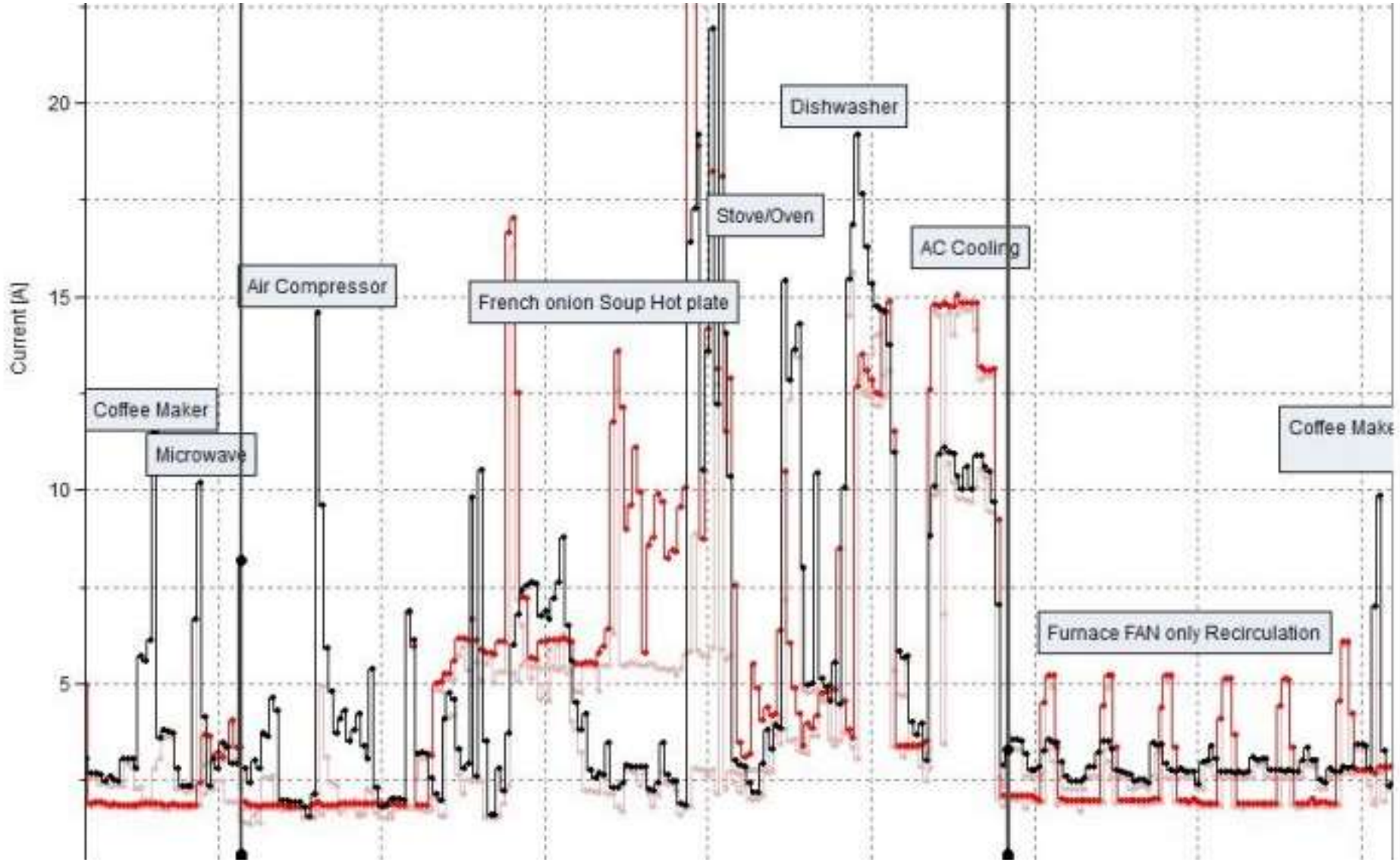
- Visualize the sources of energy loss in electrical systems due to poor quality



Energy Loss Overview - Breakdown

- Losses due to the transmission of power from source to load. This uses Fluke's patented Unified Power calculation developed by the University of Valencia.
- Losses from the source at the power system service entrance
- Each of the losses is broken down in different types, effective power, reactive power, unbalance, distortion (harmonics) and neutral losses,

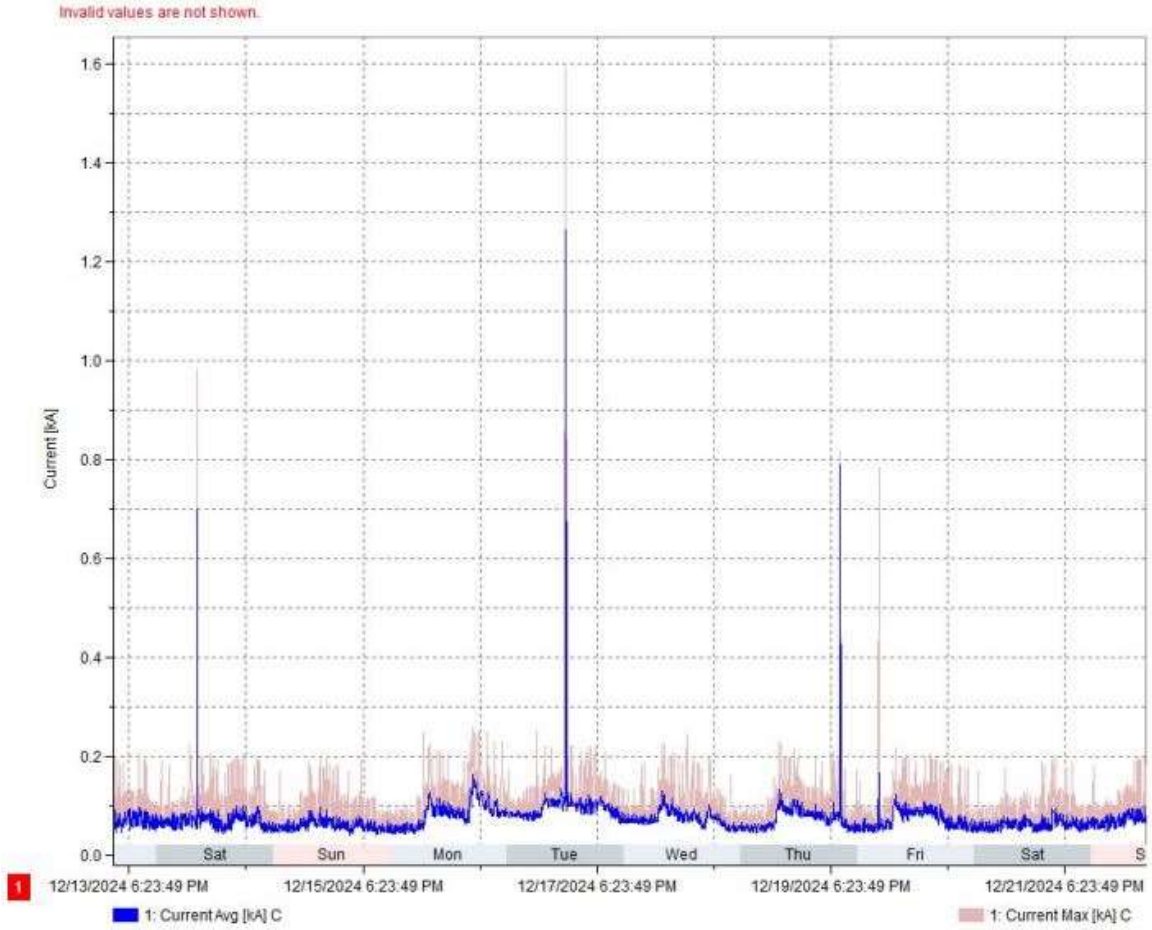



Current [A]
20
15
10
5
Coffee Maker
Microwave
Air Compressor
French onion Soup Hot plate
Stove/Oven
Dishwasher
AC Cooling
Furnace FAN only Recirculation

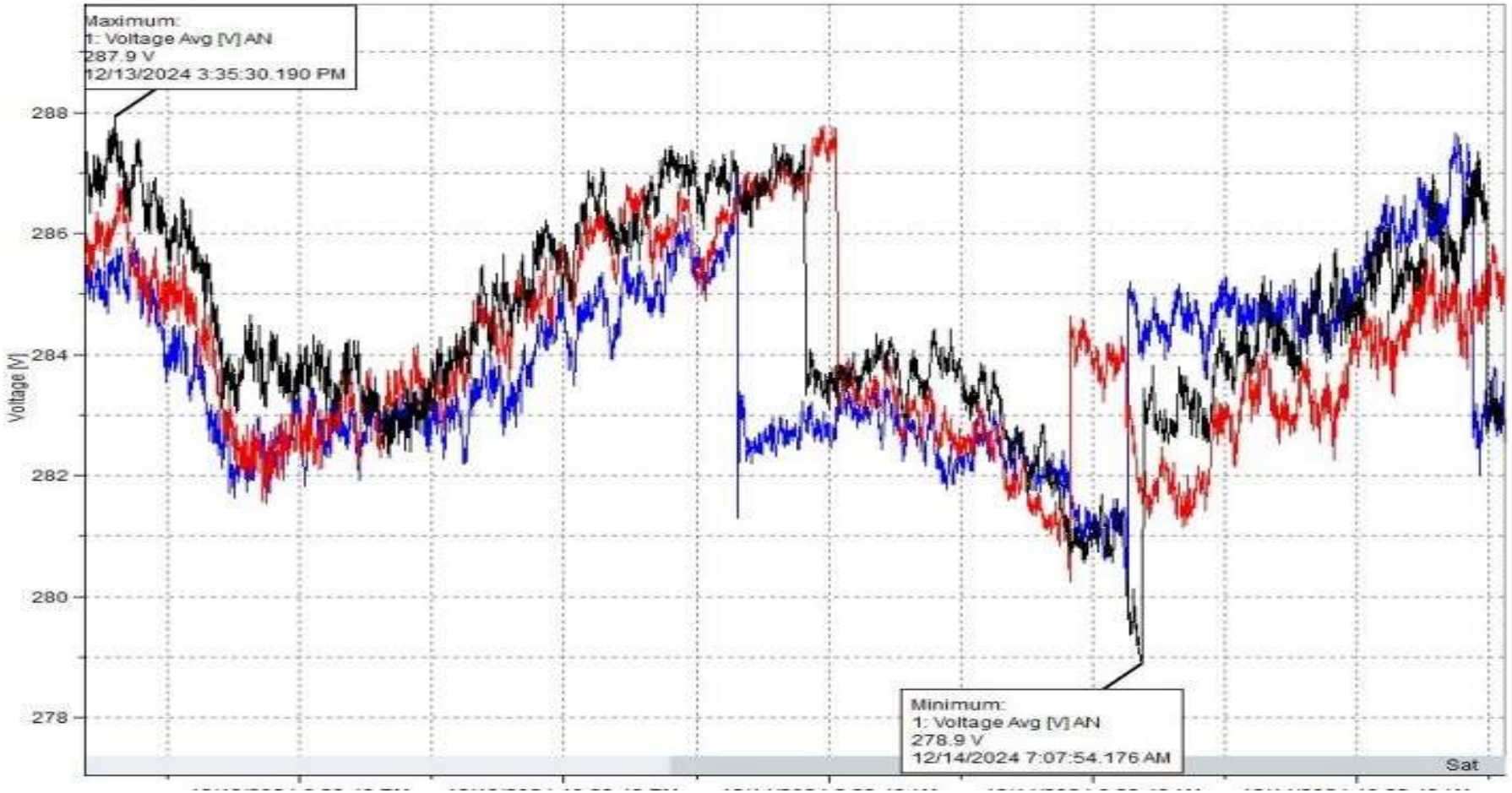
Detailed Harmonics Spilt View

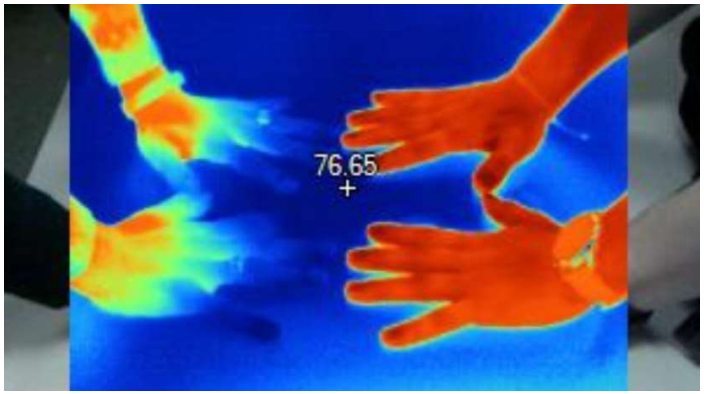
Selected harmonic is displayed in Harmonics Trend Graph in lower window

Current Phases w/Max Peak

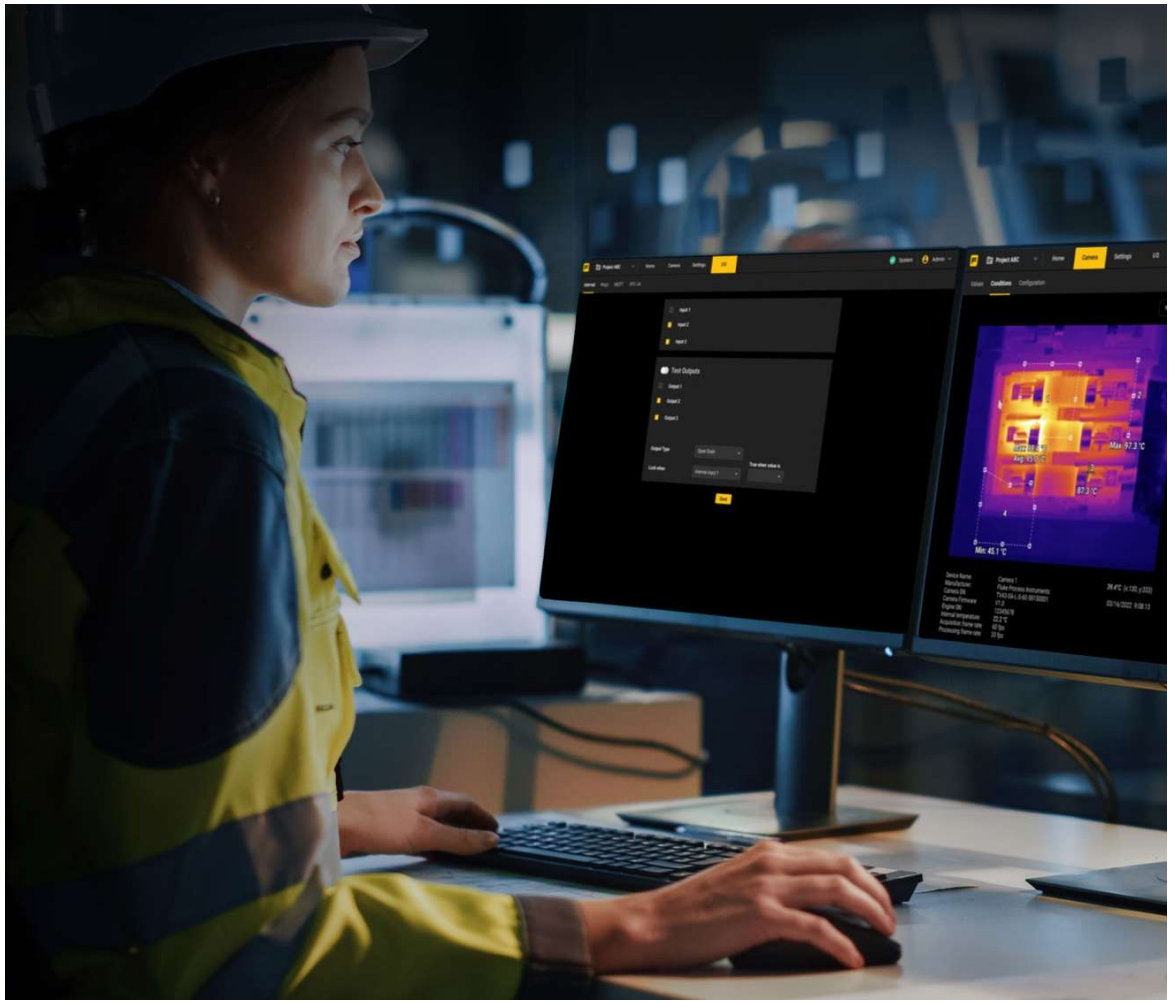


Voltage All Phase Summary - Detail




76.65


FLUKE THERMOVIEW SERIES THERMAL IMAGER
Process
Instruments



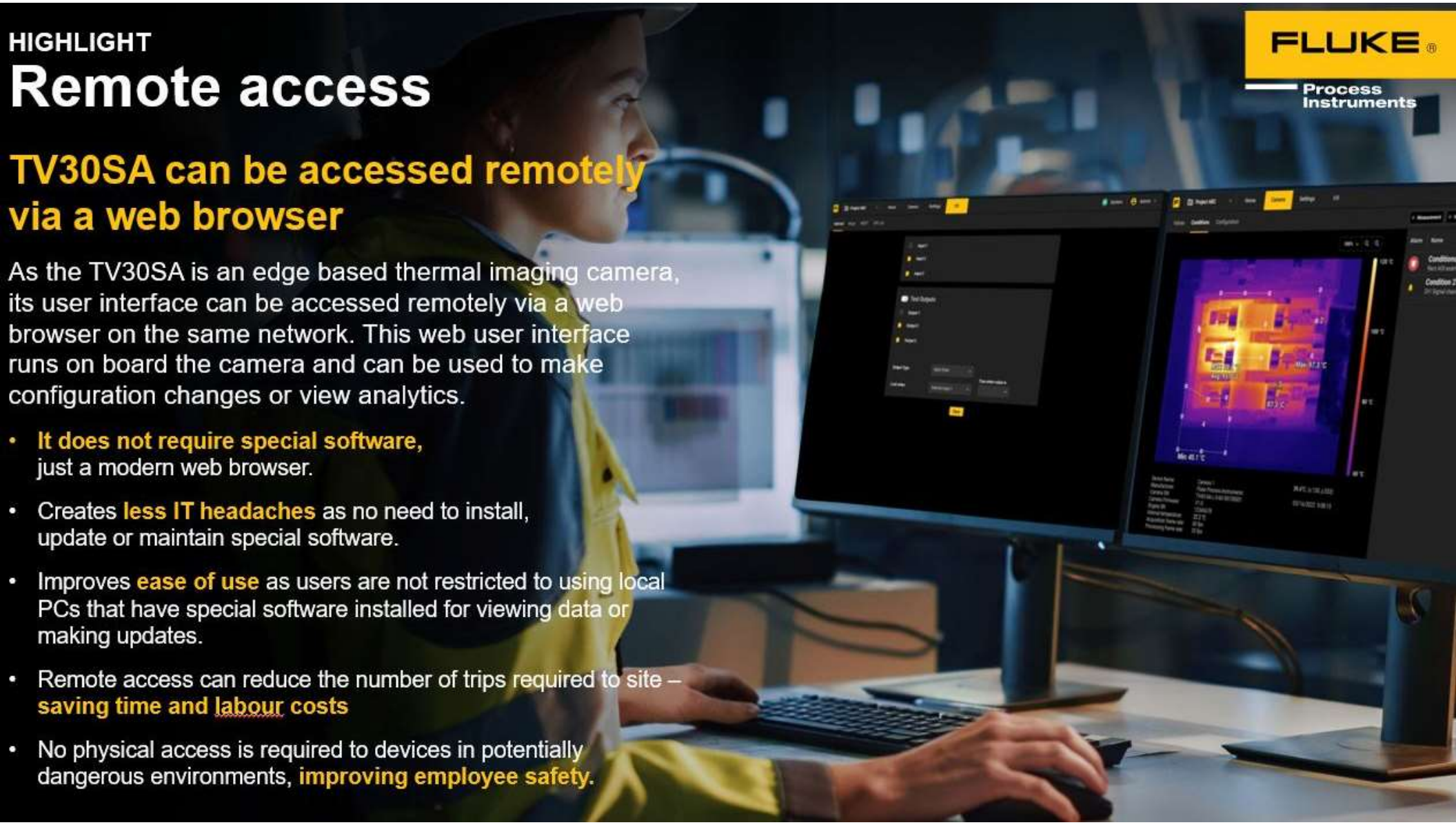
HIGHLIGHT

Remote access

TV30SA can be accessed remotely via a web browser

As the TV30SA is an edge based thermal imaging camera, its user interface can be accessed remotely via a web browser on the same network. This web user interface runs on board the camera and can be used to make configuration changes or view analytics.

- **It does not require special software,** just a modern web browser.
- Creates **less IT headaches** as no need to install, update or maintain special software.
- Improves **ease of use** as users are not restricted to using local PCs that have special software installed for viewing data or making updates.
- Remote access can reduce the number of trips required to site – **saving time and labour costs**
- No physical access is required to devices in potentially dangerous environments, **improving employee safety.**



Thank you!!!

Phil Mondro
Sales Applications Manager

517-643-1789
Philip.mondro@fluke.com

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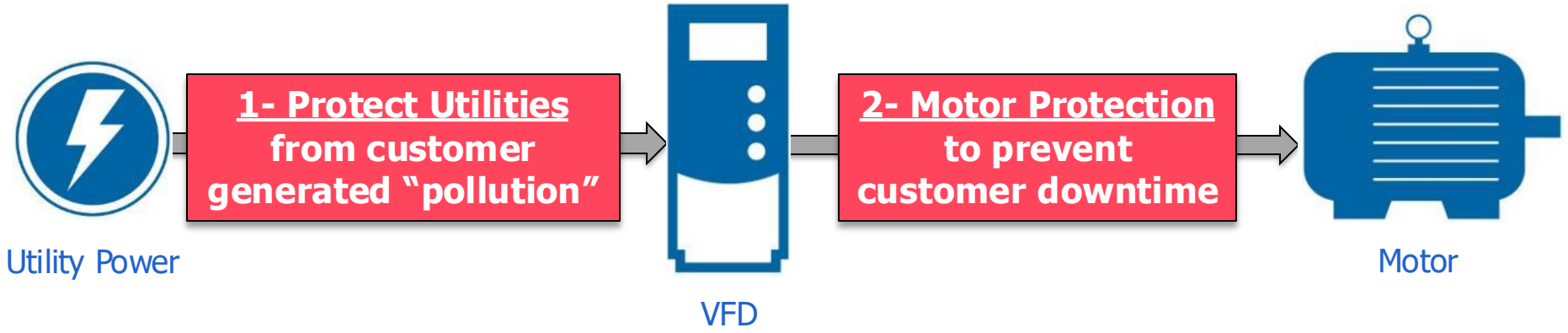
Mastering Power Quality: MTE Solutions for Harmonics and Reliable Performance

Sarah Woods, Applications Engineer

May 7, 2025

POWER QUALITY. SOLVED.
A STEEL PARTNERS COMPANY

MTE: Unique Solutions for Distinct Problems



Specializing in passive filtering solutions for line and load side harmonics caused by VFDs

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Served Market Segments

TRUSTED BY LEADING INDUSTRIES

- Industrial automation
- Water / wastewater
- Oil & gas
- HVAC/chillers
- Data centers
- Hospitals
- Schools/municipalities
- Agriculture & irrigation
- Distribution & supply chain
- Mining
- Food & beverage

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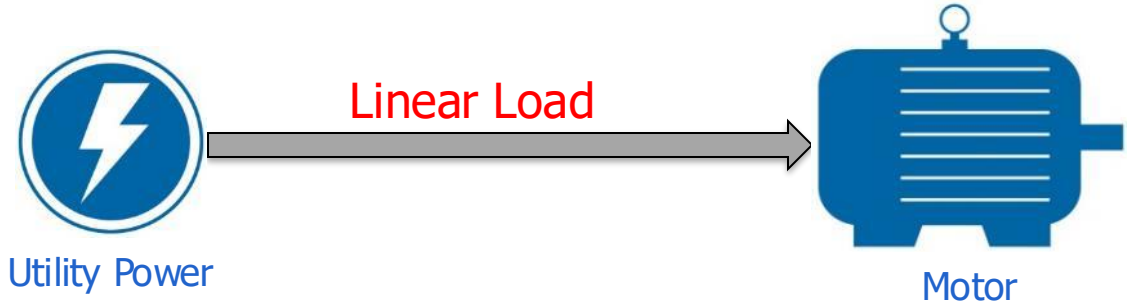
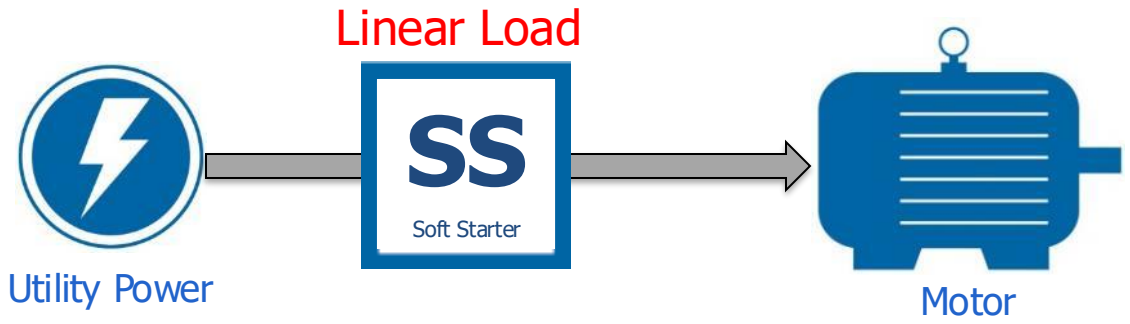
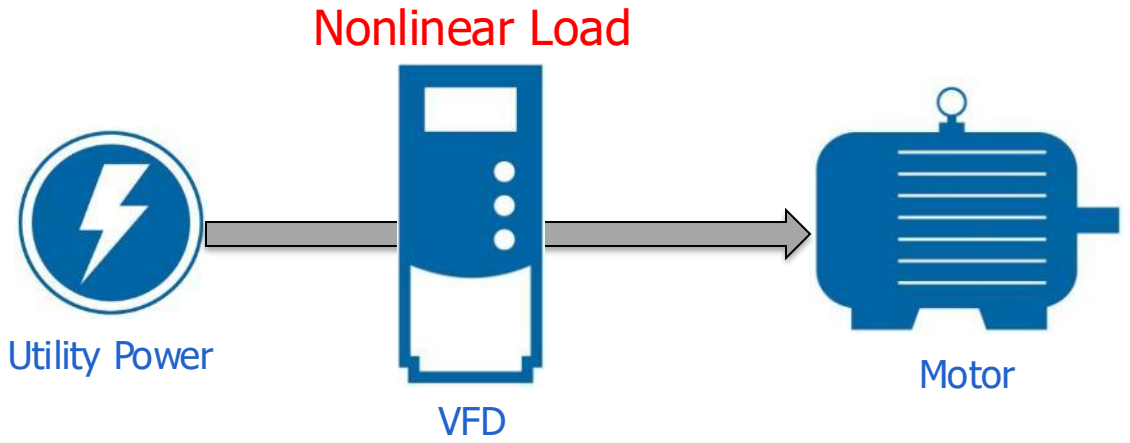
Powering Motors



- Across the line / straight utility power
  - Motor runs at 100% speed with no means of control
    - Good power quality, no harmonics



- Soft starter
  - Gradually increases the voltage supplied to the motor during start up for smooth, gradual acceleration
    - Creates harmonics during ramp up then none at speed, reduces mechanical stress on motor and shaft



- Variable frequency drive (VFD)
  - Controls motor speed and torque by varying input frequency and voltage
    - Matches system's capacity, more efficient, creates harmonics during operation

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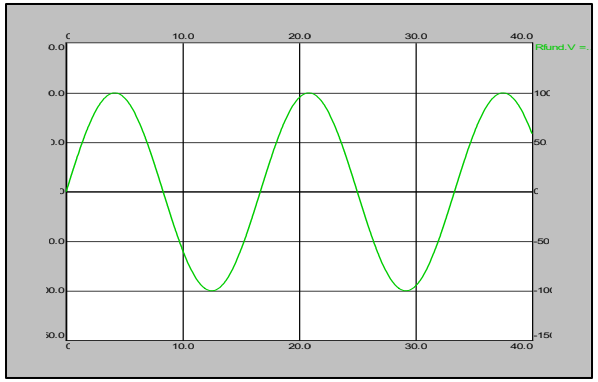
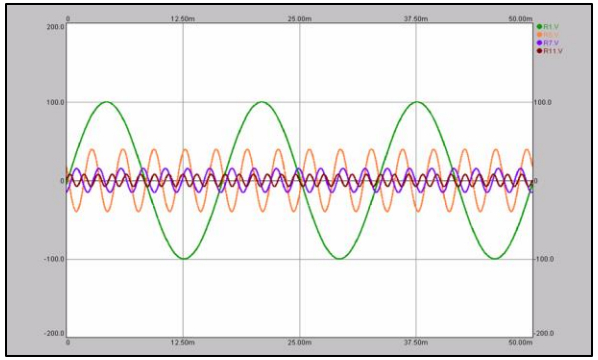
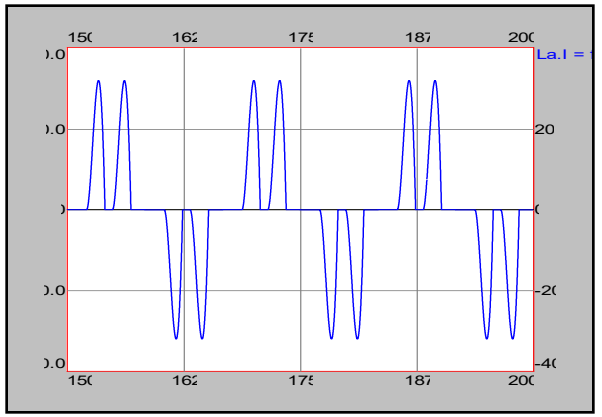
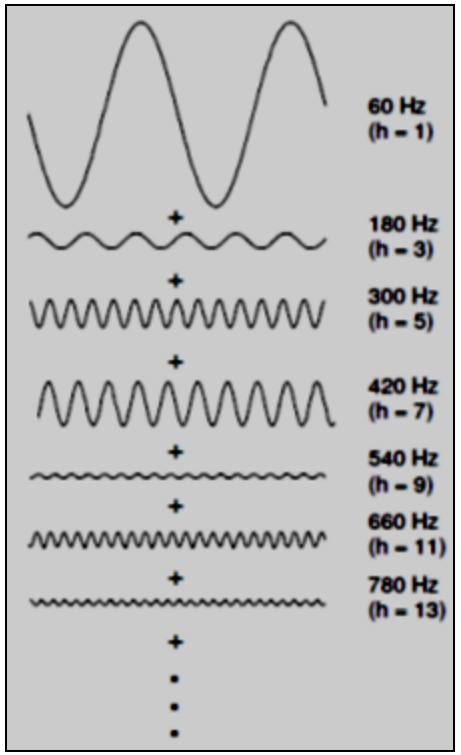
What Are Harmonics?

- A fundamental waveform has the supply frequency
- Harmonics are the shape of a waveform relative to its fundamental frequency
- The harmonics combine with the fundamental frequency to create a final distorted sinewave
- The amount of distortion is determined by the frequencies and magnitudes of the most dominant harmonic components









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Line Side Problems Caused By Harmonics

- Equipment malfunction / downtime
  - Lost productivity due to nuisance tripping or drive faults
  - Increased maintenance costs due to incorrect meter readings or data
- Premature component failure
  - Replacement of distribution transformers, wiring and capacitors due to overheating
  - Total current = fundamental current + harmonic currents
- Increased utility current requirement / costs
  - Planned expansion limited by facility capacity
  - Increased wire size needed driving higher installation costs
  - Increase in utility costs due to reduced utility power factor
  - Fines or utility charges due to spreading harmonics





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Harmonics and Neighboring Facilities

- Harmonics generated in a facility are eventually pushed to neighboring facilities and the utility itself

- Many utilities require compliance to the IEEE-519 standard
  - Noncompliance can mean fines or power cuts
  - IEEE-519 affects line side only

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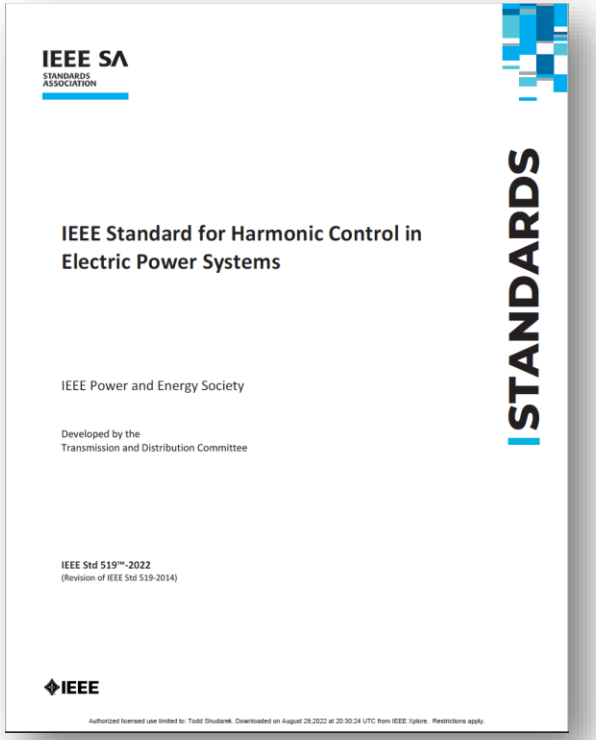
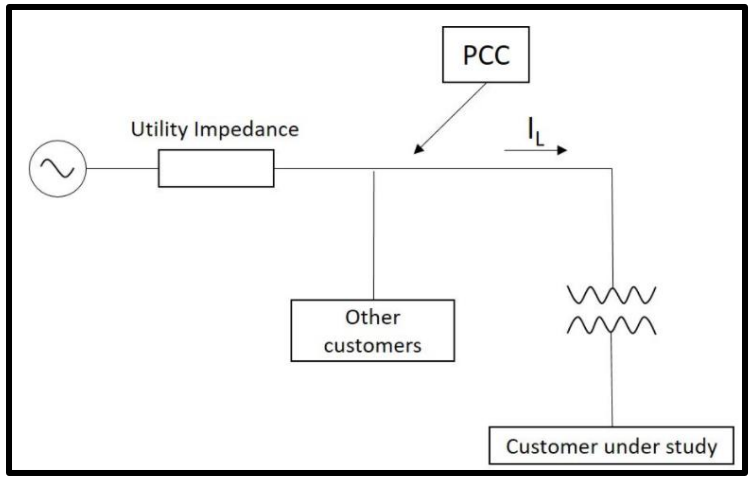
IEEE-519: Standard for Harmonic Control in Electric Power Systems

- Shared responsibility between system owners or operators and users
- Voltage and current limits
  - Not binding
  - Looks at steady state, not transient, conditions
  - THVD vs TDDi
  - Individual harmonic order limits
- Compliance considers the entire system of linear and nonlinear loads
  - Should not be applied to individual pieces of equipment
  - Filtering may not be required on all nonlinear loads
- Point of common coupling (PCC)

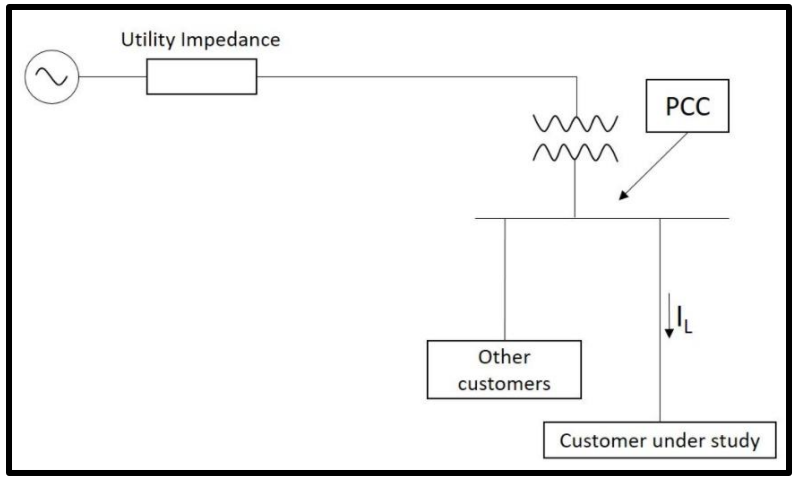


IEEE-519: Point of Common Coupling (PCC)

- Defined as the point where another customer can be served
  - Dedicated service transformer
  - Common service transformer



Ex: Industrial users (i.e. manufacturing plants)



Ex: Commercial users (office parks, shopping malls, etc.)

IEEE-519: Voltage & Current Distortion

Table 1—Voltage distortion limits

Bus voltage V at PCC	Individual harmonic (%) h ≤ 50	Total harmonic distortion THD (%)
$V \leq 1.0$ kV	5.0	8.0
1 kV < $V \leq 69$ kV	3.0	5.0
69 kV < $V \leq 161$ kV	1.5	2.5
161 kV < V	1.0	1.5[a]

[a]High-voltage systems are allowed to have up to 2.0% THD where the cause is an HVDC terminal whose effects are found to be attenuated at points in the network where future users may be connected.

Table 2—Current distortion limits for systems rated 120 V through 69 kV

Maximum harmonic current distortion in percent of I_L						
	Individual harmonic order[b]					
I_{SC}/I_L	$2 \leq h < 11$[a]	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h \leq 50$	TDD
< 20[c]	4.0	2.0	1.5	0.6	0.3	5.0
20 < 50	7.0	3.5	2.5	1.0	0.5	8.0
50 < 100	10.0	4.5	4.0	1.5	0.7	12.0
100 < 1000	12.0	5.5	5.0	2.0	1.0	15.0
> 1000	15.0	7.0	6.0	2.5	1.4	20.0

[a] For $h \leq 6$, even harmonics are limited to 50% of the harmonic limits shown in the table.

[b] Current distortions that result in a dc offset, e.g., half-wave converters, are not allowed.

[c] Power generation facilities are limited to these values of current distortion, regardless of actual I_{sc}/I_L unless covered by other standards with applicable scope.
where:
I_{sc} = maximum short-circuit current at PCC
I_L = maximum demand load current at PCC under normal load operating conditions

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IEEE-519: Compliance

- No "one size fits all" solution
  - Application A may require harmonic filters on all nonlinear loads while Application B may need a few harmonic filters with the rest using line reactors

- Linear loads will help offset the level of harmonics produced by nonlinear loads
  - Motors run across the line or with a soft starter

- General rule of thumb – Add filtering starting at the highest HP loads and work down to the lowest HP loads

4 total all liner motor loads that use across the line or soft starters these motors typically have 0.8 PF		
4.1 Total all linear loads that are typically running across the line	**775**	HP
4.2 Total all motors that are on soft starters	**0**	HP
4.3 Linear loads on generator	**NO**	

Ref	Quantity	Load notes	HP	% load	Initial VFD Configuration	On Gen	Proposed added Mitigation
A	1	15hp drives	15	100	No link or reactor		5% line Reactor
B	5	7.5hp drives	7.5	100	No link or reactor		None
C	1	20hp drives	20	100	No link or reactor		5% line Reactor
D	20	10hp drives	10	100	No link or reactor		5% line Reactor
E	1	50hp drives	50	100	No link or reactor		MTE AP harmonic Filter
F	2	75hp drives	75	100	No link or reactor		MTE AP harmonic Filter
G	2	40hp drives	40	100	No link or reactor		MTE AP harmonic Filter
						req TDD	
	Initial harmonic findings at PCC				34.11	8	7.73

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MTE Harmonic Mitigating Solutions

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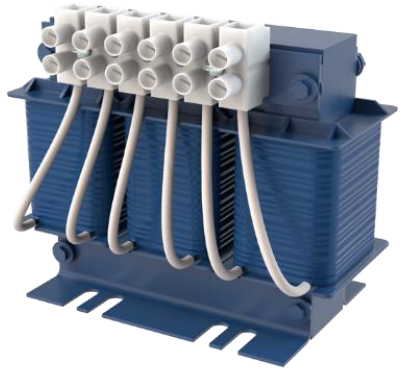
RL & RLW Line Reactors

- Reduces line side harmonics and provides drive protection
- Economical "insurance policy" for system reliability
  - Buffer for surges, transients & power line disturbances
- 3% impedance eliminates 95+% drive nuisance tripping
- 3 phase reactor can be wired for single phase applications



RLW Reactor Specification	
Input Voltage; Frequency	208V – 690V; 50/60Hz
Current Range	0.5A – 750A
THID Performance	30% – 35%
Impedance Levels	1.5%, 3%, 5%
Continuous Overload	100%

RL Reactor Specification	
Input Voltage; Frequency	208V – 690V; 50/60Hz
Current Range	1A – 1,500A
THID Performance	30% – 35%
Impedance Levels	1.5%, 3%, 5%
Continuous Overload	150% (<750A) 125% (≥750A)

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RB & DCA DC Link Chokes

- Connected to a VFD's internal DC bus
  - Some VFDs have a link choke integrated into the design
  - Does not provide protection to the input bridge rectifier
- Adds impedance for harmonic reduction without a voltage drop
- Reduce DC bus transient overvoltage, AC ripple on DC bus
- Combine with a line reactor for increased harmonic mitigation

RB & DCA DC Link Choke Specification	
Maximum Voltage	1,000VDC
Current Range	1A – 1,000A
Ripple Frequency	300Hz or 360Hz
THID Performance	30% – 40%
Ripple Current	10% peak-to-peak @ 360Hz

MTE POWER QUALITY. SOLVED. A STEEL PARTNERS COMPANY

Matrix® ONE Single Phase Harmonic Filters

- Specifically designed to reduce harmonics in single phase power applications

- Reliable harmonic protection in environments where utility power may not be optimal
  - Rural, remote areas
  - Aged electrical grid

Matrix® ONE Harmonic Filter Specification

Input Voltages; Frequency	Current Ratings	HP Range	Maximum THID
240V; 60Hz	17A – 620A	3HP – 150HP	12% @ full load
480V; 60Hz	8A – 310A	3HP – 150HP	

MTE POWER QUALITY. SOLVED. A STEEL PARTNERS COMPANY

Matrix® E-Series Passive Harmonic Filters

- Economical solution for harmonic mitigation
  - Supports the compliance of IEEE-519
- Flexible design
  - Compact and robust
- Easy to install and maintain
- Meets harmonic requirements in international markets

Matrix® E-Series Harmonic Filter Specification			
Input Voltages; Frequency	**Current Ratings**	**HP / KW Range**	**Maximum THID**
380 – 415V; 50Hz	6A – 320A	1.1KW – 150KW	*With DC Link Choke or Reactor* 8% @ full load 12% @ 40% load
480V; 60Hz	6A – 320A	3HP – 250HP	*Without DC Link Choke or Reactor* 12% @ full load 17% @ 40% load

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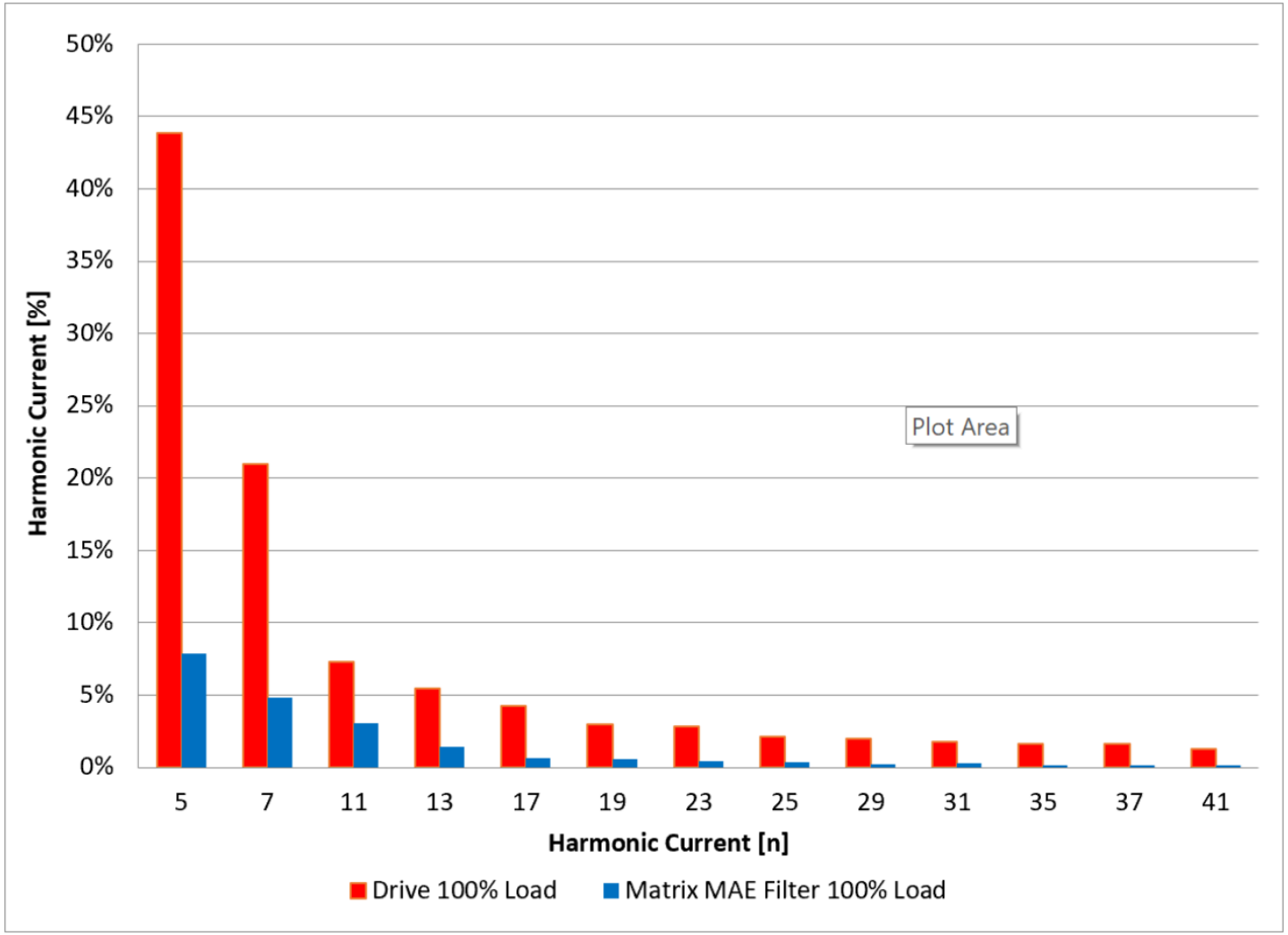
Matrix® E-Series Harmonic Performance



MTE POWER QUALITY. SOLVED. A STEEL PARTNERS COMPANY

Matrix® AP Passive Harmonic Filters

- The most advanced passive filters on the market – adaptive passive (AP)
  - Patented technology adjusts to varying power loads as needed
- Increased protection for VFDs
- Easy to install and maintain
  - Simple configuration and installation that doesn't require detailed analysis
  - Install with new equipment or retrofit into existing application
  - Smaller than comparable passive harmonic filters
  - Generally maintenance free

Matrix® AP Passive Harmonic Filters

Input Voltages; Frequency	Current Ratings	HP / HW Range	Maximum THID
208V – 240V; 60Hz	6A – 403A	1.5HP – 150HP	5% @ full load 8% @ 30% load
380V – 415V; 50Hz	6A – 1200A	2.2kW – 750kW	
480V; 60Hz	6A – 2300A	3HP – 1850HP	
600V; 60Hz	6A – 786A	5HP – 800HP	
690V; 50Hz	52A – 636A	37kW – 450kW	

MTE POWER QUALITY. SOLVED. A STEEL PARTNERS COMPANY

Matrix® AP Passive Harmonic Filters

- Meets IEEE-519 requirement
  - Performance guarantee – maximum 5% THID @ full load; 8% @ 30% load
- Generator compatible with lower kVAR
- Contactors for capacitor disconnect available as an option
  - Contactor only
  - Automatic contactor with control transformer + current sensors
  - Contactor + control transformer
  - Contactor + control transformer + filter bypass contactor

Matrix® AP Passive Harmonic Filters

Input Voltages; Frequency	Current Ratings	HP / HW Range	Maximum THID
208V – 240V; 60Hz	6A – 403A	1.5HP – 150HP	5% @ full load 8% @ 30% load
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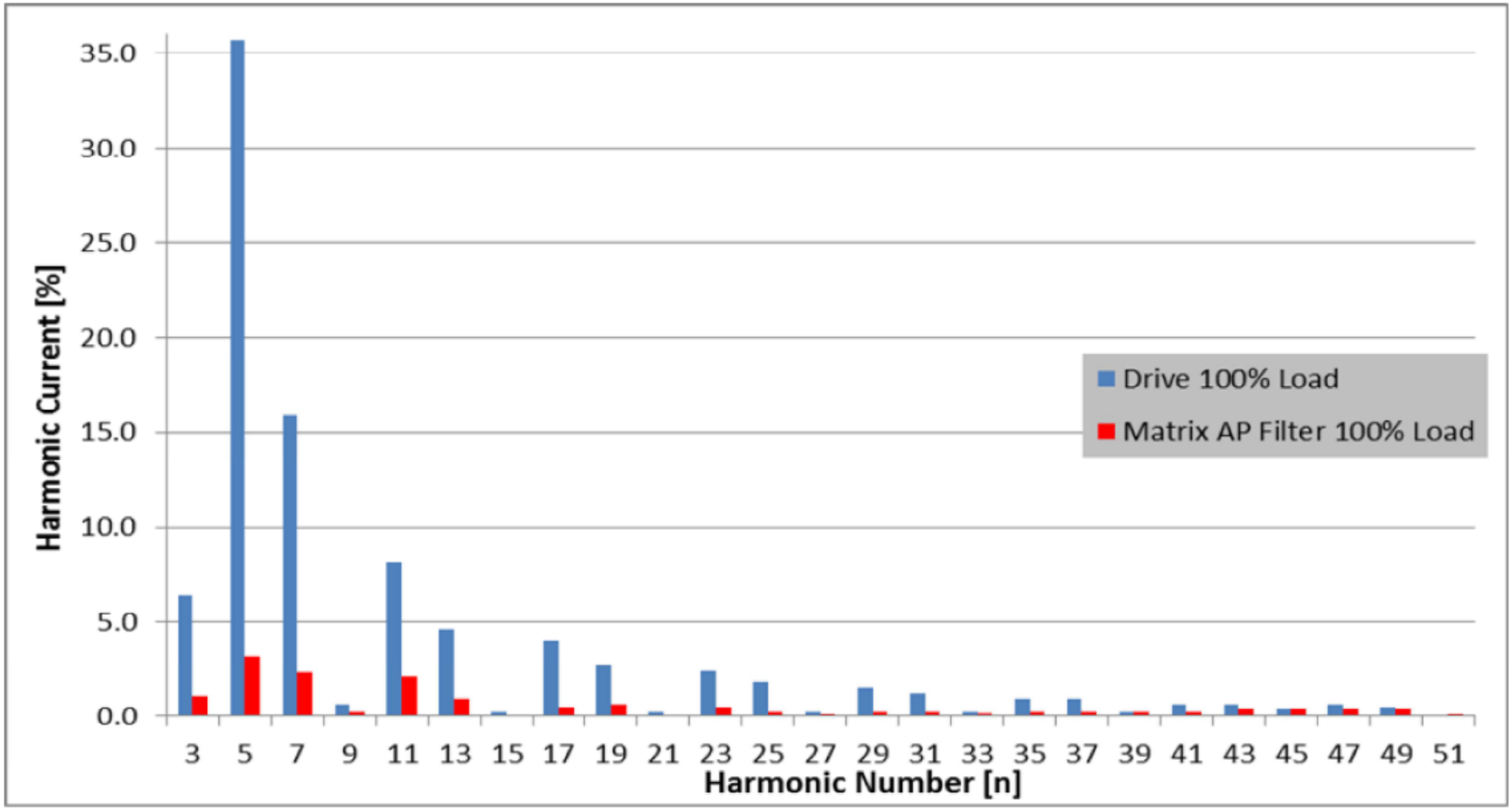
Matrix® AP Harmonic Performance



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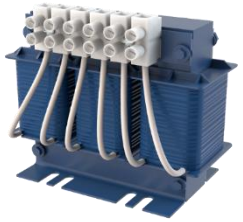
Harmonic Mitigating Solutions Summary

GOOD

- RL & RLW Line Reactors
  - 30 – 35% THID performance
  - Buffer for surges, transients, and power line disturbances
  - Economical insurance policy for system reliability



BETTER

- Matrix® E-Series Harmonic Filter
  - 8 – 12% THID at full load
  - 12 – 17% THID at 40% load
  - Economical solution for harmonic mitigation
  - Supports compliance of IEEE-519
  - Meet international harmonic distortion requirements

BEST

- Matrix® AP Harmonic Filter
  - Adaptive passive technology changes the inductance for better performance at light loads
  - 5% THID at full load
  - 8% THID at 30% load
  - Lower kVAR; generator compatible
  - Meets IEEE-519 requirements

MTE POWER QUALITY. SOLVED. A STEEL PARTNERS COMPANY

MTE

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A STEEL PARTNERS COMPANY

Thank You!

MTE

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Understanding and Optimizing Your Electrical System

Lauren Kaszak

Eaton Corporation, Engineering Services

Powering Business Worldwide

Agenda

- Identifying your electrical equipment
- Understanding your electrical equipment
- Optimizing your electrical equipment

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Identifying your electrical equipment

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What is does your electrical system impact?

Safety

- Electrical distribution equipment requires maintenance to operate as designed by the manufacturer; foregoing regular equipment maintenance, increasing the risk of equipment failures and hazards to nearby workers and equipment

Cost

- Improved reliability of electrical system – unplanned outages
- Extended equipment life
- Lower cost of ownership with regular electrical maintenance

Compliance

- National standards like NFPA 70B, NFPA 70E, and NFPA 99 require maintenance
- The insurance industry is represented on the technical committee and could link coverage to standard compliance

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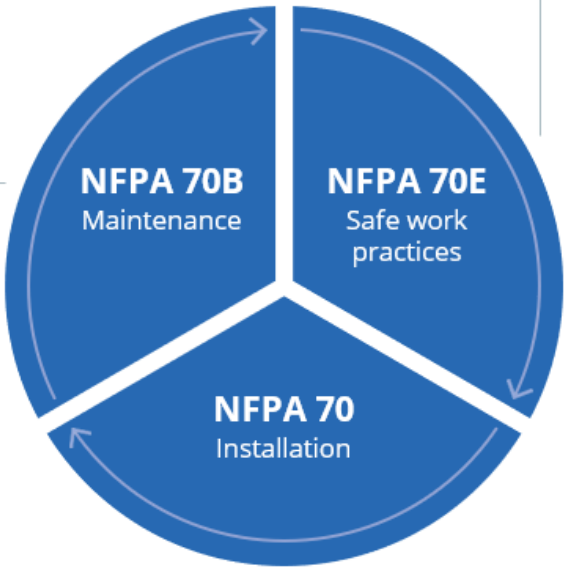
NFPA safety wheel

NFPA 70E
Standard for electrical safety in the workplace

- Requires an incident energy calculation
- Safe work practices
- Includes arc flash safety, which has connectivity to maintenance requirements
- Acts as basis of standards for many enforceable practices by OSHA
-

NFPA 70B
Standard for electrical equipment maintenance

- Electrical Equipment maintenance
  - Not intended to duplicate or supersede manufacturing instruction
- National consensus standard
  - Updated in 2023 from a recommended practice
- Acts as basis of standards for many enforceable practices by OSHA
- Often a requirement for insurance companies



NFPA 70
National Electrical Code

- Installation requirements
- Contains some maintenance requirements
- Adopted as law (Code)

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Defining the requirements of NFPA 70B

Chapter 4 of NFPA 70B lists the general requirements, which include an electrical maintenance program, responsible personnel, and analysis guidelines of electrical equipment.

General requirement summary

- **Follow manufacturer's guidelines, if available**
  In the absence of manufacturer's instructions, equipment shall be maintained in accordance with industry consensus standards
- **You shall have an electrical maintenance program (EMP)**
  The equipment owner shall implement and document an overall EMP that directs activity appropriate to the safety and operational risks
- **A new focus on equipment condition**
  The EMP shall include elements that consider current condition of maintenance of electrical equipment and systems, as well as the potential safety and operational risks to maintenance and operational personnel
- **Maintenance shall be performed by a trained professional**
  A qualified person responsible for conducting electrical maintenance shall be trained in the specific maintenance tasks, test methods, test equipment, PPE usage (as applicable), and hazards associated with the electrical equipment or system being serviced

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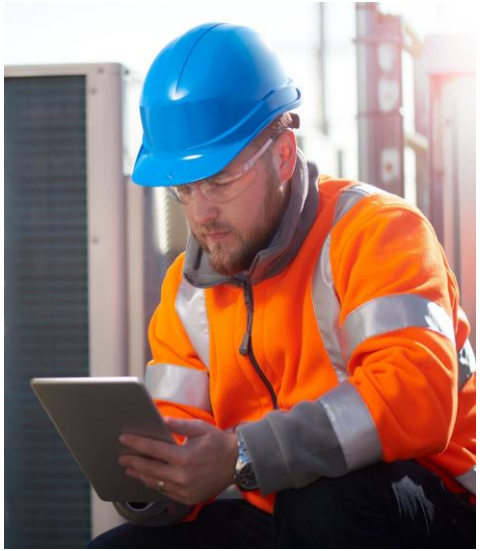
Defining an electrical maintenance program (EMP)

What is an EMP?

A managed program of inspecting, testing, monitoring, analyzing, and servicing electrical equipment with a purpose of maintaining safe operations.

An EMP shall include:

1. An electrical safety program that addresses the condition of maintenance
2. Identification of personnel responsible for implementing each element of the program
3. Survey and analysis of electrical equipment and systems to determine maintenance requirements and priorities
4. Developed and documented maintenance procedures for all equipment within the scope of the EMP
5. Plan of inspections, servicing, and suitable tests
6. Maintenance, equipment, and personnel documentation and records-retention policy
7. Process to prescribe, implement, and document corrective measures based on collected data
8. Process for incorporating design for maintainability in electrical installations
9. Program review and revision process that considers failures and findings for continuous improvement



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How to develop an electrical maintenance program

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Understanding your electrical equipment

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Monitoring with intelligent power management

EPMS: Electrical Power Monitoring System

Adopting an intelligent power management system will shed light on risks and inefficiencies that compromise *operations* and *safety*

With increased access to smart, connected devices, business can leverage the data from their operations to enable action that *aligns with their ESG goals.*

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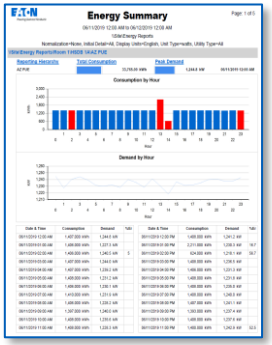
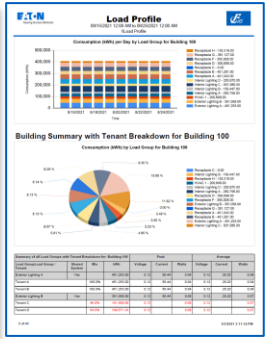
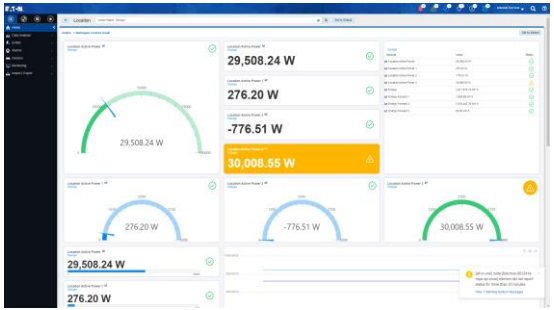
Measuring your energy consumption

EPMS: Energy Benchmarking

- ✓ Meet energy efficiency compliance (IECC 2021, ASHRAE 90.1, DOE, EPA).
- ✓ Automated graphical reports to track energy by category and environmental footprint.
- ✓ **Benchmark energy usage** and identify improvement areas.
- ✓ **Trend historical data** within the UI to compare YOY metrics and performance.
- ✓ Centralized view of utility incoming, renewable **energy sources**, and backup emergency systems.







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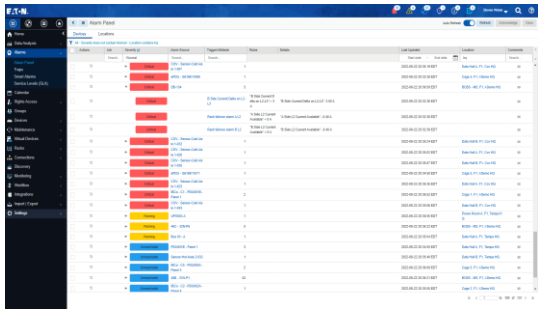
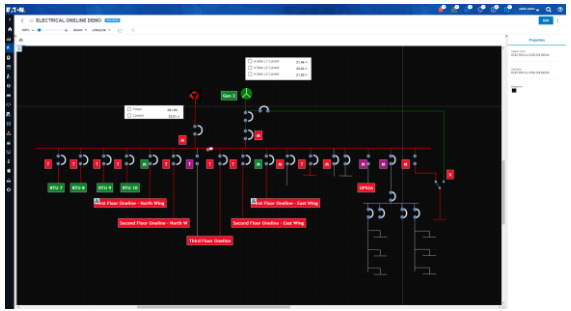
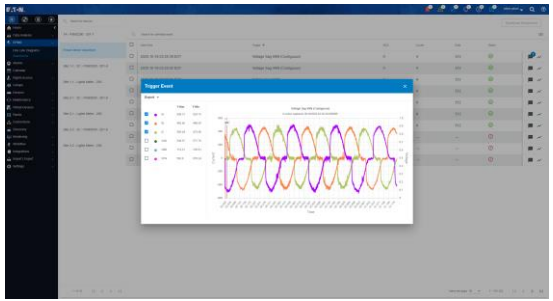
Measuring your energy consumption

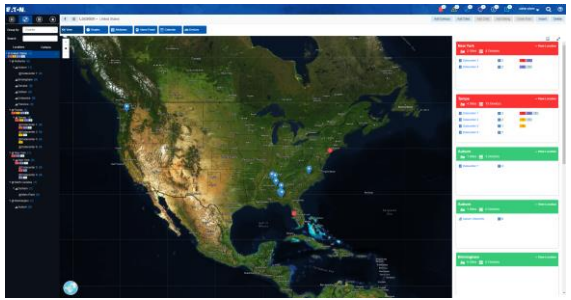
EPMS: Power Management and PQ Benchmarking

- ✓ 24/7 view of the electrical distribution system and subsystems.
- ✓ Analytical tools to analyze event triggers and waveform captures.
- ✓ Monitor the **condition and availability** of backup emergency systems and alternative energy sources.
- ✓ Measure and analyze the **quality of power** throughout the facility
- ✓ Enable need-based maintenance by **monitoring the health of critical components**.









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12

Analyzing your energy consumption – power quality

PQ Studies comprise of harmonic analysis, power quality investigations, grounding surveys/analysis and forensic studies.

Used for:

- PFC & utility bill review
- Transient mitigation/snubber applications
- Equipment troubleshooting
- Hot conduit, overheating equipment
- “Harmonics” caused this equipment for trip offline/fail
- Adding equipment to see impact on system

1 Onsite Visit / Data Collection

- System and equipment inspection
- Power quality monitoring

2 Analysis

- Analyzing PQ data;
  - Ensure compliance with IEEE 519
- Computer based modeling
- Identify problem categories such as harmonics, voltage sags, voltage unbalance, flickers, transients

3 Solutions

- Active/passive harmonic filtering, power factor correction
- Equipment selection & system design

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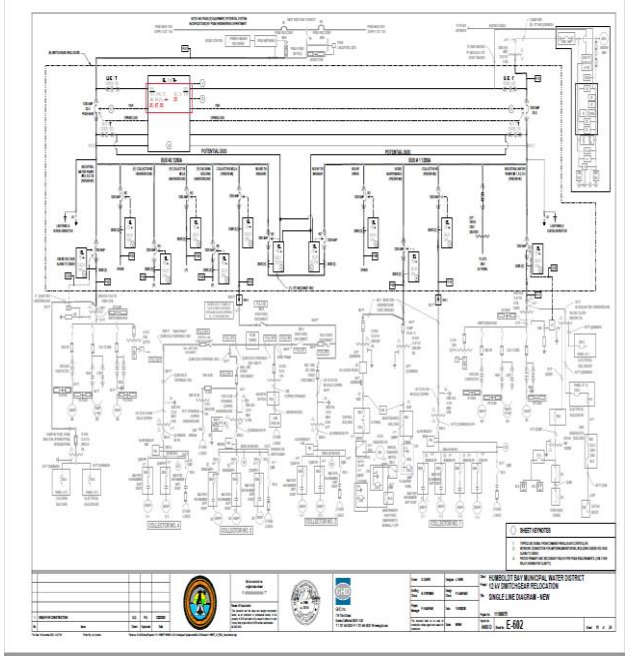
Analyzing your energy consumption – load flow

First step in analyzing your system from the capacity standpoint

Used for:

- Pointing out in your system where a low-voltage or high-voltage conditions may exist.
- Evaluating loading of cables and transformers.
- Evaluating voltage drops and power factor.
- Providing recommendations to improve loading and/or PF to address penalties charged by local utilities



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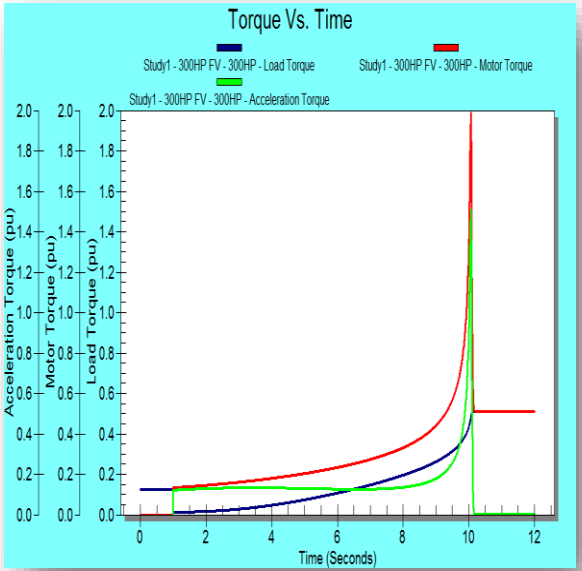
Analyzing your energy consumption – motor starting

Determine the voltages, currents and starting times involved when starting large motors

Used for:

- Ensuring that motor(s) will start with appropriate/acceptable voltage drop
- Evaluating whether a large motor can come up to speed and the impact to that power system during the start up
- Ensure motors will start within the thermal limits of the machines
- Determine set points for motor starters



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Optimizing your electrical equipment

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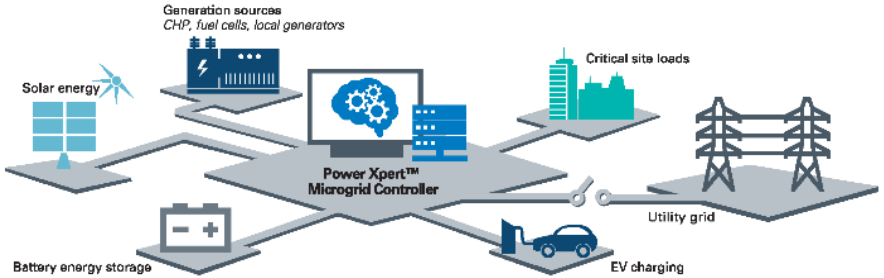
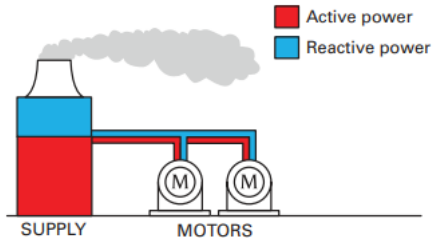
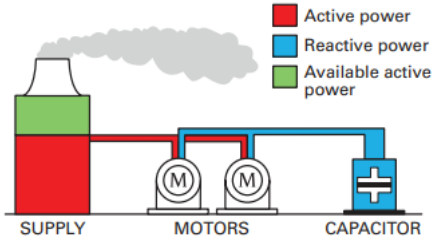
Optimizing your system

Once you know your system, there are countless options for optimization, including…

- Microgrids and BESS
- Harmonic Correction Units
- Power Factor Correction Units







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Summary and next steps

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Summary

- The starting point is identifying your electrical equipment through an EMP
- Once you identify your system, you can start monitoring and measuring using a power monitoring system
- That data will allow you to analyze and optimize your systems

Key Links

- NFPA – 70B – www.eaton.com/nfpa70b
- EPMS - Electrical power monitoring system | power management | energy monitoring | Eaton
- Advanced power studies - Electrical system studies | advanced electrical studies | Eaton

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Solutions for Industrial Efficiency and Selling Projects to Leadership

Werner Electric Supply

Power & Energy Summit

Tim Dantoin, Senior Energy Advisor

Focus on Energy, Large Industrial Program

(920) 366 – 3744 timothy.dantoin@focusonenergy.com

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Wisconsin Utilities' Statewide
Energy Efficiency (EE) & Renewable Energy (RE) Program

- Financial incentives & technical assistance for implementing energy-saving projects which would not otherwise occur

- Technical assistance, including:
  - Estimate savings and payback for potential projects
  - On-site support to identify energy saving opportunities
  - Research and provide best practice information
  - Support energy management and sustainability efforts

- Funded by Utility Rate Payers

Large Industrial (L-I) Participants

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- L-I Customer > (a) 1 MW or average 100,000 Therms per month
  (b) $60k per month average energy spend
- 620 customers with 1,600 sites in Wisconsin
- Each site has an assigned Focus on Energy L-I Advisor
- 430 total site visits (~25%) by L-I Staff in last 12 months
- 223 customers visited (36%) in last 12 months
- 512 sites (31%) used Focus incentives in last 24 months
- We've communicated with 97.5% of customers in last 6 months

Focus on Energy Advisors

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- Assigned to L-I customer sites by region and / or sector
- Develop ongoing relationships with assigned site
- Help assigned site identify & quantify energy efficiency opportunities
- Develop energy saving estimates and apply for custom incentives
- Advise and support prescriptive incentive applications
- Support energy management efforts including energy teams & capital planning
- Serve as your connection to and advocate within the Focus on Energy program

Focus on Energy L-I Advisors

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Energy Advisor	**Region / Sector**	**Email Address**
Amy Wanek	Southwest / Central	amy.wanek@focusonenergy.com
Dustin Schneider	Southeast / Central	dustin.schneider@focusonenergy.com
Gary Hegewald	Pulp & Paper	gary.hegewald@focusonenergy.com
Joe Cantwell	Wasterwater / Biogas	joe.cantwell@focusonenergy.com
Kevin Kohlbeck	Food & Dairy / Fox Valley / NE	kevin.kohlbeck@focusonenergy.com
Matt Droese	Central / MKE	matthew.droese@focusonenergy.com
Nick Sovacool	Pulp & Paper	nick.sovacool@focusonenergy.com
Paul Kling	Southeast / MKE	paul.kling@focusonenergy.com
Randy Urness	Northwest / Central	randy.urness@focusonenergy.com
Steve Lewallen	Metal Casting	steve.lewallen@focusonenergy.com
Thomas Danz	Pulp & Paper	thomas.danz@focusonenergy.com
Tim Dantoin	MKE / NE / Lake Shore	timothy.dantoin@focusonenergy.com

L-I's Subject Matter Experts (SMEs)

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Experienced industry specialist available to L-I customers at no cost for assessing process efficiency and making improvement recommendations

Area of Expertise

- Ethanol
- Pulp Mill
- Paper wet-end
- Metal Casting
- Solar PV
- Paper Machine
- Hyrdo
- Industrial Refrigeration

Selling EE to Leadership

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It's not just a project-specific exercise.

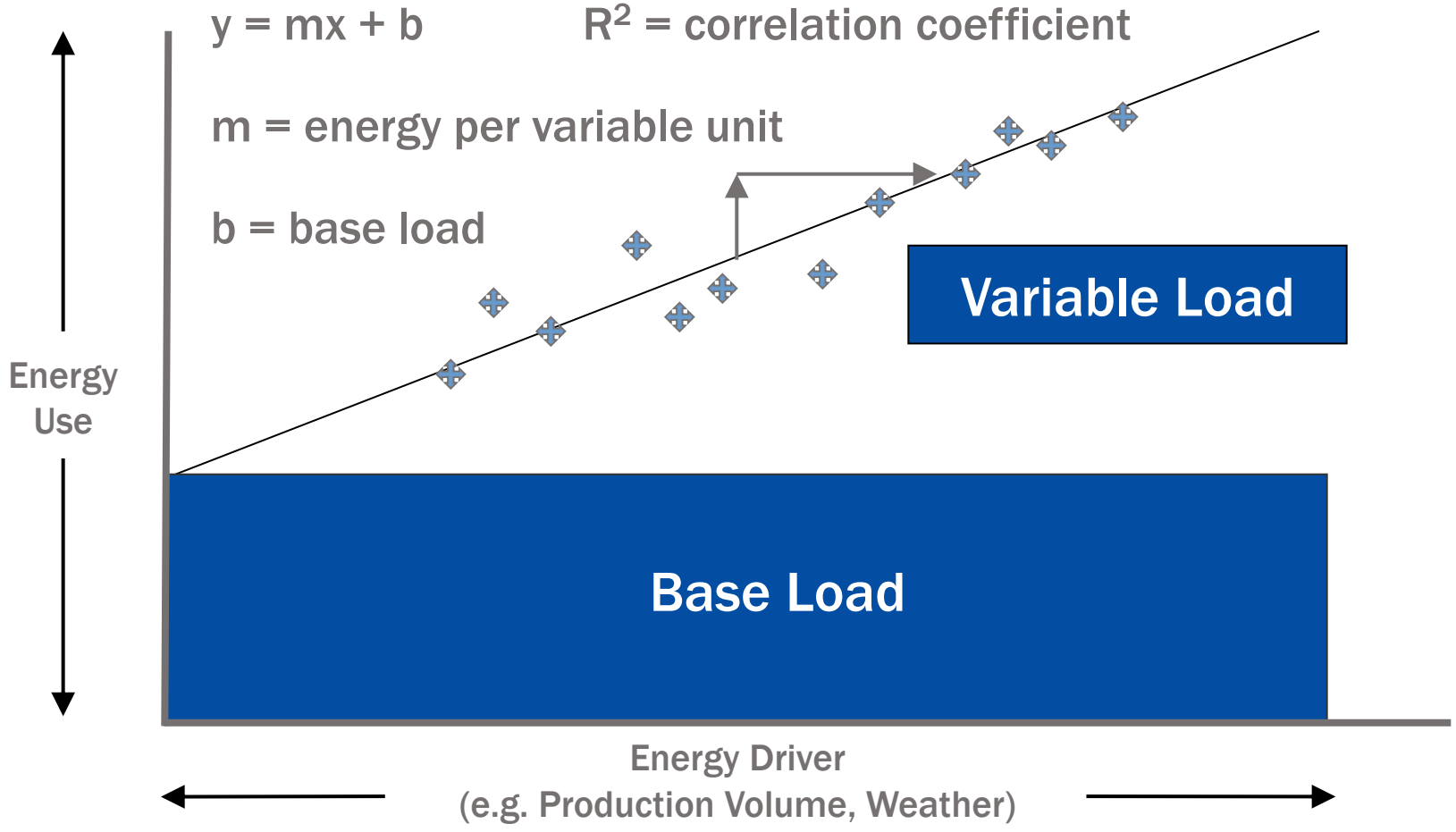
It's an ongoing effort

<u>Step 1</u>

Understand

Energy Efficiency vs

Energy Consumption



Tracking Energy Performance

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Indicator Type	Example
Utility Bill Review	Review Utility Bill Each Month
Year-Over-Year	Aug-2023 vs Aug-2024 = % difference
Energy use Per Part	Monthly Energy Use ÷ Monthly Production = kWh/pound
Regression Model	Daily kWh = 105,000 + (124 * Product A) + (213 * Product B) + (55*CDD) + (-12,000 * Weekend)

Selling EE to Leadership

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Step 2

Identify & Quantify Opportunities for Improvement

Opp #	Short Title	Status	Type	kW	kWh	Therm	$$ Saved	$$ Cost
1	Dry off Oven temperature reduction	Pursuing	Operations					
2	Install new MAU w/ DDC controls	Pursuing	Capital					
3	Compressed air system optimization	Identified	Study					
4	Compressed air leak survey	Quantified	Maintenance					
5	Reduce Downtime for Job Changeover	Identified	Operations					
6	Determine suitable value position on steam recover loop	Identified	Study					
7	Automate valve position on steam recovery loop	Completed	Capital					

Sources for Ideas

- Production & Maintenance Staff
- Equipment Vendors
- Site Assessment / Walk Thru
- Capital Plan Energy Review
- System Studies
- Corporate / Facility Experience
- Case Studies / Success Stories

Energy Team…Opportunity List = Mtg Agenda

Selling EE to Leadership

$$\text{Simple Payback} = \frac{\text{Project \$\$ Cost} - \text{Focus \$\$ Incentives}}{\text{Energy \$\$ Saved}}$$

Step 3

Make the case for turning opportunities into projects

Continuous Improvement Context

- Projects are NOT Standalone Efforts
- Report to Leadership Regularly / Periodically
  - 5 to 10 minutes in an existing mtg vehicle
- Discuss Energy Performance (broad context)
- Share Opportunities List (ongoing effort)
- Highlight Ready Projects (make the specific case !!)

Participant Example

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- Sector – Food Processing
- Support – Steam Boiler System Upgrade
  - $80,000 RFP incentive for Condensing Economizer
  - $32,000 custom incentive for Reverse Osmosis on Feedwater
  - Customer recognition event
- Savings Annually
  - 100,000 therms
  - $44,000

Participant Example

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- Sector – Metal Casting
- Support for the Long Term
  - $550,000 incentives over 7 Yrs
  - 11 Prescriptive, Custom & PAIs
  - Monthly Energy Team Mtgs
  - Submetering & Data Analysis
- Energy Improvements
  - Reduced 1,630 kW
  - Saving 1,100,000 kWh and $125,000 annually

Primary Incentive Offerings

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Prescriptive Incentives

- Fixed incentive per unit (e.g. Hp, light fixture)
- Covers commonly installed equipment
- Applied for after installation

Custom Incentives

- Incentive based on estimated energy saved
- Typically for more complex projects
- Requires pre-approval before getting started

Project Assessments

- For in depth study of an opportunity
- 50% of study cost up to $15k
- You select the contractor
- Requires pre-approval

Prescriptive Incentives

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- Common facility & production equipment & maintenance practices
- See Summary of Business Incentives or catalogs for detailed information
- Fixed incentive rates per unit (e.g. motor Hp, light fixture)
- Application needed within 60 days of installation
- Preapproval not required unless specified
- We can help with applications as can your contractors
- 25% Incentive Rate increase in 2025

Prescriptive Application Process

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Confirm equipment eligibility

1

Install qualifying equipment

2

Submit application, invoices, and required documentation within 60 days of installation

3

Receive check within 8-10 weeks

4

Use of Prescriptive Incentives

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Annual Average (2021-2024)	
Participating L-I Sites	212
Applications	487
Incentives $$	2,480,000
Ave $$ per App	$5,100
kW Saved	8,800
kWh Saved	78,500,000
Therms Saved	810,000

Est. Customer Savings
~ $4.0 million
~ $0.5 million

Custom Incentives

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- For non-standard facility and production upgrades
- Pre-approval required, so get us involved ASAP
- Incentive based on estimated 1st year gas & electric energy saved at the rate of….
  - $100 per kW
  - $0.05 per kWh
  - $0.95 per therm
- We can help with energy saving estimates
- Max of $300,000 per project up to 50% of project cost
- Simple payback w/o incentive must be 1 to 10 yrs
- Exception requests considered

Custom Application Process

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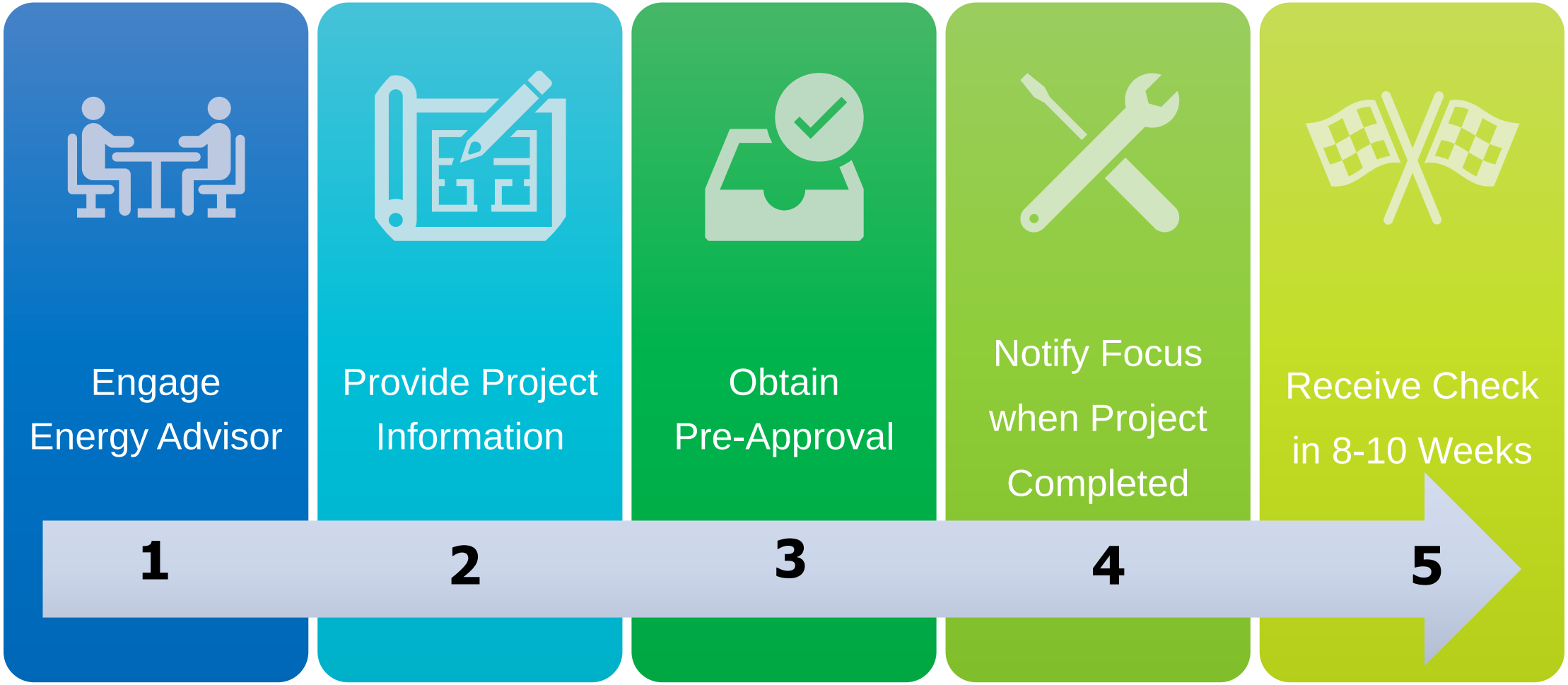

Use of Custom Incentives

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Annual Average (2021-2024)	
Participating L-I Sites	87
Applications	141
Incentives $$	5,400,000
Ave $$ per App	$39,000
kW Saved	5,700
kWh Saved	49,000,000
Therms Saved	5,500,000

Est. Customer Savings
~ $2.5 million
~ $3.0 million

Process Assessment Incentive

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- Lesser of $15,000, 50% of study cost
- Application pre-approval required
- Use your preferred contractor
- Suitable for all industrial processes including biomass
- Study proposal must describe what will be assessed & anticipated findings
- Report due 6 mo. after pre-approval must include…
  - Savings estimates w/ supporting calculations
  - Project implementation cost estimates
  - Any data collected and used in the assessment
  - Plan for implementing recommendations

Annual Average (2021 to 2024)	
Ave Annual PAI's	19
Ave $$ per PAI	$6,400

Additional Offerings

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Energy Design

- New construction & major renovations
- Evaluate various facility equipment options
- Incentive based on energy saved

Request for Proposals (RFP)

- Request project assistance beyond primary offerings
- Competitive
- Generally offered every other year
- Current RFP Submittals Due Tuesday !!

Capital Planning Incentive (CPI)

- Brings Focus financial support into capital planning
- $2,500 incentive available annually following meeting with site's capital decision-makers
- Available per site

Production Efficiency

- Improve process efficiency (i.e. energy per unit produced)
- Scrap Reduction
- Capacity or Thru Put Increase
- Product or Process Redesign

Energy Design
(aka New Construction)

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Energy Design Assistance

- Customized whole-building analysis
- Available for buildings >5,000 sq ft
- Must be in the planning phase
- Incentives provided to both design team and customer

Energy Design Review

- Simplified whole-building energy analysis
- For projects beyond planning & design phase
- Incentives available to customer for implementing energy-efficient options

Product & Equipment Incentives

- Projects already completely designed or completed
- Available incentives are indicated in the prescriptive catalogs
- Available up to 60 days after occupancy

Request for Proposal (RFP)

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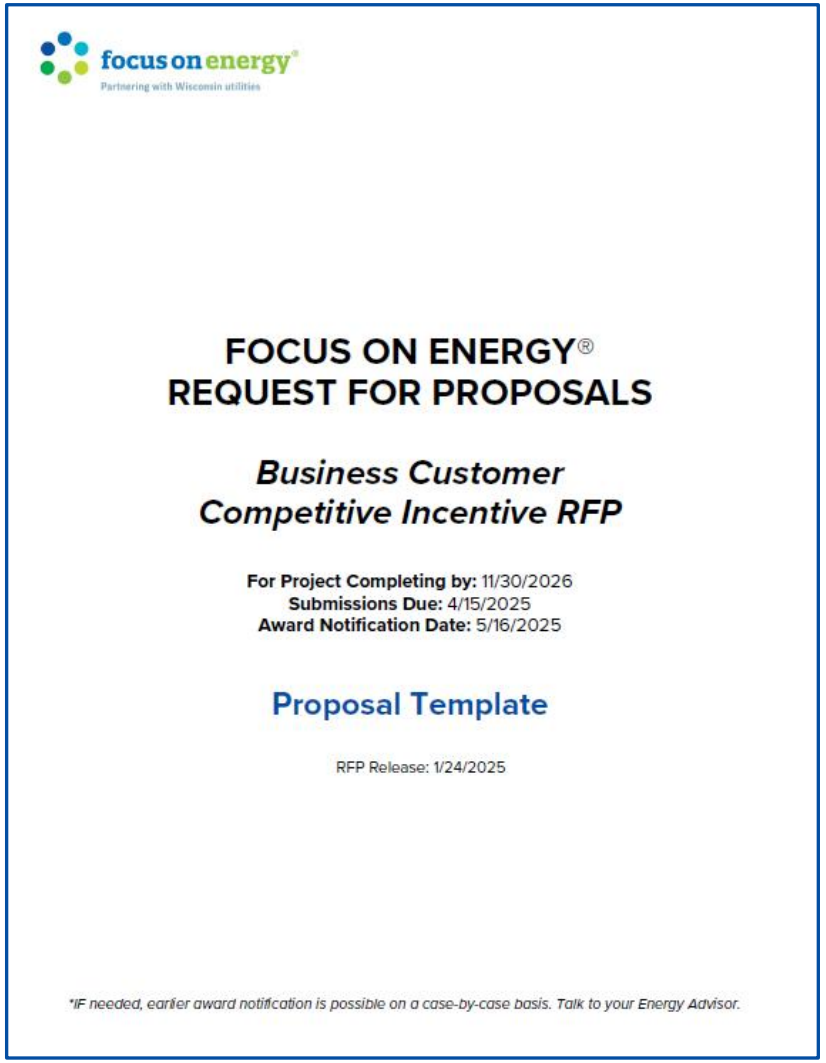
Competitive Scoring based on…

- Cost Effectiveness – measured in $/MMBTU saved
- Savings Potential – magnitude of energy savings
- Project Timing – a shorter implementation period reduces the risk of project delay or even cancellation
- Impact Statement – explaining why the incentive is needed to move the project forward
- Next RFP Round ?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FOCUS ON ENERGY®
REQUEST FOR PROPOSALS

Business Customer
Competitive Incentive RFP

For Project Completing by: 11/30/2026
Submissions Due: 4/15/2025
Award Notification Date: 5/16/2025

Proposal Template

RFP Release: 1/24/2025

**If needed, earlier award notification is possible on a case-by-case basis. Talk to your Energy Advisor.*

Capital Planning Incentive (CPI)

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- Large, cost-effective energy saving opportunities typically have long lead times.
- Early engagement with Focus on Energy improves the likelihood and amount of an incentive available for your project.
- The CPI provides $2,500 annually for discussing your capital plans with us
- We'll work with you to understand the energy implications of those plans
- We'll also develop an estimated incentive you can use in gaining approval for the proposed capital expenditure.
- Available for each site

Production Efficiency

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- Energy efficiency isn’t just about reducing energy consumption
- Incentives are available for reducing your energy use per unit of production
- Possible avenues for improving energy use per unit produced include;
  - Improving your scrap rate or production yield
  - Increasing product through put rate with new or modified equipment
  - Redesigning products or production operations
  - Refining operational control through real-time optimization of parameters
- We’re seeing an increase in application of A-I for production & systems control

CONTACT INFORMATION

Focus on Energy – for Manufacturers

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Focus on Energy, Large Industrial Program
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Customer support, energy efficiency and renewable energy offerings

May 7, 2025

Wisconsin Public Service

Greg Smedema
Manager Key Accounts

Jeff Mackey
Energy Efficiency Services engineer

Agenda

1. Programs available to help commercial and industrial customers with their energy goals.
2. About us
3. Energy Efficiency Services
4. Renewable Energy

We Energies and Wisconsin Public Service staff

Key Account Managers

- Works with the largest C&I customers.

Service Managers

- Meets service needs of business customers within a geographic area.

Business Center Consultants

- Works with business customers via phone, email, or web.

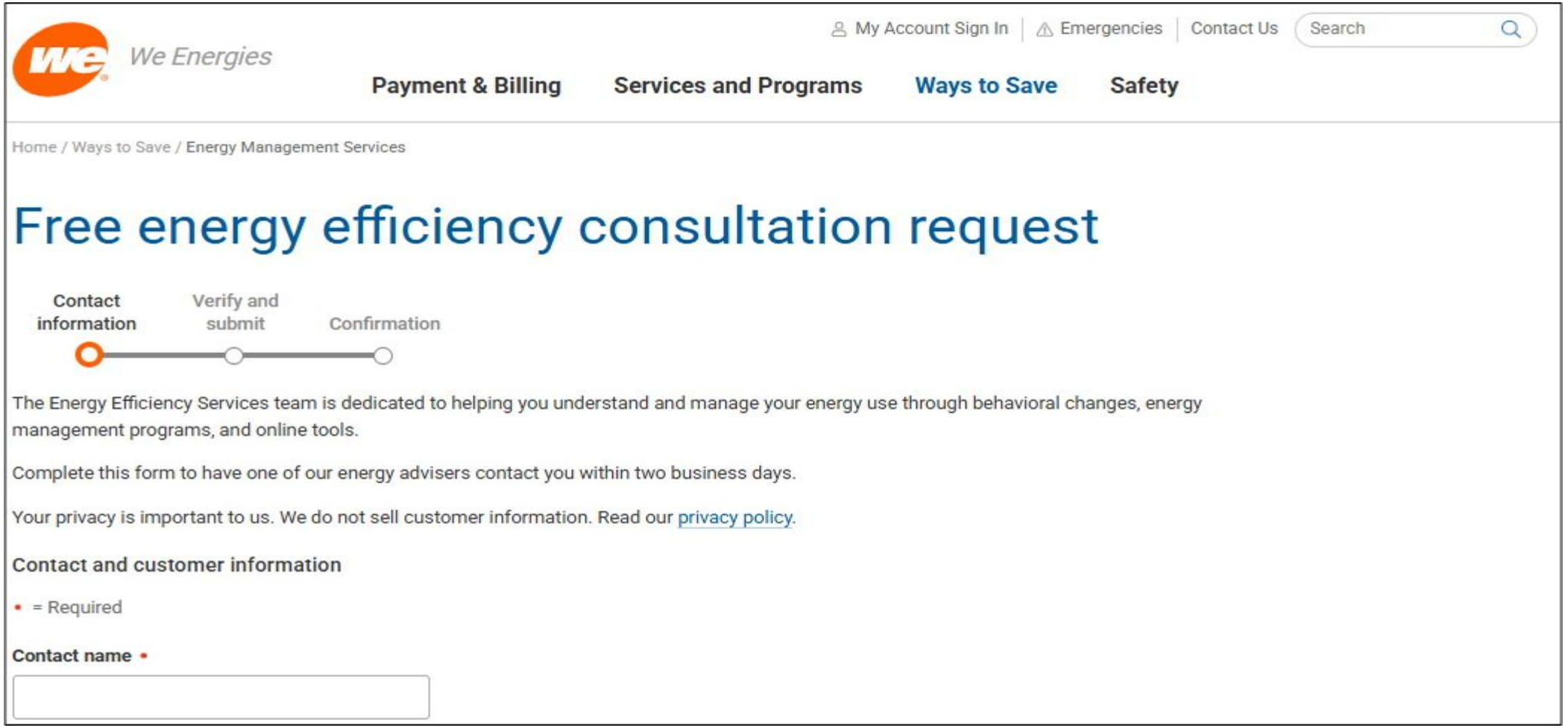
Energy Efficiency Engineers

- Works with business customers through the Energy Efficiency Services program (EES).

EES program offerings

- Phone consultation
- Energy Analysis report
- Utility rates and bill review
- Customer training with free online tools
- Energy Star benchmarking
- Energy saving calculations

How to get started – Phone consultation

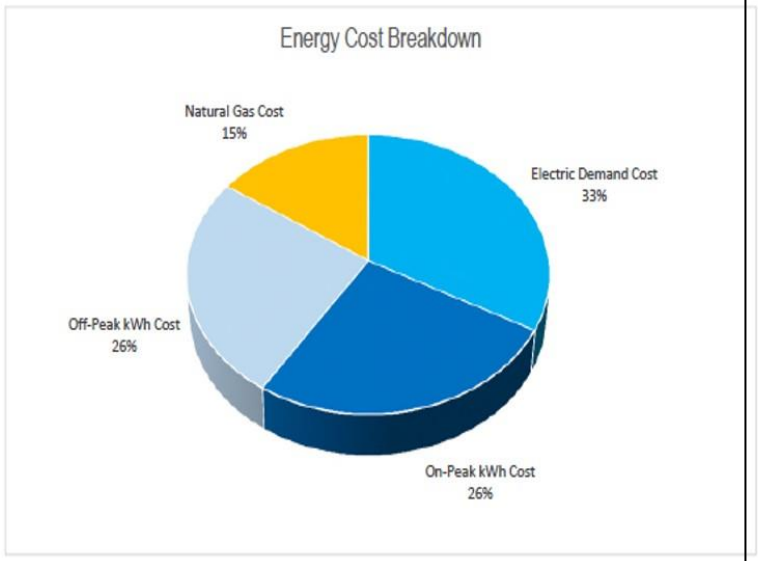


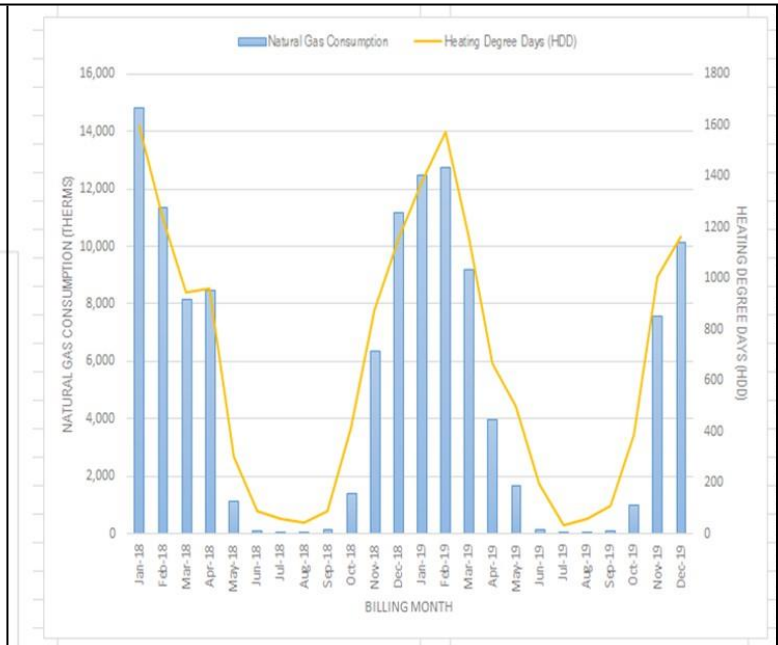
www.we-energies.com/businessconsultation

Services overview – Phone consultation or assessment

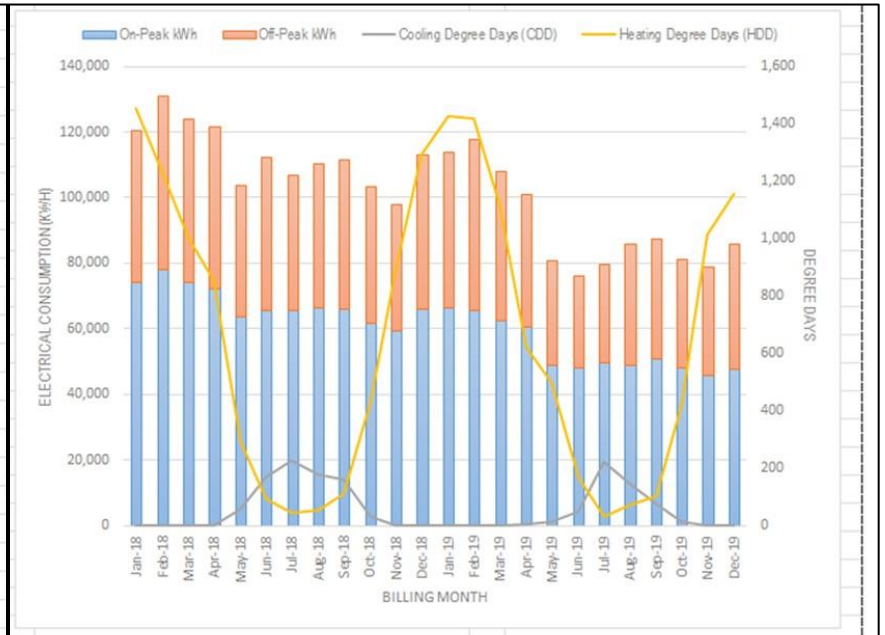
Your average annual energy costs are as follows:

Electricity	1,793,464	kWh at an average annual cost of	$	213,969
Natural Gas	70,133	therms at an average annual cost of	$	35,768
		Total Cost :	$	249,736





Average annual usage (therms)	61,499.50
Average annual natural gas Cost (USD)	$36,290.00
Average cost per therm (USD/therm)	$0.590

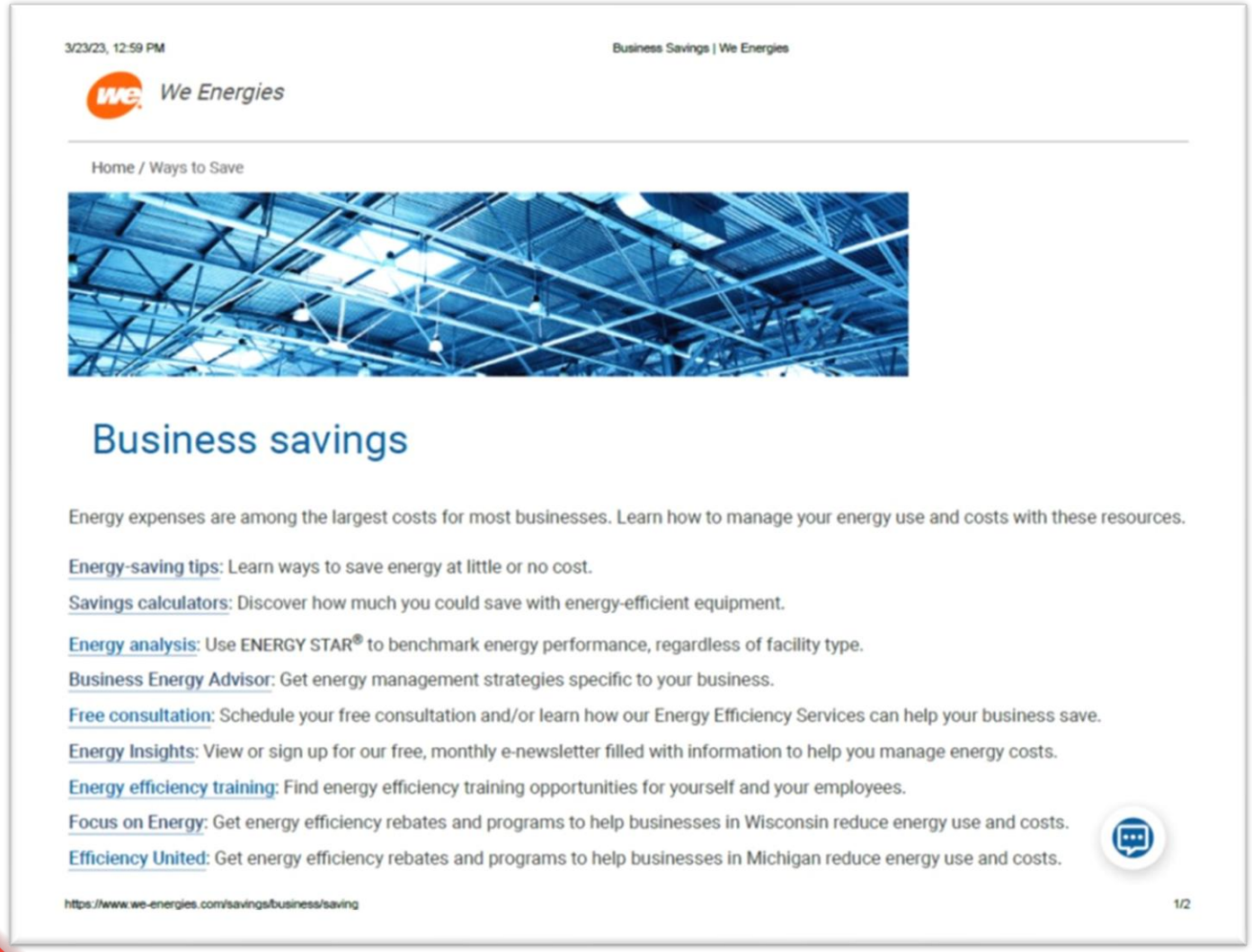


Average 12-month total usage (kWh)	1,227,724
Average 12-month total cost	$156,565
Average Blended Rate (USD/kWh)	$0.128

Services overview – Free tools, bill analysis, benchmarking

- Online Tools
  - MyMeter
  - Energy Information System
  - Business Account Online
- Bill Analysis
  - Review recent energy bills
- Benchmarking
  - Energy Star Portfolio Manager

Services Overview – Guidance to reduce energy use



3/23/23, 12:59 PM Business Savings | We Energies

We Energies

Home / Ways to Save

Business savings

Energy expenses are among the largest costs for most businesses. Learn how to manage your energy use and costs with these resources.

Energy-saving tips: Learn ways to save energy at little or no cost.

Savings calculators: Discover how much you could save with energy-efficient equipment.

Energy analysis: Use ENERGY STAR® to benchmark energy performance, regardless of facility type.

Business Energy Advisor: Get energy management strategies specific to your business.

Free consultation: Schedule your free consultation and/or learn how our Energy Efficiency Services can help your business save.

Energy Insights: View or sign up for our free, monthly e-newsletter filled with information to help you manage energy costs.

Energy efficiency training: Find energy efficiency training opportunities for yourself and your employees.

Focus on Energy: Get energy efficiency rebates and programs to help businesses in Wisconsin reduce energy use and costs.

Efficiency United: Get energy efficiency rebates and programs to help businesses in Michigan reduce energy use and costs.

https://www.we-energies.com/savings/business/saving 1/2

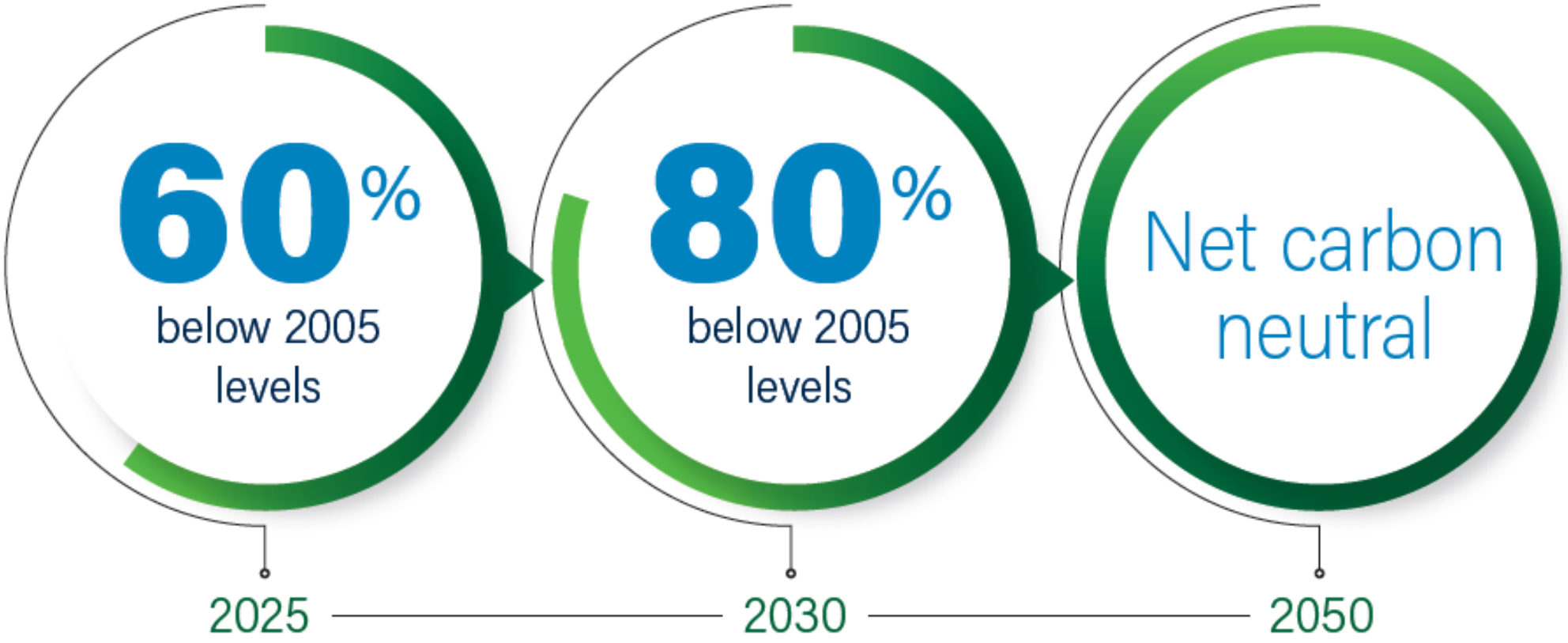
Links:

- Energy-saving tips
- Savings calculators
- Business Energy Advisor: Includes specific energy management strategies

www.we-energies.com/savings/business/saving

We Energies has renewable energy generation

Our parent company WEC Energy Group is planning for a net-zero electric generation fleet by 2050.



Customer options for renewable energy

1. Purchase renewable energy-generated electricity.
   - Energy for Tomorrow or NatureWise
   - Renewable Pathway
2. Install your own equipment.
   - Customer-Owned Generation Systems (COGS)
3. Pilot program for Electric Vehicle (EV) charging.

www.we-energies.com/services/electric-vehicles/ev-business-charger-pilot

We Energies

We Energies	Energy For Tomorrow	Renewable Pathway
Program cap	None	125 MW
Program min	None	1000 kWh/month
Customer eligibility	Residential Commercial Industrial	Commercial Industrial Lighting
Enrollment Type	Percentage Blocks (1 kWh)	Blocks (100kWh)
Sources	Solar & Wind facilities in Wisconsin	**Specific** utility-scale, renewable energy facility in Wisconsin
Duration	Year to year	1 year, 5 years (customer election)
Participation cost (2025)	In addition to customer's normal energy charge: • 1.158 cents/kWh (enrolled 100% <70,000 kWh/month) • 0.995 cents/kWh (>70,000 kWh/month)	In addition to customer's normal energy charge: • 1.768 cents/kWh (1 year) • 1.582 cents/kWh (5 years)
Renewable attributes	Green-e Certified; RECs retired in the name "Energy for Tomorrow"	RECs retired in Customer Name by We Energies on behalf of the customer

Wisconsin Public Service

WPS	NatureWise	Renewable Pathway
Program cap	None	40 MW
Program max/min	25,000 blocks/month - Maximum	1000 kWh/month - Minimum
Customer eligibility	Residential Commercial Industrial	Commercial Industrial Lighting
Enrollment Type	Blocks (100 kWh)	Blocks (100kWh)
Sources	Wind facilities in Midwest	**Specific** utility-scale, renewable energy facility in Wisconsin
Duration	Year to year (if purchasing >20 blocks)	1 year, 5 years (customer election)
Participation cost (2025)	In addition to customer's normal energy charge: 1.277 cents/kWh	In addition to customer's normal energy charge: • 2.173 cents/kWh (1 year) • 1.986 cents/kWh (5 years)
Renewable attributes	RECs retired in the name "NatureWise"	RECs retired in Customer Name by WPS on behalf of the customer

Rate comparison when you own generation equipment

Rate	We Energies	WPS
Net metering	• 0-300 kW limit • Usage and gen netted monthly • $/kWh avoided energy	• 0-20 kW limit • Usage and gen netted monthly • $/kWh avoided energy
Mid-size buy and sell	CGS-CU • 0-5,000 kW limit • Usage and gen not netted; billed/credited for actual • $/kWh avoided energy • + capacity credit	PG-2B • 0-5,000 kW limit • Usage and gen not netted; billed/credited for actual • $/kWh avoided energy • + capacity credit
Sell all generation	CGS DS-FP • 0-5,000 kW limit • $/kWh avoided energy • + capacity credit	PG-2A • 0-5,000 kW limit • $/kWh avoided energy • + capacity credit
Non purchase	CGS-NP • 0-15,000 kW limit • No credit for energy sent back to utility	PG-1 • 0-15,000 kW limit • No credit for energy sent back to utility

Questions?

Resources

Topic	Website
Free EE consultation	www.we-energies.com/businessconsultation
Business savings links	www.we-energies.com/savings/business/saving
Emergencies and outages	www.we-energies.com/safety/emergency
Energy for Tomorrow – Large business	www.we-energies.com/services/business/eft-lrgbus
Environmental topics	www.we-energies.com/environment/
Electric Vehicles	www.we-energies.com/services/electric-vehicles/electric-vehicles
Corporate Responsibility	www.wecenergygroup.com/csr/index.htm
Environmental policy	www.wecenergygroup.com/about/environmental-policy.htm
Renewable energy projects	wecenergygroup.com/environment/wec-clean-energy.htm
We Energies News Center	news.we-energies.com