

# WPS Energy Efficiency & Sustainability Forum

Wednesday, June 12  
7:30 am–11:10 am

Lambeau Field  
Green Bay, Wisconsin



SPONSORED BY



# Welcome

THANK YOU TO OUR SPONSOR



# Event Partner



**focus on energy**<sup>®</sup>

Partnering with Wisconsin utilities



# Agenda

**7:30 am – 8:00 am | Registration and breakfast**

**8:00 am – 11:10 am | Program**

**11:15 am – 12:30 pm | Tour Group #1**

**11:30 am – 12:45 pm | Tour Group #2**


- Welcome, introductions, and opening remarks
- Ask the experts – Updates from Focus on Energy and IRA
- Featured session # 1 – Compressed air systems: Opportunities for improved efficiency
- Networking break
- Featured session # 2 – Renewable Energy Certificates (RECs) and their role in decarbonization strategy
- Lambeau Field energy conservation measures
- Lambeau Field Facility Tours



# Your Feedback is Important

Please fill out an evaluation by scanning the QR code or by paper to help us better serve your continuing education needs.





---

### Evaluation of this course

How successful were we at meeting these training objectives?	Failing		Excellent		
	F	D	C	B	A
How much do you agree or disagree with these statements regarding the training?	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
Training content	1	2	3	4	5
Presentation	1	2	3	4	5
Logistics	1	2	3	4	5



Welcome

Greg Smedema, WPS



SPONSORED BY





# Ask the Experts

**Kyle Thomas:**  
Focus on Energy  
program updates

**Robin Lisowski:**  
Inflation Reduction Act  
update



SPONSORED BY





# FOCUS ON ENERGY OVERVIEW

## 2024 Programs





# FOCUS BY THE NUMBERS



Served nearly 1 million residential participants



Served 3,900 business participants

Achieved \$4+ in benefits for every \$1 invested



Wisconsin's official resource for

**smart energy solutions**

Works with residents and businesses to complete

**smart energy projects**

Provides rebates, technical assistance, and

**smart energy resources**

# PRESCRIPTIVE INCENTIVES

- Standard equipment retrofits.
- Generally 1-for-1 replacements.
- Fixed incentive rates.
- Preapproval not required unless specified.
- Incentives and requirements found in prescriptive incentive catalogs.



# LIGHTING INCENTIVES



- On average, lighting represents 8%<sup>1</sup> of energy usage at commercial facilities.
- Replacing Interior and Exterior Lighting with LED can save up to 75%<sup>2</sup> on lighting costs.
- LED Light fixtures generally have a much higher useful life, reduced maintenance, and provide better light quality.

<sup>1</sup> <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/e1.php>

<sup>2</sup> <https://energy.gov/energysaver/led-lighting>



# HVAC & PLUMBING INCENTIVES

- On average, heating, ventilation, and air-conditioning (HVAC) represents over 40%<sup>1</sup> of energy usage at commercial facilities.
- Energy-efficient technologies can help the average hospital save 28%<sup>2</sup> on HVAC and 20%<sup>2</sup> on water heating energy.
- Prescriptive incentives are available for equipment retrofits and common control strategies.

<sup>1</sup> <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/e1.php>

<sup>2</sup> <https://www.aceee.org/sites/default/files/publications/researchreports/a1703.pdf>





# COMMERCIAL REFRIGERATION



- Energy-efficient doors.
- ECMs for Evaporator, Compressor, and Condenser Fans.
- LED Case Lighting.
- Case Modifications.
  - Replace open multideck cases with cases with doors.
  - Install doors on open multideck cases.
  - Night Curtains for open cases.
  - Strip Curtains for walk-in cases.
- Controls.
  - Anti-Sweat Heater Controls.
  - Evaporator Fan Speed Controls.
  - Demand Defrost Controls.
  - Floating Head Pressure Controls.

# PROCESS SYSTEMS INCENTIVES



- Equipment used in industrial manufacturing applications.
- Data-center and telecom facilities.
- Heating, cooling, and controls for equipment used for process.
- Custom incentives may be available for other process equipment.



# PRESCRIPTIVE APPLICATION PROCESS



## 1. Confirm equipment eligibility.

- Review requirements in Incentive Catalog.
- Obtain preapproval if required.
- Contact an Energy Advisor for additional support.



## 2. Install qualifying equipment.



## 3. Submit application, invoices, and required documentation.

- Must be submitted within 60 days of project completion.
- Can be sent to Energy Advisor or [business@focusonenergy.com](mailto:business@focusonenergy.com)



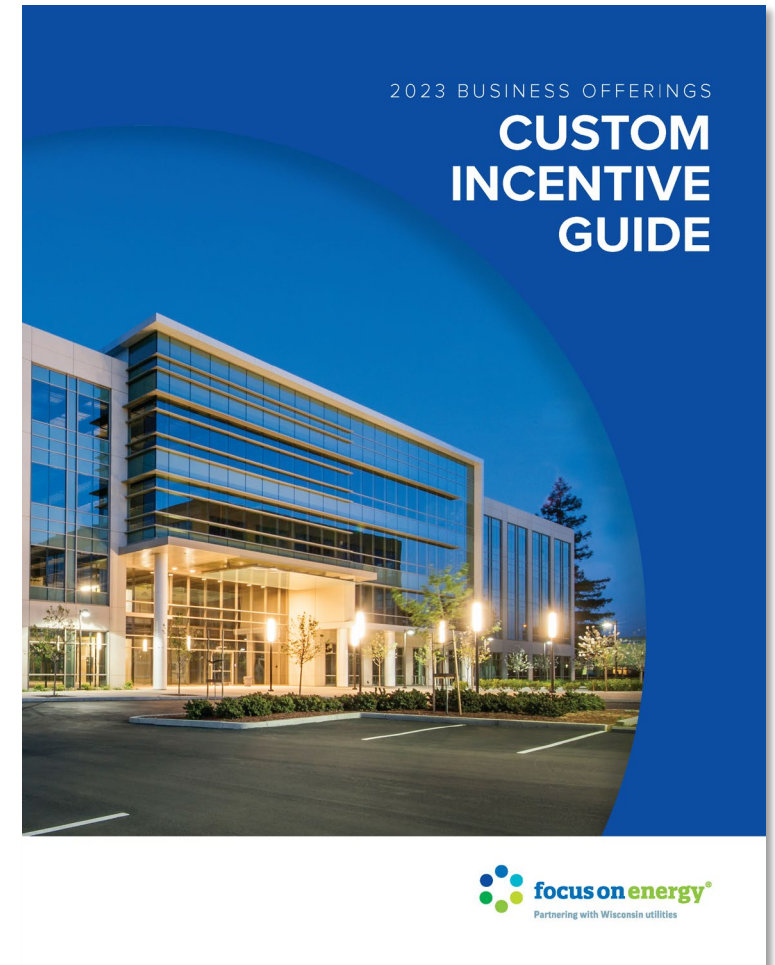
## 4. Receive check within 6-8 weeks.

- A post-installation inspection may be required prior to payment.

# CUSTOM INCENTIVES



- Offered for projects where a prescriptive incentive does not exist.
- E.g., non-standard equipment or operating conditions, not a 1-for-1 replacement.
- Incentive is based on the estimated first year gas and electric energy savings.
- Projects must pay back between 1 and 10 years.
- All custom incentives require pre-approval before equipment is purchased or work begins.
  - Contact an Energy Advisor ASAP if you are unsure whether your project requires a custom incentive.





# CUSTOM APPLICATION PROCESS



## 1. Engage Energy Advisor

- Preapproval is required prior to project starting for all Custom projects.



## 2. Provide Project Information

- Work with your Energy Advisor and Trade Ally to gather project information.
- Includes proposal, specifications, and utility data.



## 3. Obtain Preapproval

- Your Energy Advisor will use project information to calculate energy savings and incentive.



## 4. Install Equipment

- Equipment can be purchased and installed after signing the **Incentive Agreement**.



## 5. Notify Energy Advisor of Completion.

- A post-installation inspection may be required.
- You will receive your incentive check within 6-8 weeks.

# OTHER OFFERINGS



- New Construction and Major Renovations
  1. Energy Design Assistance
  2. Energy Design Review
  3. Product and Equipment Incentives
- Renewable Energy
  - Prescriptive rewards for solar PV
  - Custom incentives for other technologies
- Whole Building Tune-Up (WBTU) and RCx
- Instant Discount/Midstream
- PEM benchmarking

# GETTING STARTED WITH FOCUS ON ENERGY



# WORKING WITH AN ENERGY ADVISOR



- Identify energy-saving opportunities.
- Create, maintain, and monitor energy management plans.
- Verify measure eligibility and assist with paperwork.
- Complete energy-saving estimates and apply for custom incentives.
- Coordinate media and PR opportunities.





# WORKING WITH A TRADE ALLY



- Registered Trade Allies provide additional support.
- Familiar with the incentives their equipment qualifies for.
- Assist with completing paperwork.
- Can elect to receive an incentive on behalf of the customer, reducing first-cost.
- Find a Trade Ally at **[focusonenergy.com/trade-allies](https://focusonenergy.com/trade-allies)**.

# CONTACT INFORMATION

Call: 800.762.7077

Email: [focusinfo@focusonenergy.com](mailto:focusinfo@focusonenergy.com)

Visit: [\*\*focusonenergy.com\*\*](http://focusonenergy.com)

# Inflation Reduction Act Highlights for Utility Customers

WPS Energy Efficiency Forum

Robin Lisowski | Slipstream

June 10, 2024

# Inflation Reduction Act (IRA) Overview

- Signed into law by President Biden August 16, 2022
- Designed to reduce the federal deficit and lower inflation while investing in climate, domestic energy production, & health
- Expected to raise \$737 billion, require investments totaling \$437 billion, and reduce the deficit by more than \$300 billion
- It is a scaled back version of what was called Build Back Better in 2021
- Like IJA, part of broader opportunity to focus on and realize environmental justice



# Climate, Energy, & EJ Investment

- **IRA is the single largest Congressional climate investment in history**
- **More than 100 programs will invest \$369 billion in climate action, clean energy jobs, & environmental justice**
- **Estimated impacts of legislation:**
  - reduce greenhouse gas emissions by a billion metric tons by 2030 (about 40% below 2005 levels)
  - avoid up to 3,900 premature deaths and 100,000 asthma attacks annually by 2030 by reducing particle pollution from fossil fuels
  - lower the national deficit by \$300 billion
  - create 9 million family supporting jobs
  - enhance accountability by tracking labor, equity, & environmental outcomes





# Climate, Energy, & EJ Provisions

- Electricity
- Transportation
- Buildings
- Manufacturing
- Environmental Justice & Community Resilience
- Lands
- Agriculture



# Tribal Home Electrification & Appliance Rebates (THEARP)

- This is a \$225 million allocation of HEEHR
- Administered by Tribal Governments
- Incentive caps and income eligibilities are the same as HEEHR
- For federal taxes treated as purchase discount; not income taxable
- Application and ALRD issued November 2023
- Applications are on a rolling basis and due by May 31, 2025

DOE published tribal allocations 8.16.23

State	Tribe	Allocation
WI	Bad River Band of the Lake Superior Tribe of Chippewa	\$452,016
WI	Forest County Potawatomi Community	\$210,225
WI	Ho-Chunk Nation	\$1,005,433
WI	Lac Courte Oreilles Band of Lake Superior Chippewa	\$782,707
WI	Lac Du Flambeau Band of Lake Superior Chippewa	\$503,265
WI	Menominee Indian Tribe	\$687,663
WI	Oneida Nation, Wisconsin	\$1,104,088
WI	Red Cliff Band of Lake Superior Chippewa	\$375,294
WI	Sokaogon Chippewa Community	\$317,192
WI	St. Croix Chippewa Indians	\$428,383
WI	Stockbridge-Munsee Community	\$233,473
	Total	\$ 6,099,739.00



# State Based Home Energy Efficiency Contractor Training Grants



- \$200 million
  - \$150 million in formula funding to states
  - \$40 million in competitive funding to states
  - Wisconsin allocation is \$2,835,440 (disbursed in 2 equal installments)
- Grants to SEOs for efficiency and electrification contractor training, testing, and certification
- DOE issued ALRD July 2023
  - No match requirement
  - Leveraging philanthropy and other private funding is encouraged
  - Can earn income
- Program previously called Home On-Line Performance-Based Energy Efficiency Contractor Training Grants (HOPE)
- Application deadline extended to January 31, 2024
- Program implementation decisions pending

# 179D Commercial Buildings Energy Efficiency Tax Deduction

- Wage and apprenticeship requirements
- Tax exempt entities may allocate deduction to other party
- New and existing buildings
- Eligible improvements: interior lighting systems, HVAC/hot water systems, envelope

Site EUI Reduction	W/O Prevailing Wage	With PW & Apprenticeship
25% Min	\$0.50/SF	\$2.50/SF
+1%	\$0.02/SF	\$0.10/SF
50% Max	\$1.00/SF	\$5.00/SF

<https://www.irs.gov/credits-deductions/energy-efficient-commercial-buildings-deduction>

# 45L New Energy Efficient Homes Credit

- For homebuilders/developers
- Effective January 1, 2023
- Stackable with LIHTC without reducing basis
- Applies to new construction and major renovations
- Applies to units acquired after December 31, 2022

\*Detached SF, duplex, townhomes, manufactured homes

<https://www.energy.gov/eere/buildings/45l-tax-credits-zero-energy-ready-homes>

Energy Performance	Prevailing Wage	Multifamily	Single Family*
EPA's Energy Star New Construction	No	\$500/dwelling unit	\$2,500/dwelling unit
DOE's Zero Energy Ready Homes	No	\$1,000/dwelling unit	\$5,000/dwelling unit
EPA's Energy Star New Construction	Yes	\$2,500/dwelling unit	\$2,500/dwelling unit
DOE's Zero Energy Ready Homes	Yes	\$5,000 dwelling unit	\$5,000/dwelling unit



# 45 Production Tax Credit

- Extends current framework for PTC to facilities that begin construction before January 1, 2025
- Implements a new structure with a base credit amount and increased credit amount
- Increased credit amount is 2.75 cents per kWh
  - Labor requirements (prevailing wage, apprenticeships)
  - Max net output must be less than 1 MW AC
- Qualified facilities: wind, closed and open loop biomass, geothermal, landfill gas, trash, qualified hydropower, marine and hydrokinetic facilities
  - The base credit amount is reduced by one-half for open-loop biomass facilities, small irrigation power facilities, landfill gas facilities and trash facilities
  - Act reinstates the PTC for solar energy facilities (last eligible for the PTC if placed in service before 2006)
  - Taxpayers that own qualified facilities are eligible for the PTC for electricity produced and sold during the 10-year period beginning on the date the facility was originally placed in service
- 45Y replaces PTC with intention of being technology neutral

## 48 Investment Tax Credit

- Extends current framework for ITC to facilities that begin construction before January 1, 2025
- Implements a new structure with a base credit amount and increased credit amount
- Qualified facilities: solar, fiber optic solar, qualified fuel cell, qualified microturbine, combined heat and power, qualified small wind, waste heat recovery, standalone energy storage, qualified biogas, fuel cells using electromechanical processes, dynamic glass, and microgrid controllers
- 30% if construction began prior to the Act Beginning of Construction Deadline
- Prevailing wage and apprenticeship requirements apply to secure 30% credit
- 48E replaces ITC with intention of being technology neutral

## Bonus Credits for PTC and ITC

- +10% for satisfying domestic content requirements
- +10% for locating a qualified facility in an energy community
  - Brownfields
  - Employment
  - Coal mine retirement
  - Detail: <https://energycommunities.gov/energy-community-tax-credit-bonus/> & <https://www.irs.gov/pub/irs-drop/n-23-47.pdf>

# Low Income Communities Benefit Program (48e)

- 2024 application portal opened May 28, 2024 and closes June 27, 2024
- 10% or 20% point increase applies to ITC for solar and wind only (categories 1&2 10%, 3&4 20%)
- Maximum net output of less than 5 MW AC
- DOE/Treasury jointly administering
- 1.8 GW allocation cap per year (allocated across categories differently each year)

[Low-Income Communities Bonus Credit Program | Department of Energy](#)

## LOW-INCOME COMMUNITIES BONUS CREDIT PROGRAM 2024 CAPACITY LIMITATION

ELIGIBILITY DESCRIPTION	CATEGORY OR SUB-RESERVATION	TOTAL 2024 CAPACITY AVAILABLE INCLUDING 2023 ROLLOVER (IN MEGAWATTS)
<p><b>Category 1:</b> Located in a Low-Income Community</p> <p>800 megawatts to facilities located in low-income communities</p>	<ul style="list-style-type: none"> <li>• <b>1a:</b> Eligible Residential Behind-the-Meter (BTM)</li> <li>• <b>1b:</b> Eligible Residential Behind-the-Meter (BTM) - Additional Selection Criteria</li> <li>• <b>1c:</b> Other Facilities</li> <li>• <b>1d:</b> Other Facilities - Additional Selection Criteria</li> </ul>	<ul style="list-style-type: none"> <li>• 250</li> <li>• 250</li> <li>• 100</li> <li>• 200</li> </ul>
<p><b>Category 2:</b> Located on Indian Land</p> <p>200 megawatts to facilities located on Indian lands</p>	<ul style="list-style-type: none"> <li>• <b>2a:</b> Located on Indian land</li> <li>• <b>2b:</b> Located on Indian land - Additional Selection Criteria</li> </ul>	<ul style="list-style-type: none"> <li>• 100</li> <li>• 100</li> </ul>
<p><b>Category 3:</b> Qualified Low-Income Residential Building Project</p> <p>224.8 megawatts to facilities that are part of federally-subsidized residential buildings</p>	<ul style="list-style-type: none"> <li>• <b>3a:</b> Qualified Low-Income Residential Building Project</li> <li>• <b>3b:</b> Qualified Low-Income Residential Building Project - Additional Selection Criteria</li> </ul>	<ul style="list-style-type: none"> <li>• 100</li> <li>• 124.8</li> </ul>
<p><b>Category 4:</b> Qualified Low-Income Economic Benefit Project</p> <p>900 megawatts to facilities where at least 50 percent of the financial benefits of the electricity produced go to households with incomes below 200 percent of the poverty line or below 80 percent of area median gross income</p>	<ul style="list-style-type: none"> <li>• <b>4a:</b> Low-Income Economic Benefit Project</li> <li>• <b>4b:</b> Low-Income Economic Benefit Project - Additional Selection Criteria</li> </ul>	<ul style="list-style-type: none"> <li>• 400</li> <li>• 500</li> </ul>
<b>TOTAL</b>		<ul style="list-style-type: none"> <li>• 2124.8</li> </ul>

# PTC and ITC Over Time

			Start of Construction						
			2006 to 2019	2020 to 2021	2022	2023 to 2033	The later of 2034 (or two years after applicable year <sup>a</sup> )	The later of 2035 (or three years after applicable year <sup>a</sup> )	The later of 2036 (or four years after applicable year <sup>a</sup> )
ITC	Full rate (if project meets labor requirements <sup>b</sup> )	Base Credit	30%	26%	30%	30%	22.5%	15%	0%
		Domestic Content Bonus				10%	7.5%	5%	0%
		Energy Community Bonus				10%	7.5%	5%	0%
	Base rate (if project does not meet labor requirements <sup>b</sup> )	Base Credit	30%	26%	6%	6%	4.5%	3%	0%
		Domestic Content Bonus				2%	1.5%	1%	0%
		Energy Community Bonus				2%	1.5%	1%	0%
	Low-income bonus (1.8 GW/yr cap)	<5 MW projects in LMI communities or Indian land				10%	10%	10%	10%
		Qualified low-income residential building project / Qualified low-income economic benefit project				20%	20%	20%	20%
	PTC for 10 years (\$2022)	Full rate (if project meets labor requirements <sup>b</sup> )	Base Credit			2.75 ¢	2.75 ¢	2.0 ¢	1.3 ¢
Domestic Content Bonus						0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
Energy Community Bonus						0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
Base rate (if project does not meet labor requirements <sup>b</sup> )		Base Credit			0.55 ¢	0.55 ¢	0.4 ¢	0.3 ¢	0.0 ¢
		Domestic Content Bonus				0.1 ¢	0.0 ¢	0.0 ¢	0.0 ¢
		Energy Community Bonus				0.1 ¢	0.0 ¢	0.1 ¢	0.0 ¢




a "Applicable year" is defined as the later of (i) 2032 or (ii) the year the Treasury Secretary determines that there has been a 75% or more reduction in annual greenhouse gas emissions from the production of electricity in the United States as compared to the calendar year 2022.

b "Labor requirements" entail certain prevailing wage and apprenticeship conditions being met.

Source: <https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses>



# Manufacturing Tax Credits

Manufacturing		
§ 45V	Clean Hydrogen Production Credit	<ul style="list-style-type: none"><li>• Request for Comments (Notice 2022-58)</li><li>• <a href="#">Notice of Proposed Rulemaking</a></li></ul>
§ 45X	Advanced Manufacturing Production Credit	<ul style="list-style-type: none"><li>• Request for Comments (Notice 2022-47 )</li><li>• <a href="#">Notice of Proposed Rulemaking</a></li></ul>
§ 48C	Advanced Energy Project Credit	<ul style="list-style-type: none"><li>• Request for Comments (Notice 2022-47 )</li><li>• Initial Guidance (Notice 2023-18)</li><li>• Additional Guidance (Notice 2023-44)</li><li>• Round 2 Guidance (Notice 2024-36 )</li></ul>

# Green and Resilient Retrofit Program for Affordable Housing

- HUD administers
- **Eligible recipients are owners and sponsors of privately-owned, HUD-subsidized properties that agree to an extended period of affordability**
- **\$1 billion through September 2028:**
  - \$837.5 million for the cost of providing grants and direct loans, including to subsidize up to \$4B in direct loans
  - \$120 million for program administration
  - \$42.5 million to benchmark energy and water use for eligible properties
- **Eligible Uses:**
  - Low-emission technologies, materials, or processes, including zero-emission electricity generation, energy storage or building electrification
  - Improve energy or water efficiency, indoor air quality or sustainability
  - Climate resilience
  - Energy and water benchmarking
- **Three paths**
  - Elements-up to \$40K/unit and \$750K/property (**one WI award: Wisconsin Housing Preservation Corp, Waukesha, \$582,887**)
  - Leading Edge-up to \$60K/unit and \$10 M/property
  - (**one WI award: Greenspire Apartments in Stoughton, \$3,780,000**)
  - Comprehensive-up to \$80K/unit and \$20 M/property

<https://www.hud.gov/grrp>

# Building Energy Codes Implementation



- **\$1 billion**

- \$330 million for 2021 IECC (residential)/ASHRAE 90.1-2019 (commercial or better)
- \$670 million for adoption of zero energy provisions of 2021 IECC or equivalent stretch code

- **Jurisdictions must have a compliance plan addressing**

- Training
- Enforcement
- Annual measurement of compliance rates

- **Status**

- DOE comments were due 4.26.23
- DOE published guidance and applications 9.19.23
  - \$400 million in formula funding to states
  - \$240 million will be available to adopt and implement the latest building energy code, the 2021 International Energy Conservation Code (IECC) for residential buildings and the ANSI/ASHRAE/IES Standard 90.1–2019 for commercial buildings, or other codes that achieve equivalent or greater energy savings.
  - \$160 million will be available to adopt and implement the zero energy provisions in the 2021 IECC, or other codes with equivalent or greater energy savings.

- Round 1 applications were due 4.30.24
- Round 2 applications due 9.13.24

# Greenhouse Gas Reduction Fund

- FKA Clean Energy and Sustainability Accelerator or National Climate Bank
- \$27 billion administered by EPA
- Purpose is to facilitate rapid deployment of low and zero emissions tech with innovative financing
  - \$12 billion for the general fund (administered by nonprofits)
  - \$8 billion for the environmental justice fund (administered by nonprofits)
  - \$7 billion for zero-emissions distributed technologies in environmental justice communities (administered by state/local/Tribal govt's and nonprofits)
- Funding will flow to the recipients listed above, who then provide:
  - Direct investment in low- and zero-emissions projects
  - Indirect investment to state and local green banks
- Status
  - Stakeholder comments due 12.5.22
  - Initial EPA guidance 2.14.23
  - EPA Framework guidance 4.19.23
  - Governor Evers created Green Ribbon Commission 4.19.23 (Commissioners announced 6.22.23)
  - Solar for All applications due 10.12.23
  - National Clean Investment Fund proposals due 10.12.23
  - Clean Communities Accelerator proposals due 10.12.23



<https://www.epa.gov/greenhouse-gas-reduction-fund>

# Greenhouse Gas Reduction Fund Awards

- National Clean Investment Fund (NCIF)
  - Climate United Fund (\$6.97 billion)
  - Coalition for Green Capital (\$5 billion)
  - Power Forward Communities (\$2 billion)
- Clean Communities Investment Accelerator
  - Opportunity Finance Network (\$2.29 billion)
  - Inclusiv (\$1.87 billion)
  - Justice Climate Fund (\$940 million)
  - Appalachian Community Capital (\$500 million)
  - Native CDFI Network (\$400 million)
- Solar for All
  - 60 awardees
  - Wisconsin awarded \$62,450,000



<https://www.epa.gov/newsreleases/biden-harris-administration-announces-20-billion-grants-mobilize-private-capital-and>



# Environmental Justice Block Grants

- \$3 billion (EPA using multiple ways)
- EPA administers
- Primarily competitive grants
- Eligible recipients are local governments, universities or community-based nonprofits (or partnerships of those entities)
- Eligible activities include community-led pollution monitoring, prevention, and remediation; low- and zero-emission resilient technologies and related infrastructure; workforce development tied to GHG reduction; mitigating climate and health risks from urban heat islands; climate resiliency and adaptation; and reducing indoor air pollution
- No cost share
- Status
  - Comments to EPA were due 4.10.23
  - Preview of NOFO published 8.30.23
  - NOFO e2023
    - \$2 billion
    - Called Community Change Grants
    - Eligible applicants
      - A partnership between at least two community-based non-profit organizations (CBOs).
      - A partnership between a CBO and one or any combination of the following:
        - a Federally-Recognized Tribe
        - a local government
        - an institution of higher education

Community Change Grant  
applications accepted on a rolling  
basis until November 21, 2024

<https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-community-change-grants-program#:~:text=EPA%E2%80%99s%20new%20Environmental%20and%20Climate%20Justice%20Community%20Change,to%20respond%20to%20environmental%20and%20climate%20justice%20challenges>

# Direct Pay

- A way to monetize the tax provisions for nonprofits and entities without tax liability like local governments, tribal nations, faith organizations, and cooperative and municipal utilities
- Familiarization required for eligible entities
- Prefiling registration required
  - Status
    - Treasury published draft guidance 6.14.23
    - Comments due 8.17.23
    - Final rule issued 3.5.24
    - Nearly 1,200 registrations by mid-January 2024

# Eligible Credits

- Energy Credit (48), (Form 3468, Part VI)
- Clean Electricity Investment Credit (48E), (Form 3468, Part V)
- Renewable Electricity Production Credit (45), (Form 8835, Part II)
- Clean Electricity Production Credit (45Y)
- Commercial Clean Vehicle Credit (45W), (Form 8936, Part V)
- Zero-emission Nuclear Power Production Credit (45U), (Form 7213, Part II)
- Advanced Manufacturing Production Credit (45X), (Form 7207)
- Clean Hydrogen Production Credit (45V), (Form 7210)
- Clean Fuel Production Credit (45Z)
- Carbon Oxide Sequestration Credit (45Q), (Form 8933)
- Credit for Alternative Fuel Vehicle Refueling / Recharging Property (30C), (Part 8911, Part II)
- Qualifying Advanced Energy Project Credit (48C), (Form 3468, Part III)

<https://public-inspection.federalregister.gov/2023-12798.pdf>

<https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay>

Q&A

**Robin Lisowski**

Slipstream

[rlisowski@slipstreaminc.org](mailto:rlisowski@slipstreaminc.org)

608.729.6918

# Right sizing your air compressor

Frank Melch  
Zorn  
Compressor & Equipment



SPONSORED BY



# “Right Sizing” your air compressor

*A look at pressure, flow & controls*



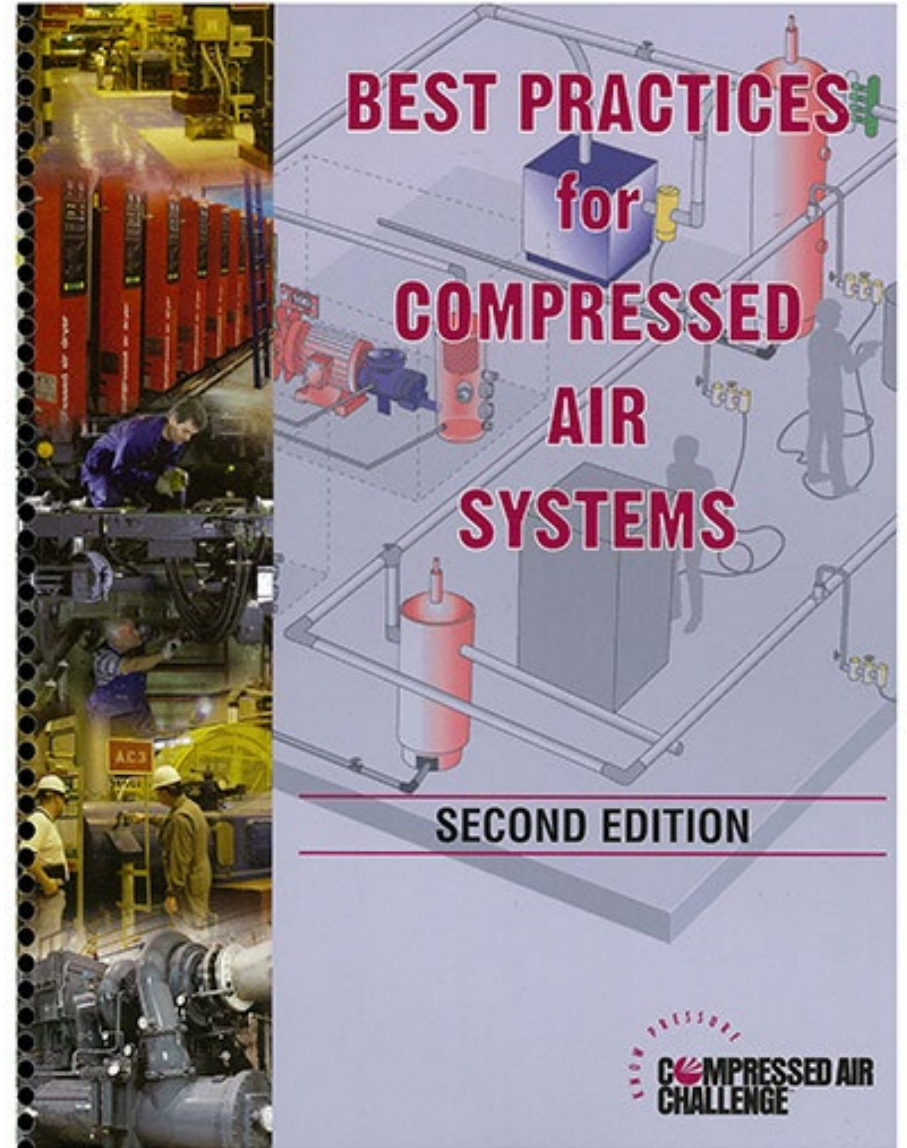
Frank Melch

DOE Certified AIRMaster+ Specialist



# Compressed Air Systems

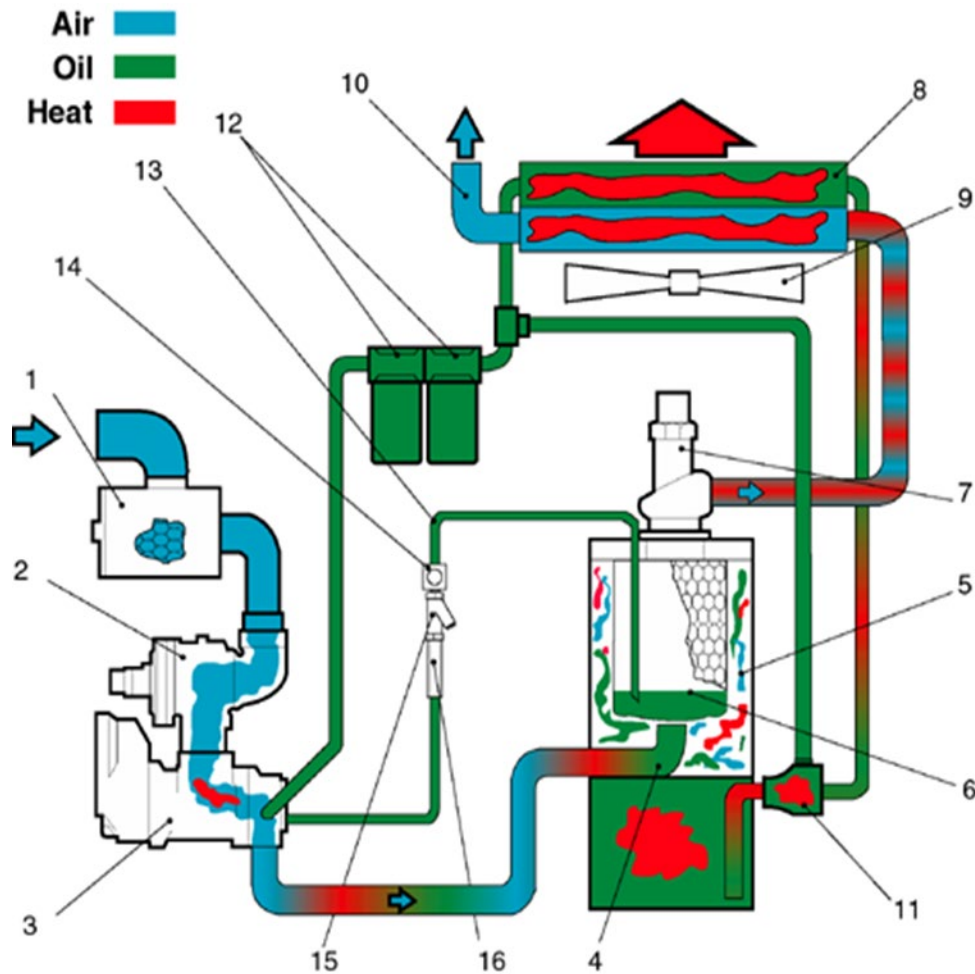
- DOE/ Industry partnership
- Supply side (Equipment)
- Demand Side (piping/ uses)
- Industry Sourcebook



# Today

- Pressure & Flow considerations
- Individual Air Compressor Controls
- Setting up Multiple Compressors
- Greatest Cost of Compressed Air
- Compressed Air System “Report Card”

# Lubricated Rotary Screw Compressor



- 1 Intake filter
- 2 Intake / Suction Control
- 3 Compression Air End
- 4 Discharge Pipe
- 5 Air / Oil Separator Vessel
- 6 Separator Element
- 7 Minimum Pressure Valve
- 8 Air / Oil Cooler
- 9 Fan
- 10 Delivery Air Outlet
- 11 Thermostatic Mixing Valve
- 12 Oil Filter (s)
- 13 Scavenge Line
- 14 Sight Glass
- 15 Strainer

# Compressing Air

- Input Power *function* Pressure & Flow  
(HP/ kW) (PSIG) (CFM)

At a given input power, inverse relationship between pressure & flow

# Input Power Pressure & Flow

MODEL	NOMINAL PRESSURE		DRIVE MOTOR		CFM
	PSIG	BAR	HP	KW	
L30	100	6.9	40	30	197
	125	8.6			181
	190	13			149
L37	100	6.9	50	37	234
	125	8.6			219
	190	13			180

# Compressor Controls

- Air compressor controls are reacting to changes in system pressure which results from changes in demands.
- Over supplying the system raises pressure
- Under supplying the system lowers the pressure
- Most systems are very dynamic with varying demands



Be Honest!



# Identify your *Critical Pressure*

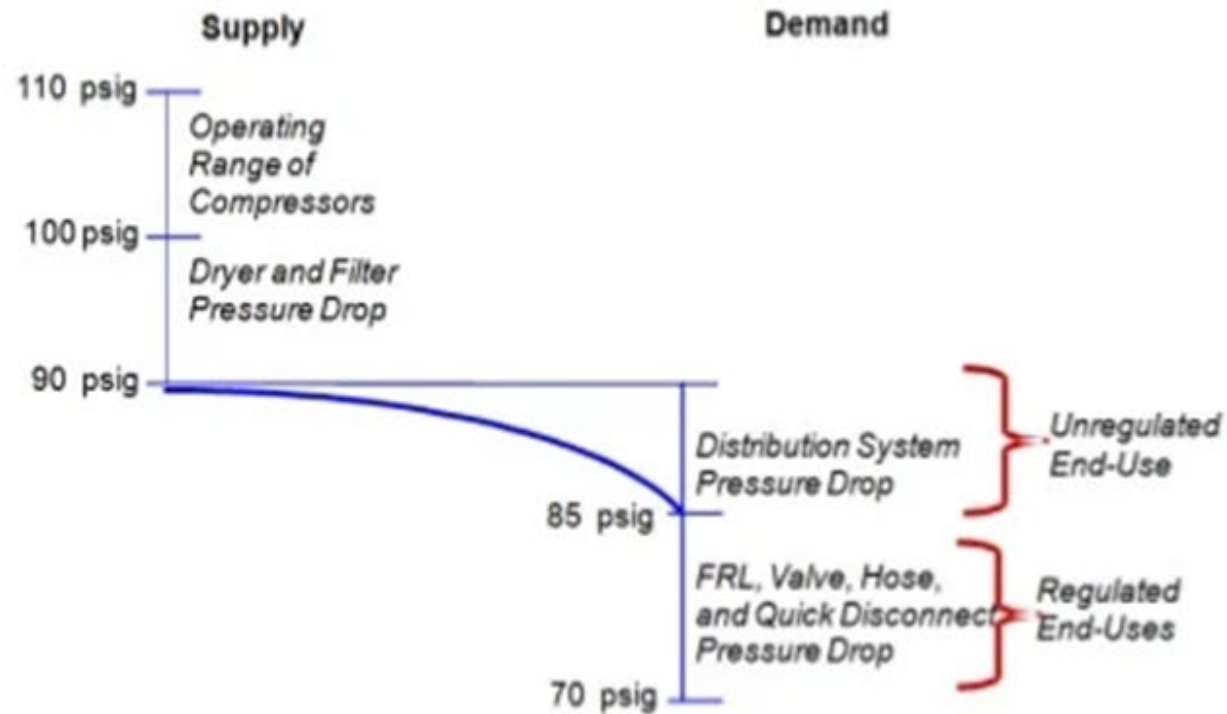
- That pressure level at which production will be interrupted or affected

Typically Leads to a “comfort” pressure  
Used to determine set pressures

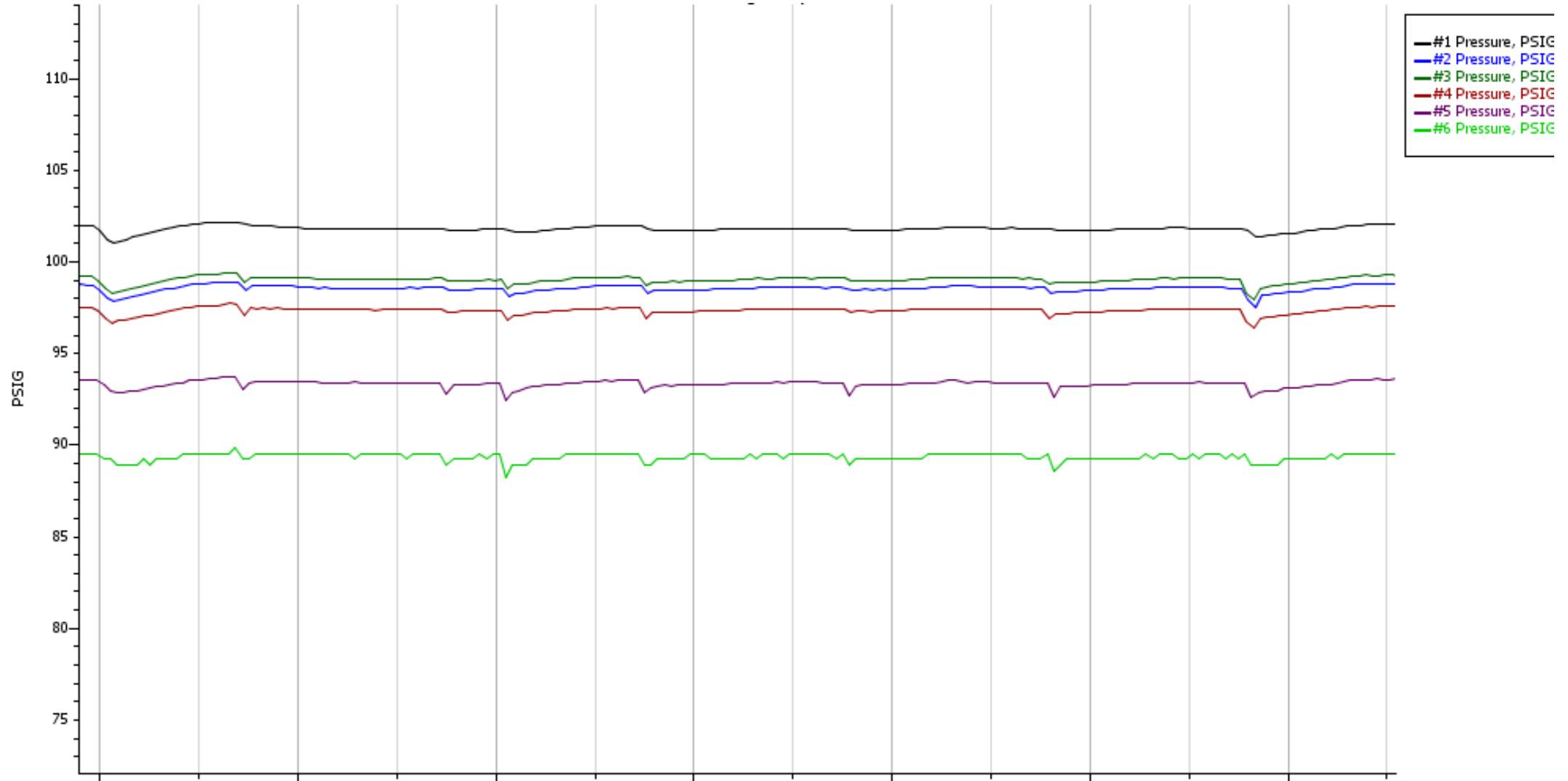


# Operating Pressure – start at the end

## Pressure Drop



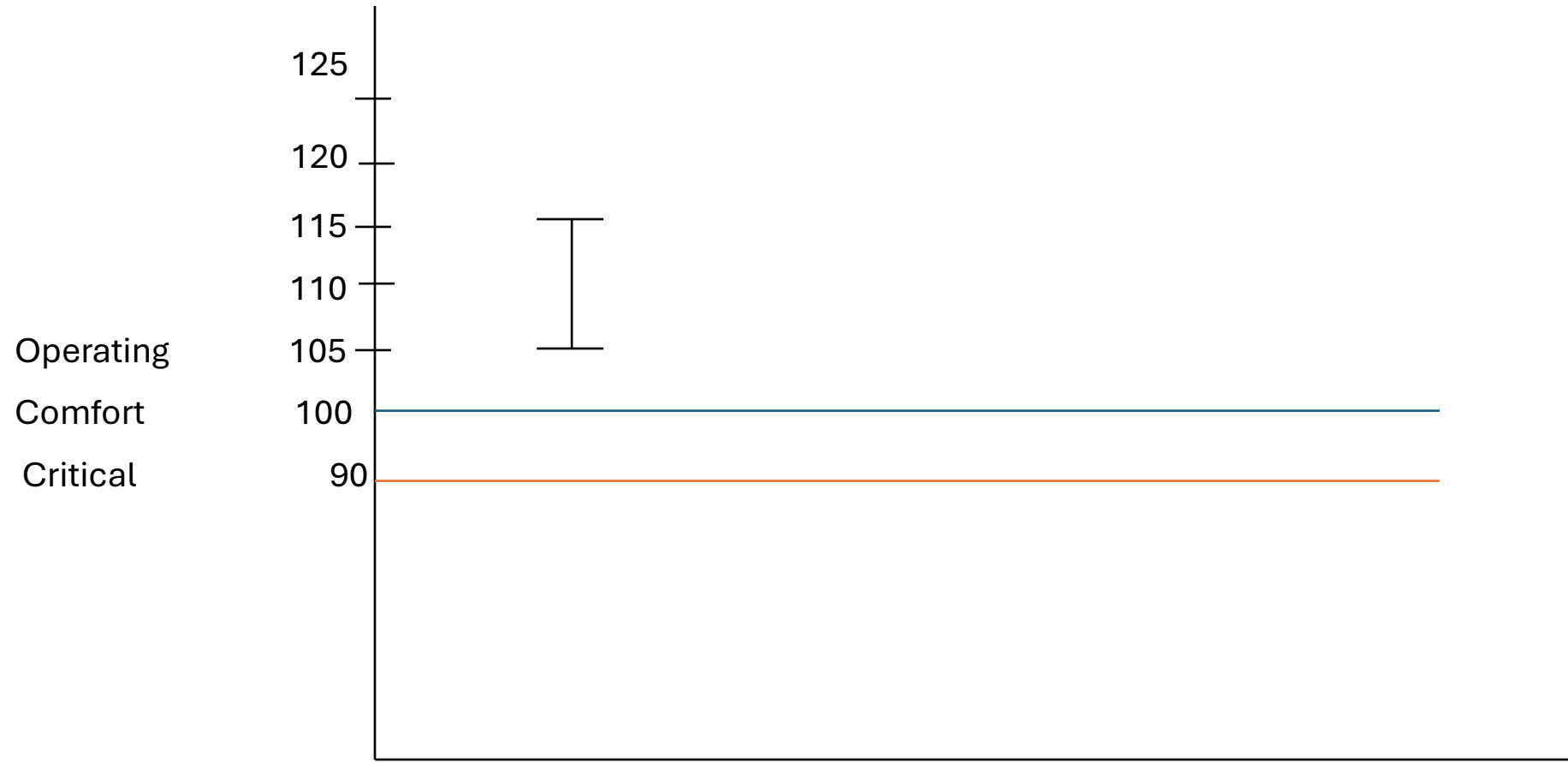
# Pressure Map



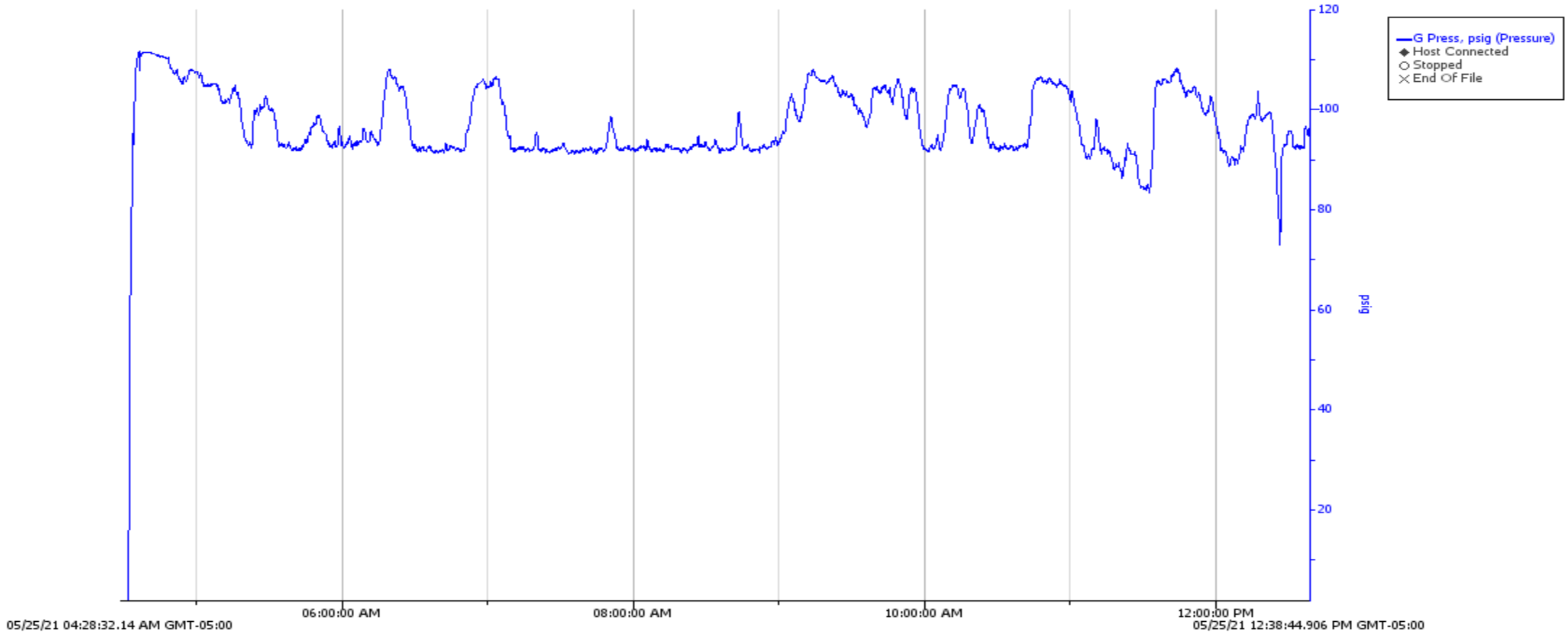
# Pressure Setting – Single Compressor

Pressure

AC1

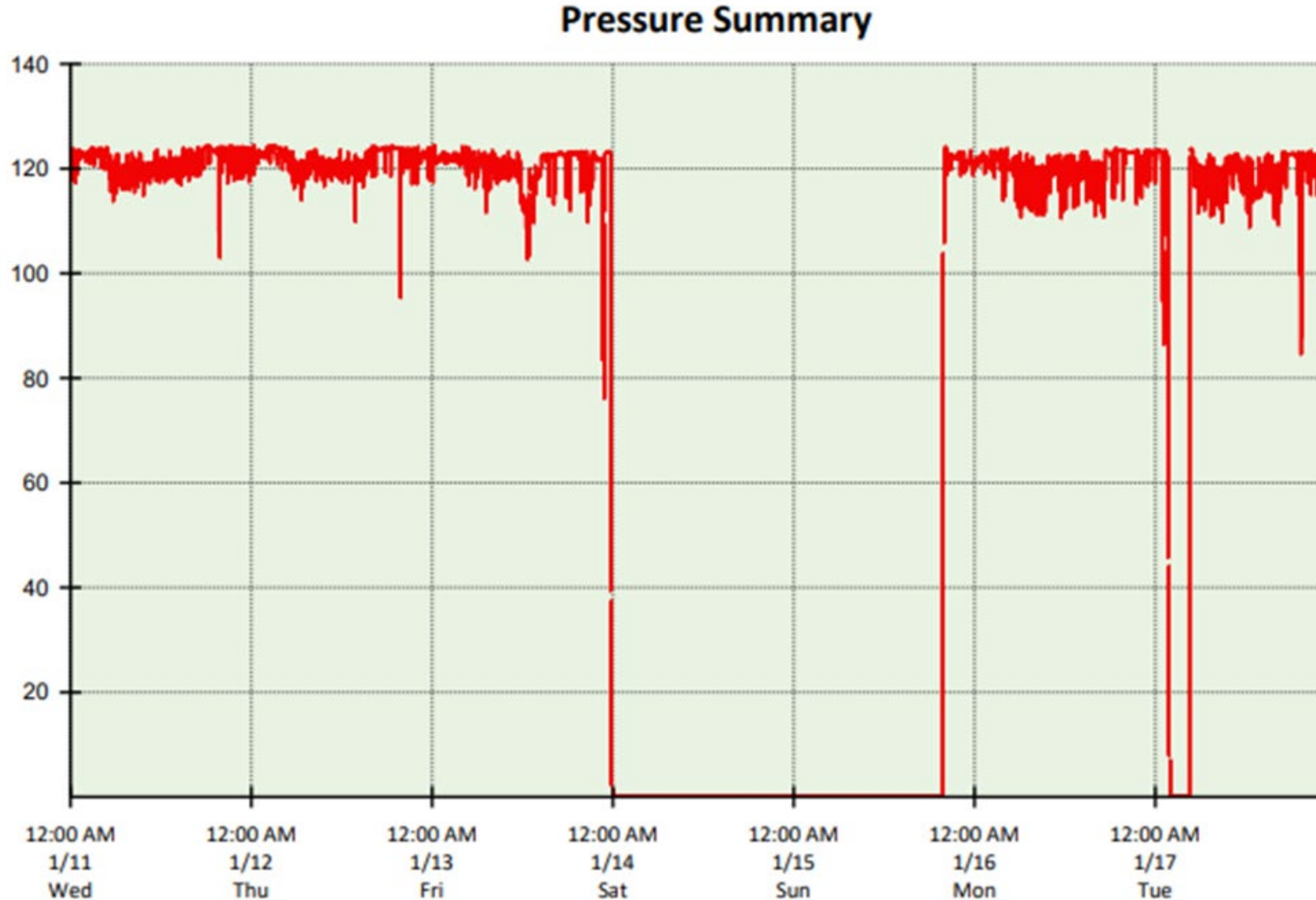


# Pressure Instability- Controls unable to keep up with demand changes





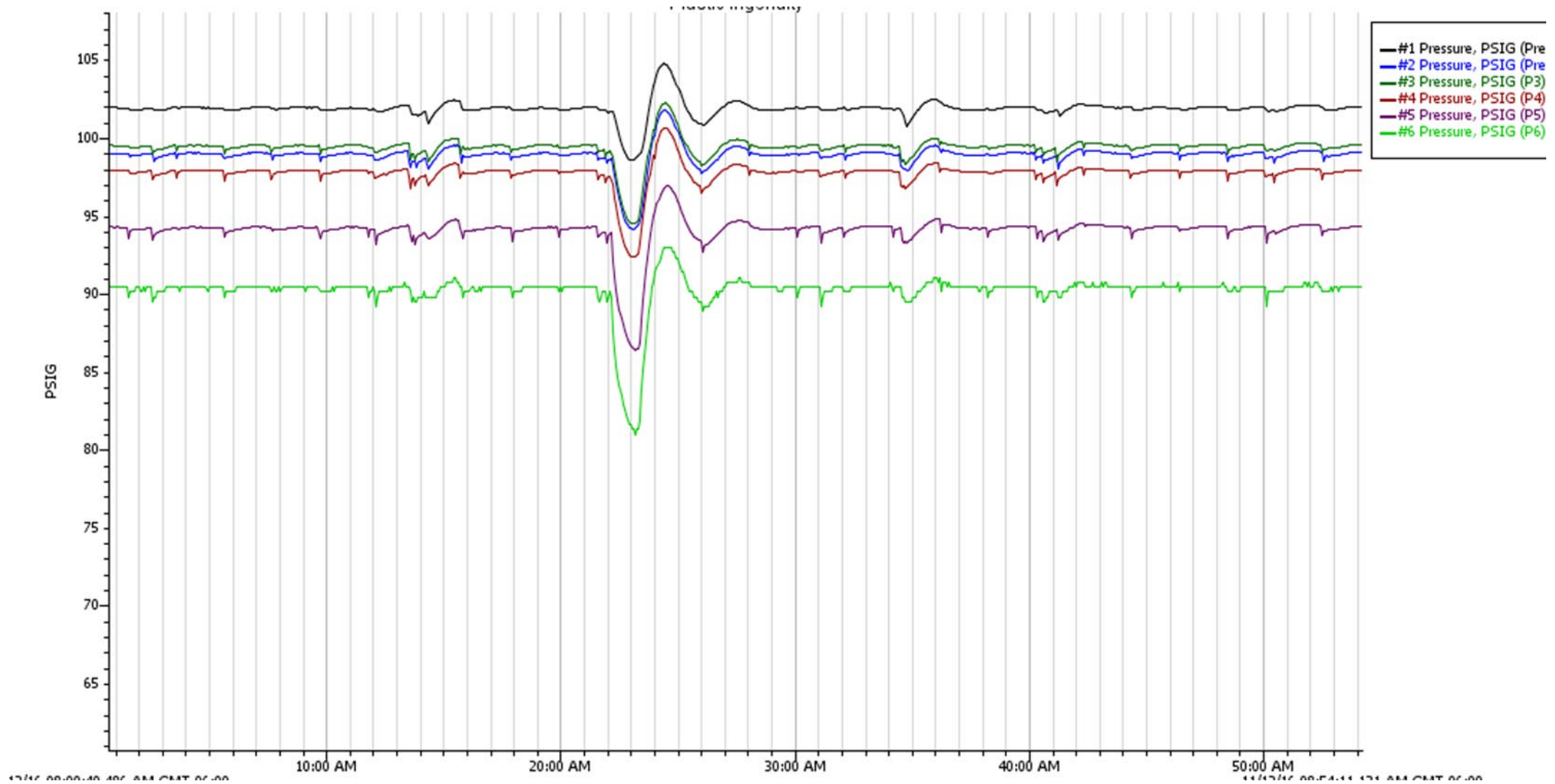
# Low Pressure Events (Draw down)



# Draw down events

- Demand exceeding supply (flow) results in a loss of pressure.
- System wide pressure loss suggests inadequate capacity
- Isolated pressure loss suggests distribution issue

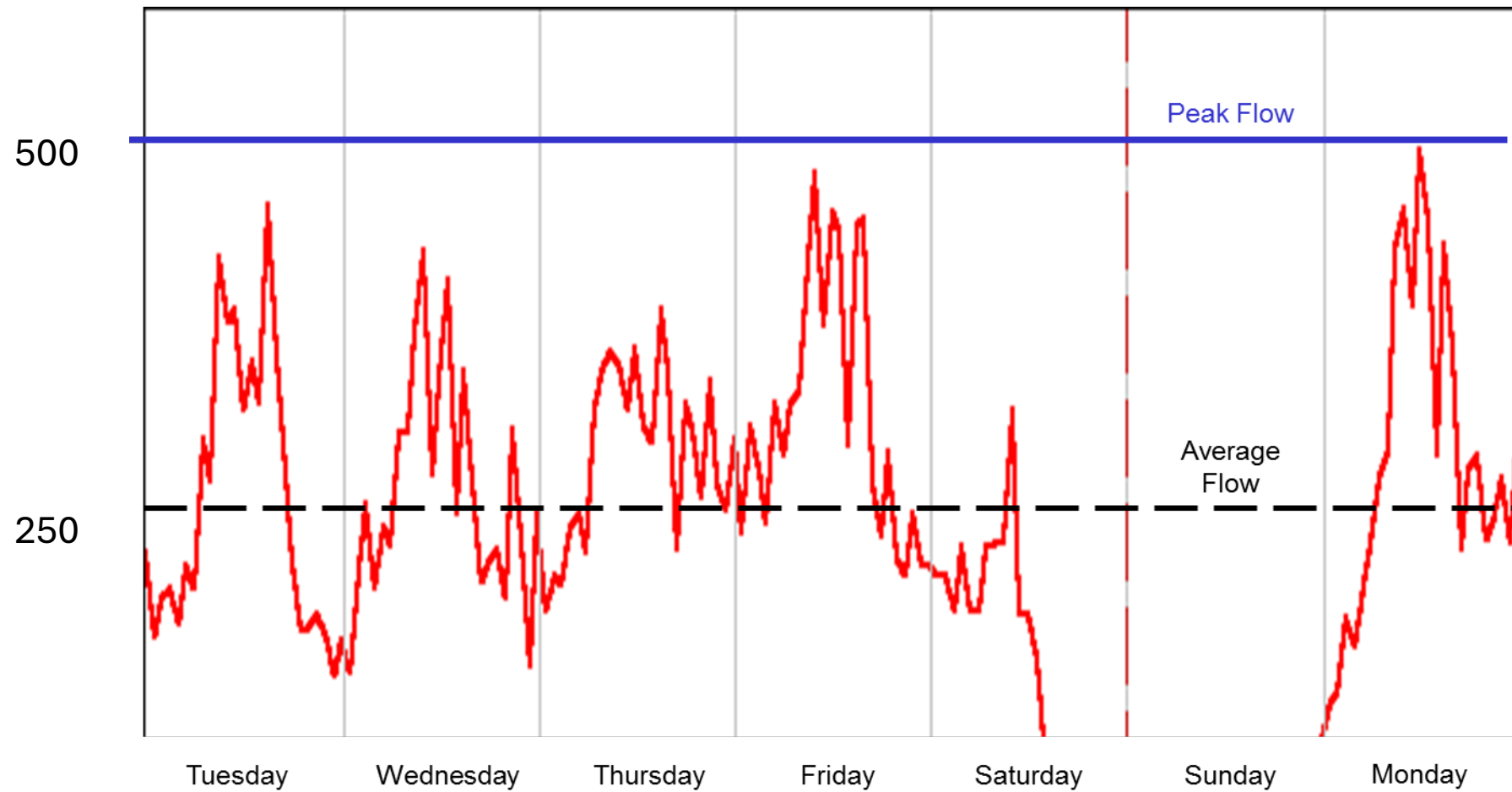
# System Draw Down Event



# Low Pressure Events

- Make modifications as needed to sustain production
- Investigate the causes of the low-pressure events
- Typically, inadequate capacity, slow reacting controls, inadequate system storage, inadequate point of use capacitance (piping/storage)

# Demand (CFM) Profile Example



# Peak Demand – Uninterrupted production

- Primary air compressor has the capacity and control method to meet this demand
- Multi compressor system will start another compressor to meet the peak demand and then shut off when demand returns to “normal”
- Multi compressor system simply runs all compressors all the time



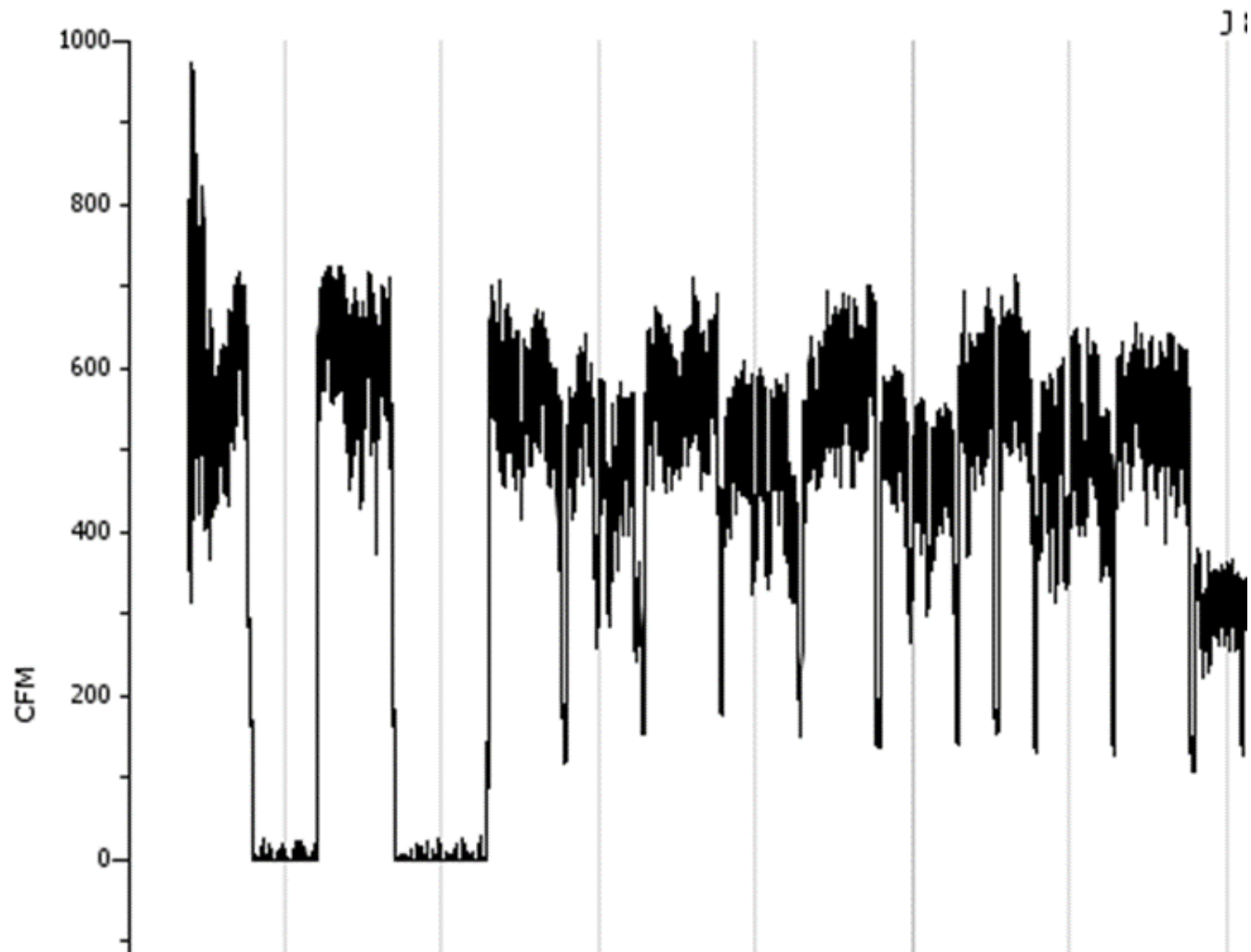
# Low Demand – Compressor utilization

- Primary air compressor has the capacity and control method to meet this demand
- Multi compressor system will shut off compressor(s)
- Have a smaller compressor in the system dedicated to the low demand

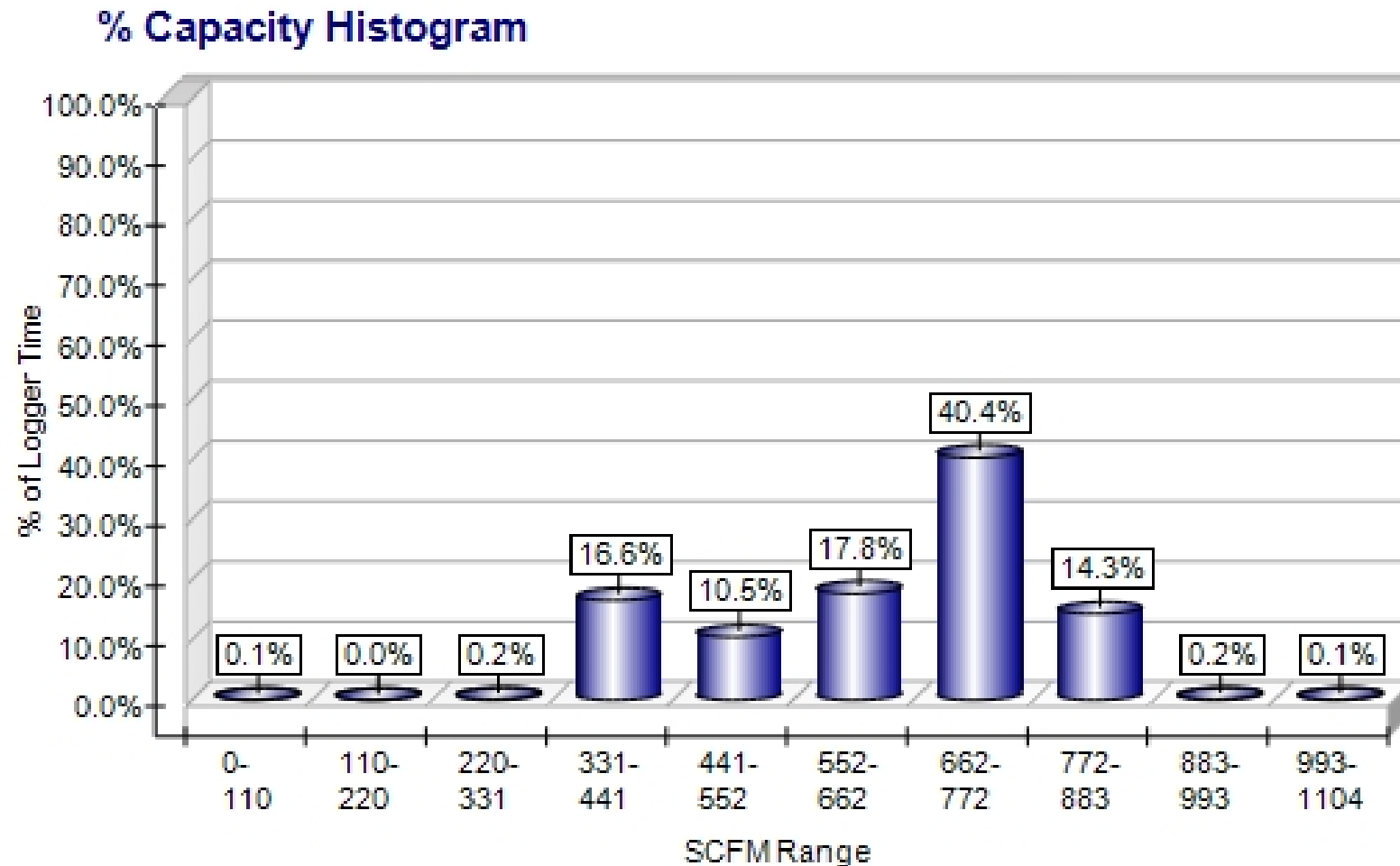
# “Normal” Demand profile - Controls

- Determines overall power consumption and energy costs
- Typically includes a few/ several distinct demand levels
- Factors include production lines, shifts, etc

# Actual flow meter logging



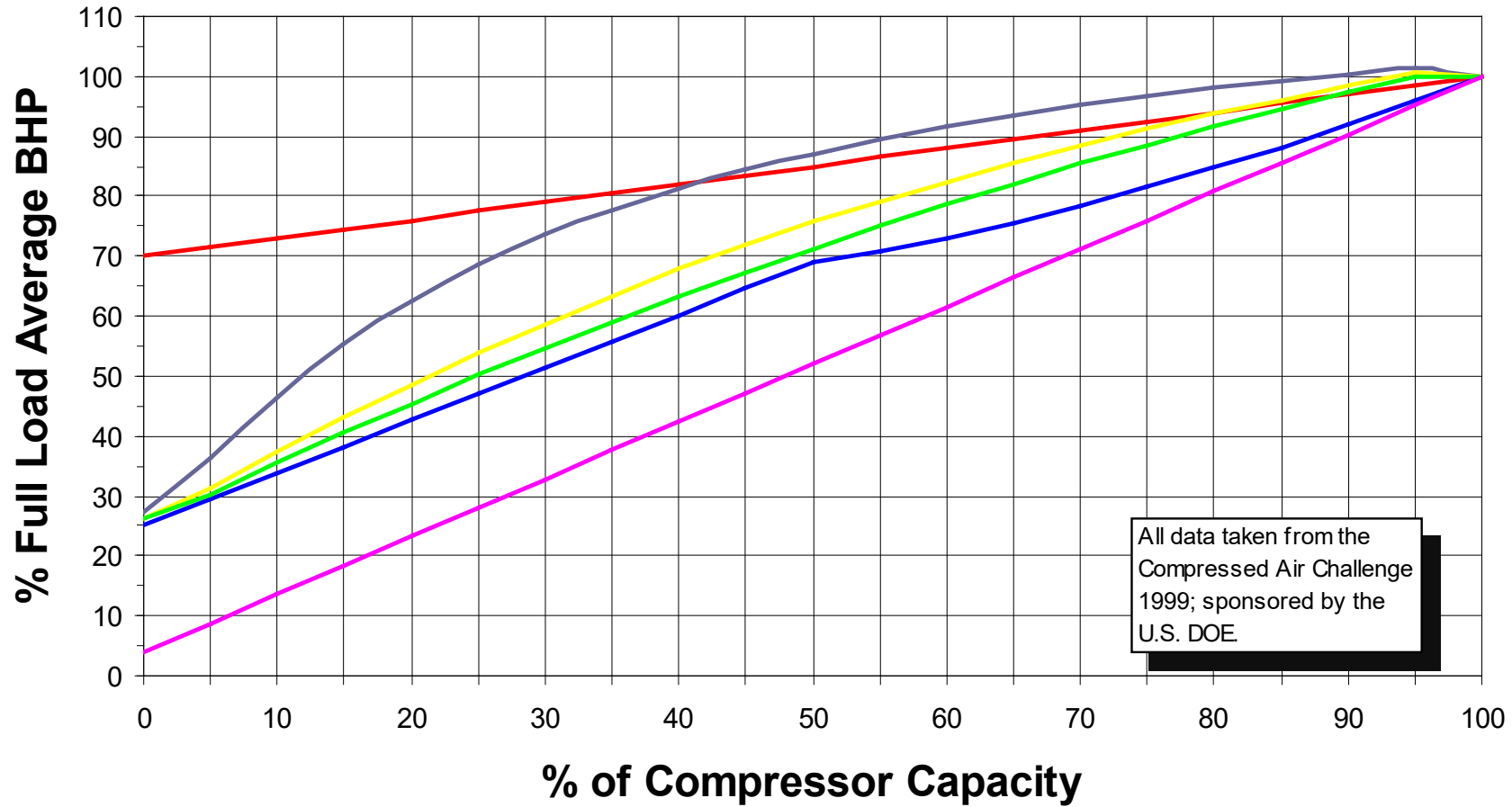
# Plant Capacity Histogram



# Part Load Operation

- Rarely does the plant demand exactly meet the capacity of the air compressor
- Industry Rule of thumb is that typically air compressors are running at about 60% capacity (over time)
- Part load operating control methods become imperative

# Compressor Control Comparison



— Modulation — Econotrol — 1 Gal/CFM — 3 Gal/CFM — 5 Gal/CFM — Variable Speed

# Rotary Controls Quick Comparison

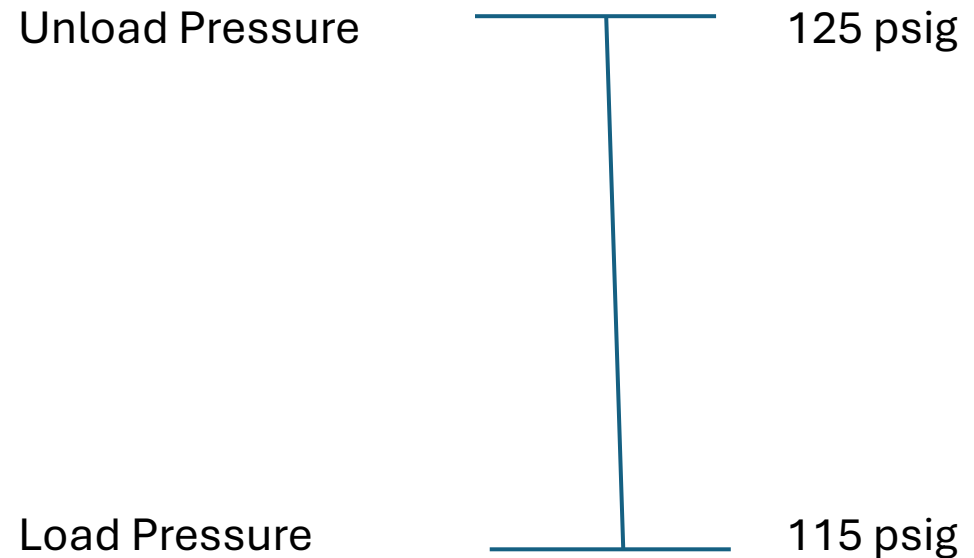
- 100 hp air compressor (500 cfm) , 300 cfm Demand – 60% capacity
- 6240 hours, electrical blended rate \$0.12/ kWh

<b>Control Method</b>	<b>% of F L Power</b>	<b>Est kW</b>	<b>Annualized kWh/ Elect \$\$</b>
Modulation	88%	76kW	474,240 kWh/ \$57,000
Variable Displacement	73%	63 kW	393,120 kWh/ \$47,000
Variable Speed	62%	53 kW	330,720 kWh/ \$40,000
Load/ No Load w/ 1 Gal ratio	91.5%	79 kW	492,960 kWh/ \$59,000
Load/ No Load w/ 3 Gal ratio	82.5%	71 kW	443,040 kWh/ \$53,000
Load/ No Load w/ 5 Gal ratio	79%	68 kW	424,320 kWh/ \$51,000

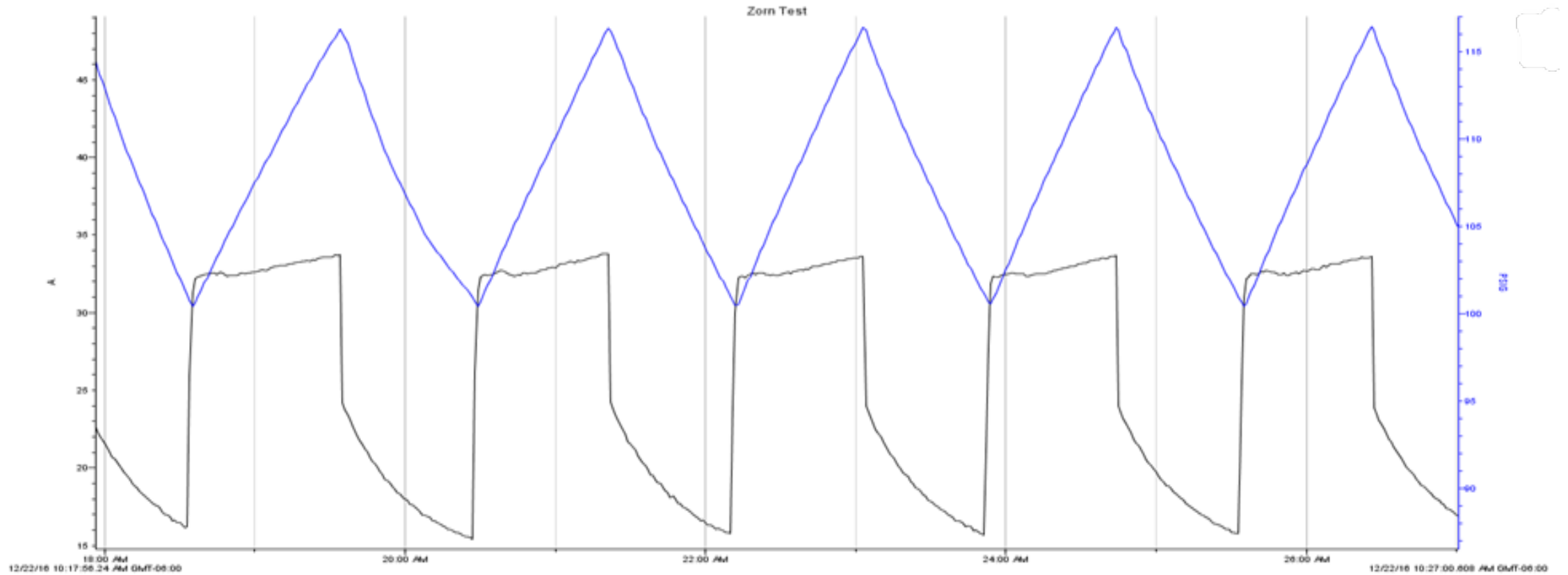


# Load/ No Load Control

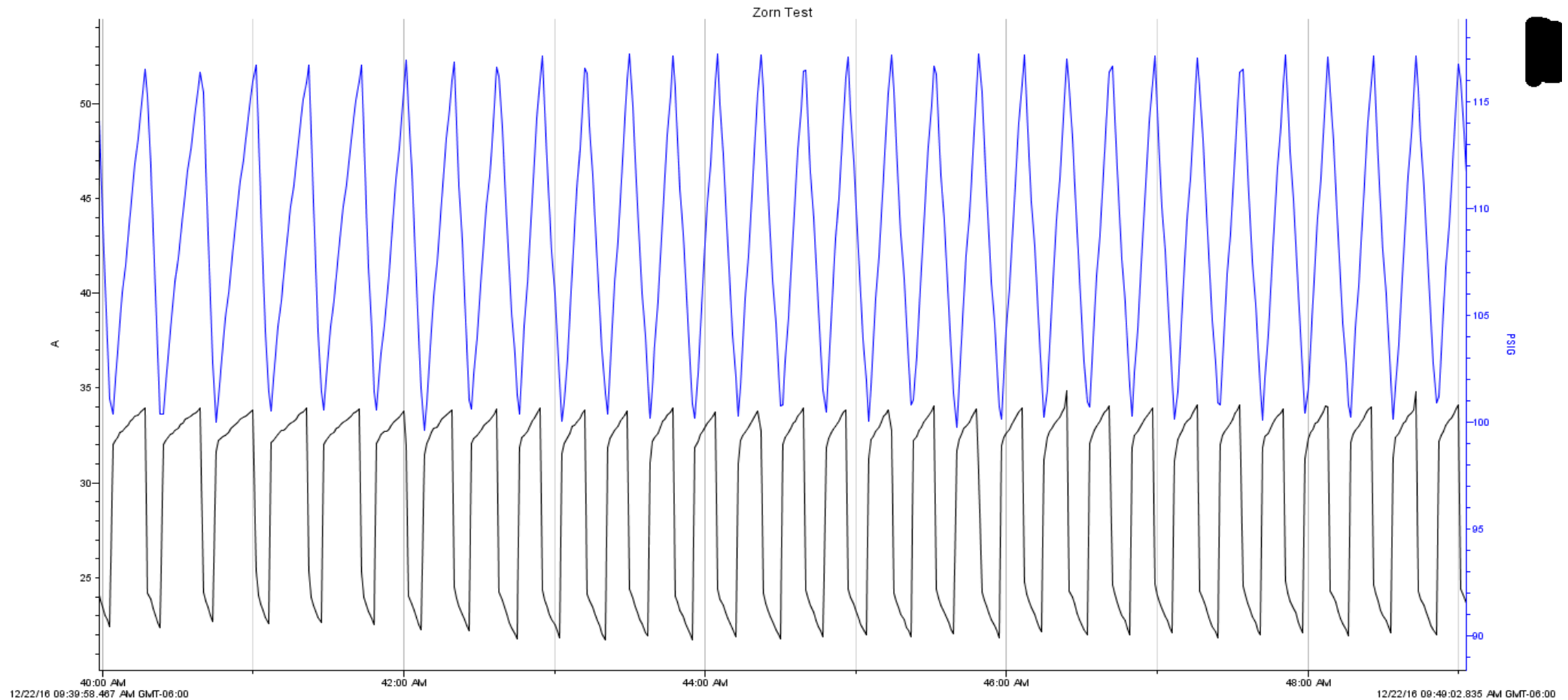
- *Fixed Speed*
- Inlet valve is either fully open (100% flow) or fully closed (0% flow) reacting to pressure band (differential)
- Resulting in a “duty cycle” based upon demand vs capacity



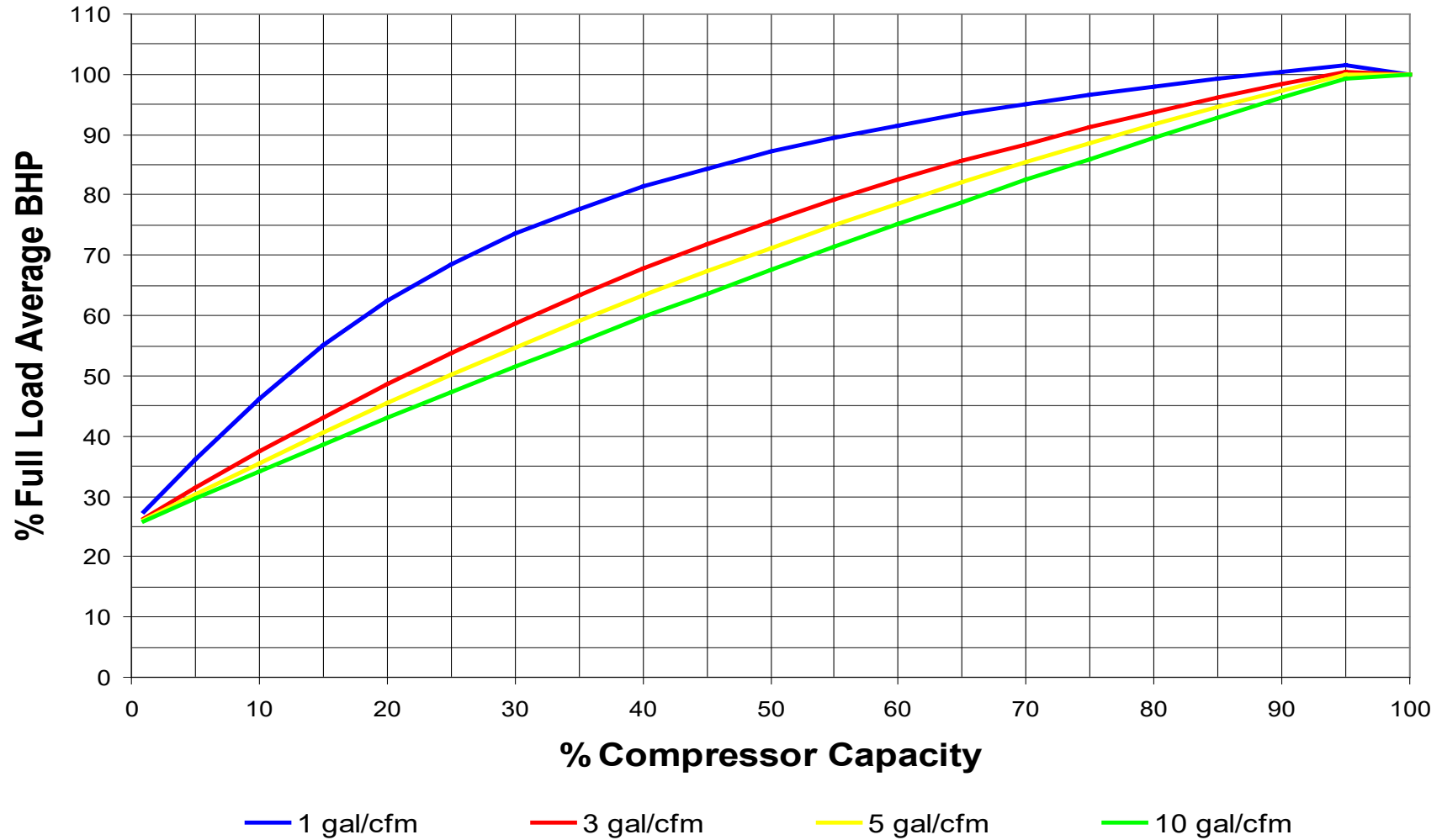
# Load/ No Load (Ample Storage – 4 gal ratio)



# Load/ No Load (Lesser Storage – 1 gal ratio)



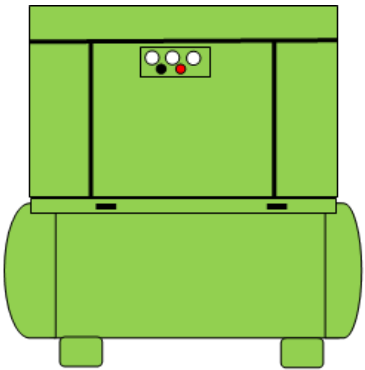
# Air Compressor On-Line / Off-Line Performance



# Rotary Controls Quick Comparison – smaller system

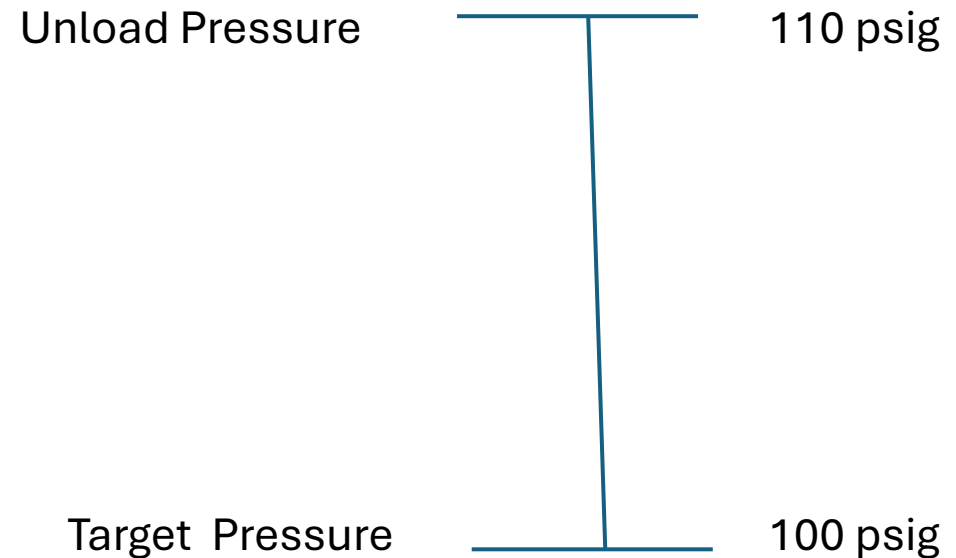
- 30 hp air compressor (125 cfm), 6240 hours, electrical blended rate \$0.12/ kWh
- 75 cfm Demand – 60% capacity

Control Method	% of Full Load Power	Est kW	Annualized kWh/ Elect \$\$
Load/ No Load w/ 1 Gal ratio	91.5%	22 kW	137,280 kWh/ \$16,500
Load/ No Load w/ 3 Gal ratio	82.5%	20 kW	124,800 kWh/ \$15,000
Load/ No Load w/ 5 Gal ratio	79%	19 kW	118,560 kWh/ \$14,000

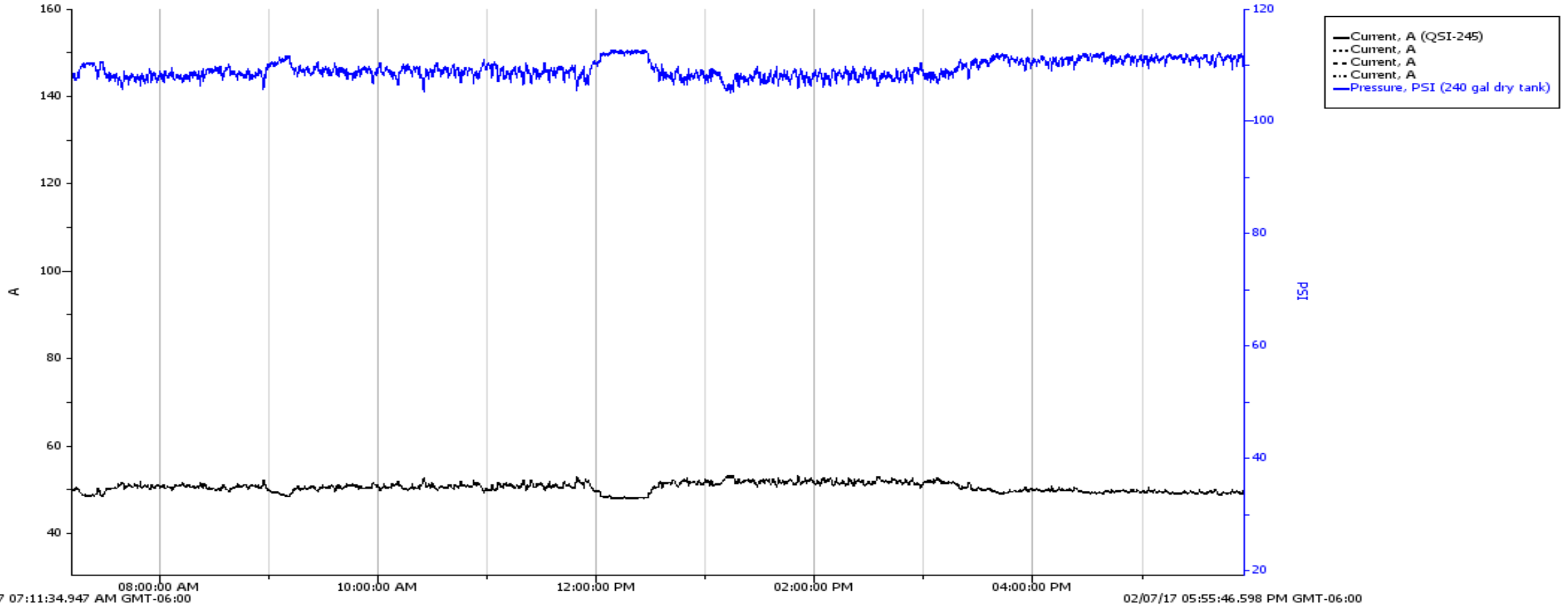


# Modulation Control

- *Fixed Speed*
- Inlet valve restricts the intake of atmospheric air based on a target pressure
- Pressure rises as inlet valve closes (lower flows)

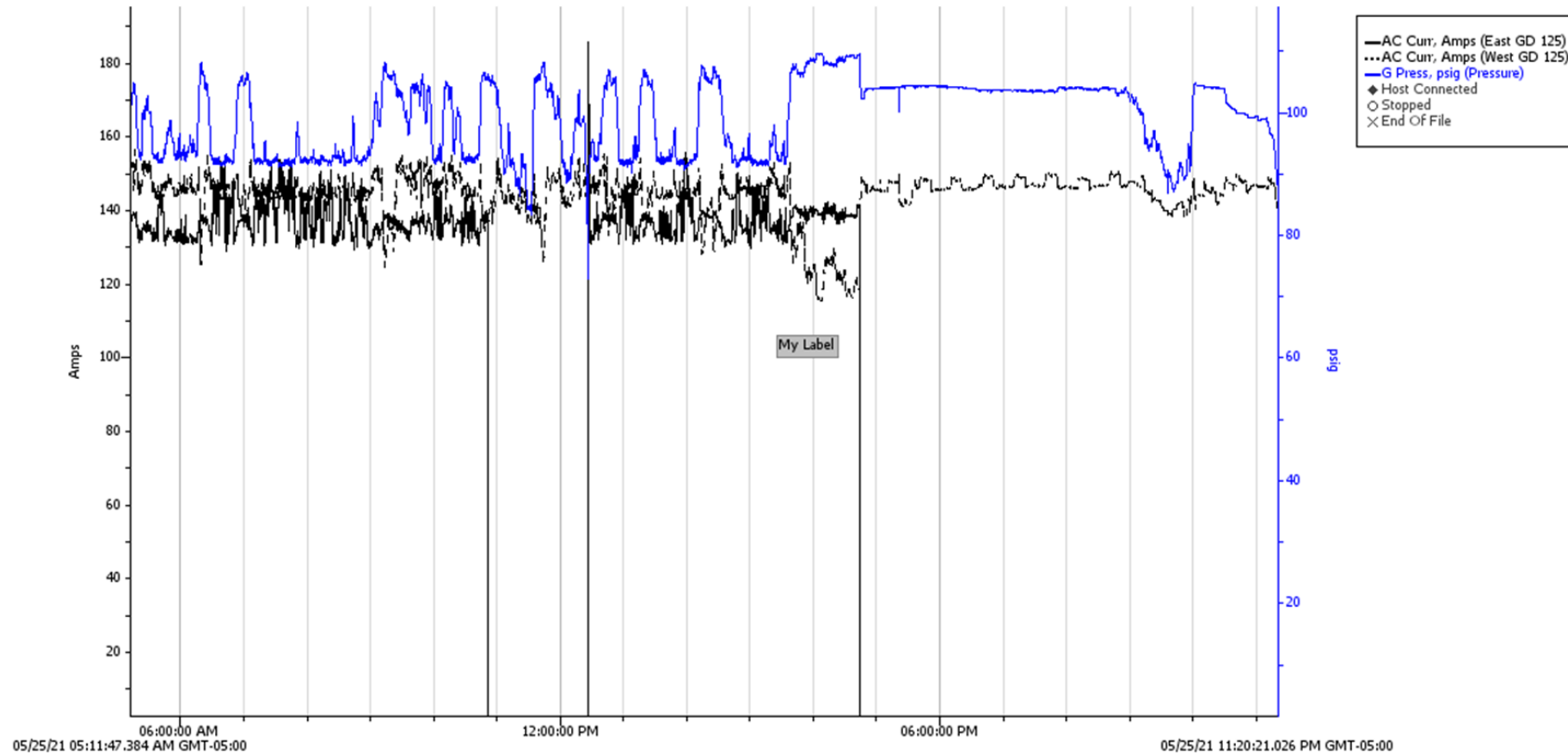


# Modulation Control (consistent demand)



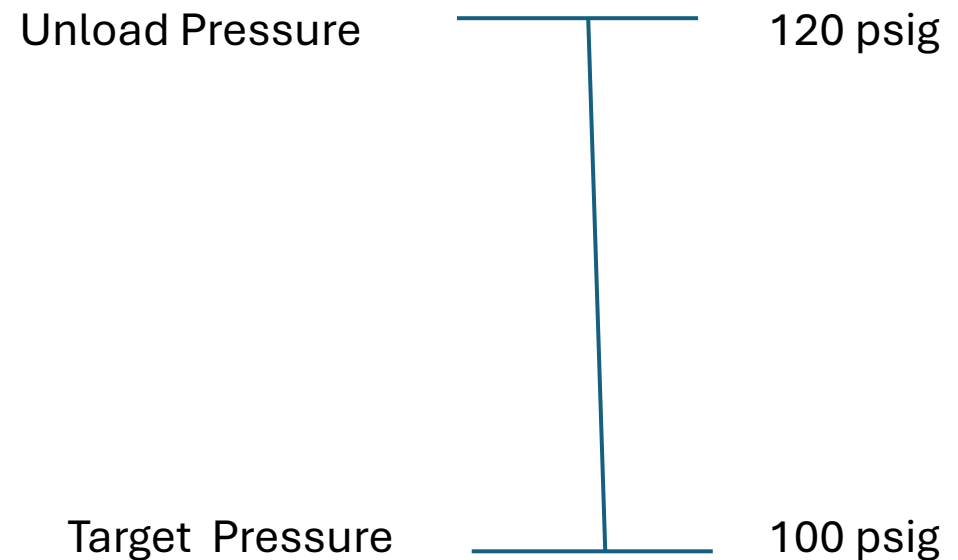


# Modulation Control (varying demands)

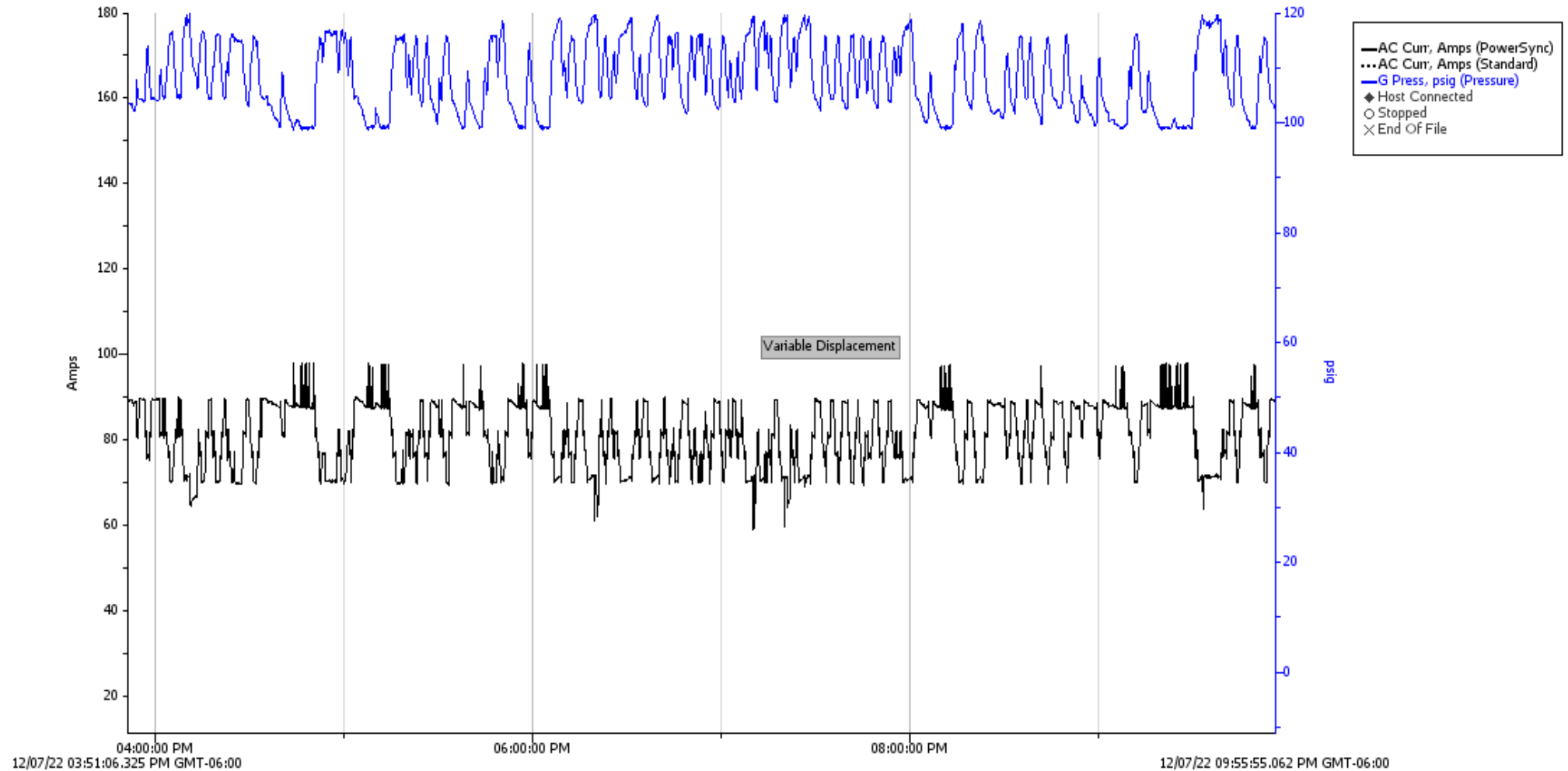


# Variable Displacement Control

- *Fixed Speed*
- A porting system will vary the effective length of the compressor air end based upon a pressure band
- Uses a series of lift valves or slide valve

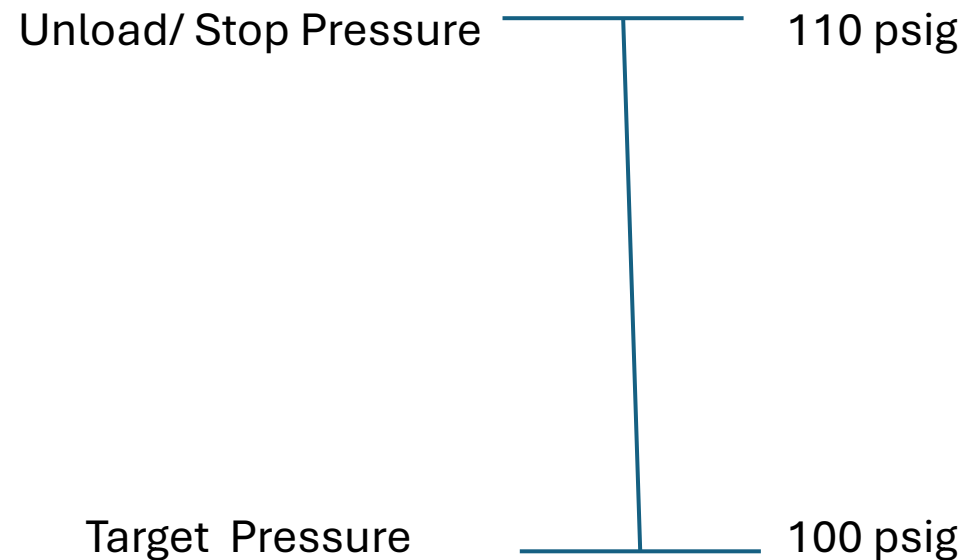


# Variable Displacement – Lift Valves

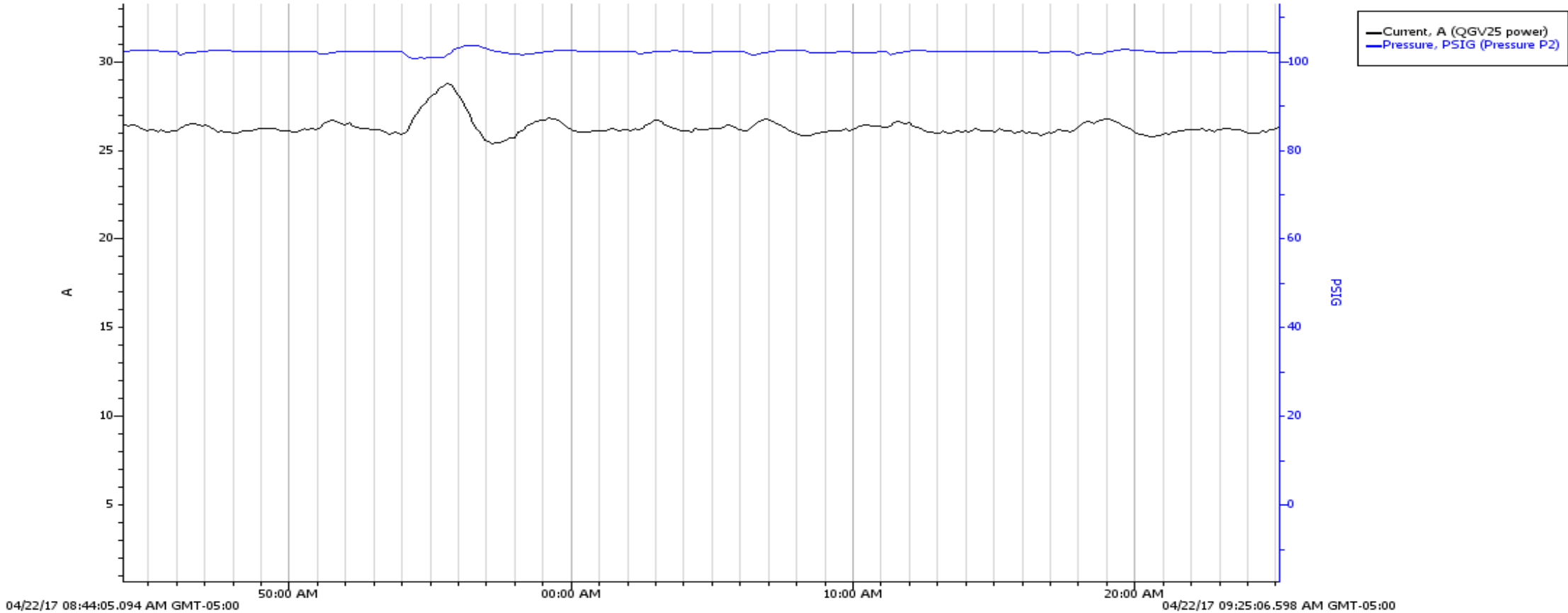


# Variable Speed Control

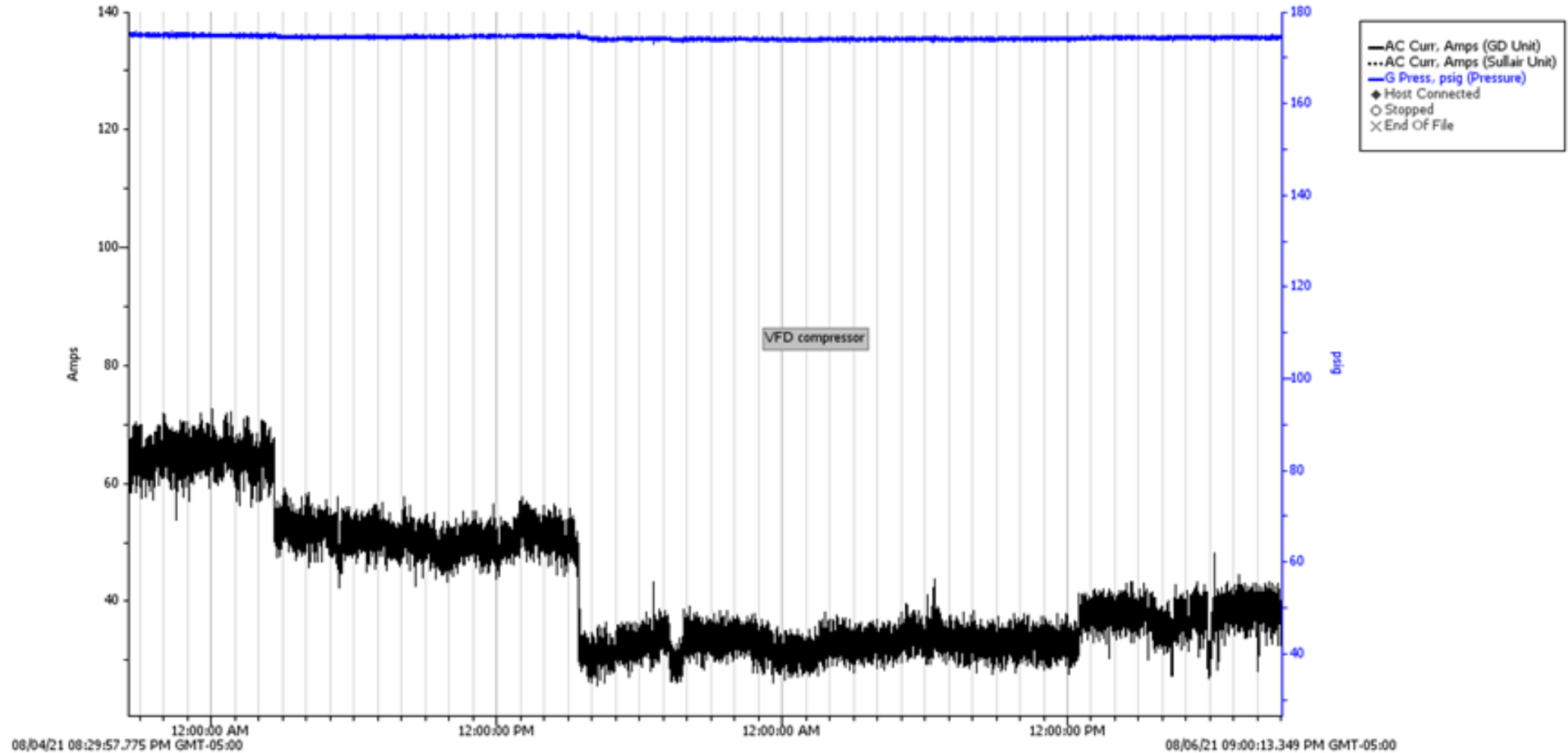
- *Variable Speed*
- A frequency drive will vary the speed of the compressor air end and thereby the capacity based upon a target pressure
- A minimum speed (capacity) has to be factored



# VFD – steady demand



# VFD varying demands



# Multiple Compressor Systems

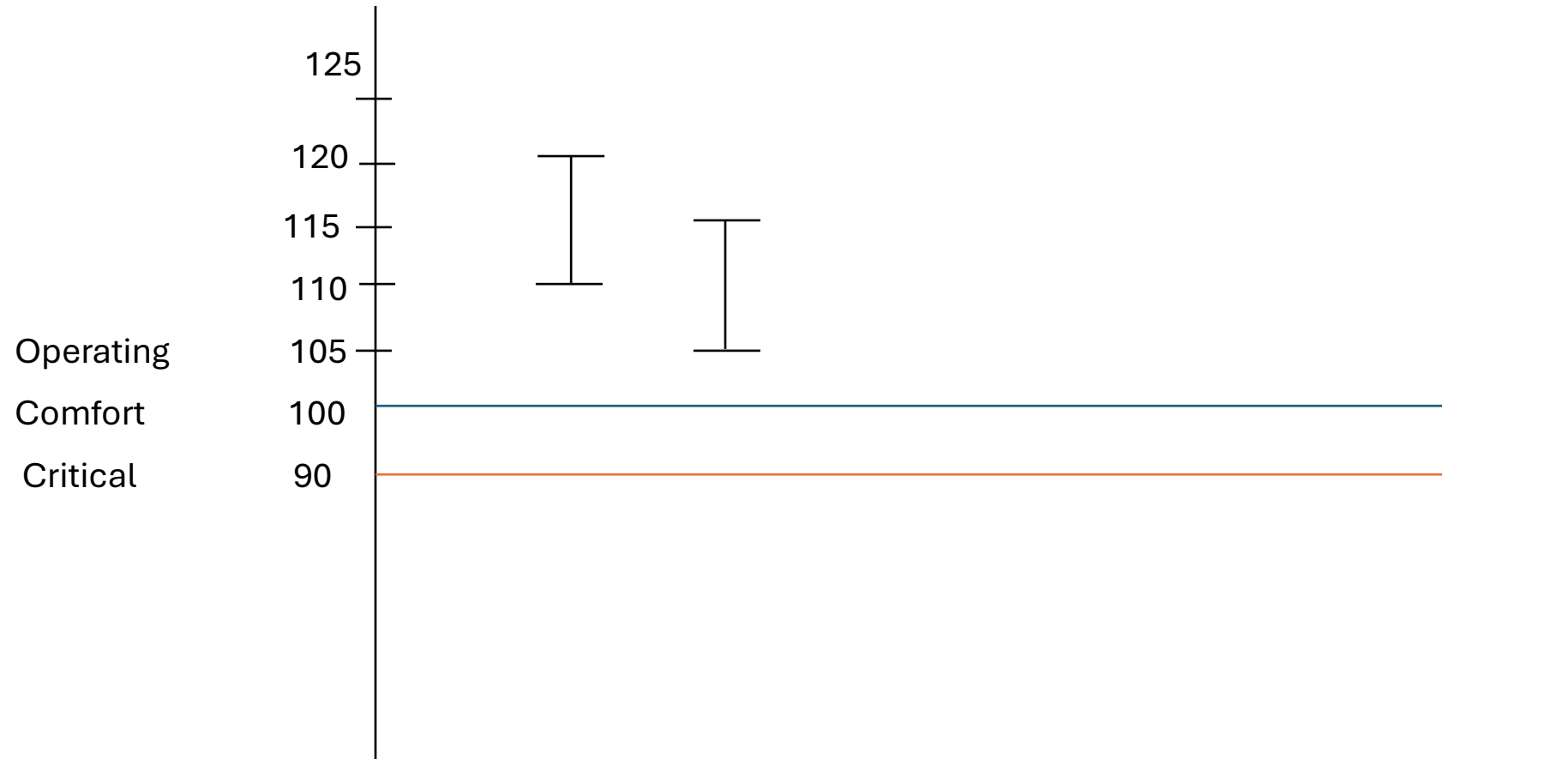
- Control strategy is paramount
- “Last” compressor in sequence set above critical pressure
- Operating efficiently/ optimally – only one machine in “trim”



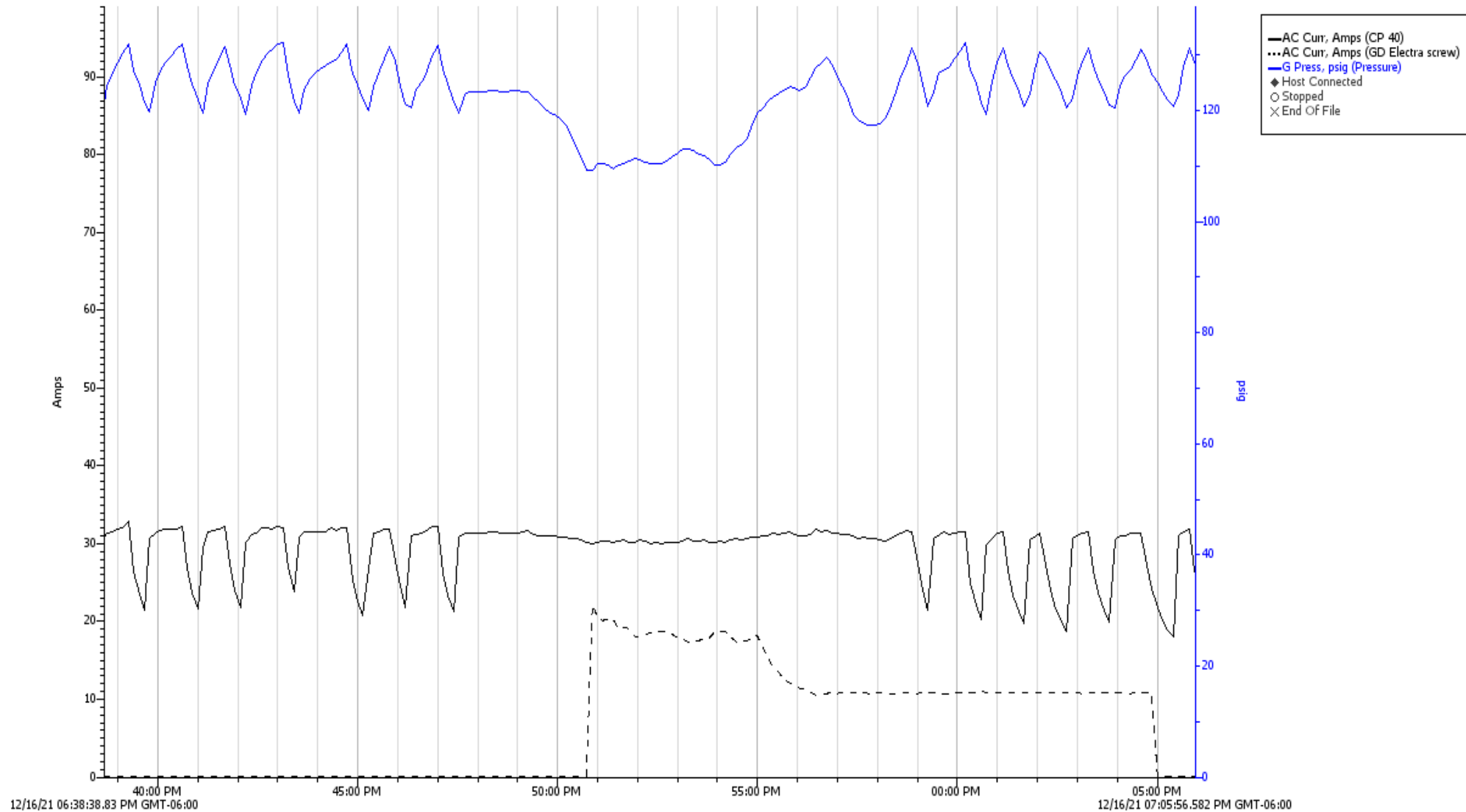
# Pressure Setting – Lead/ Lag (Cascade)

Pressure

AC1 AC2



# Lead Lag Control – 2 machine



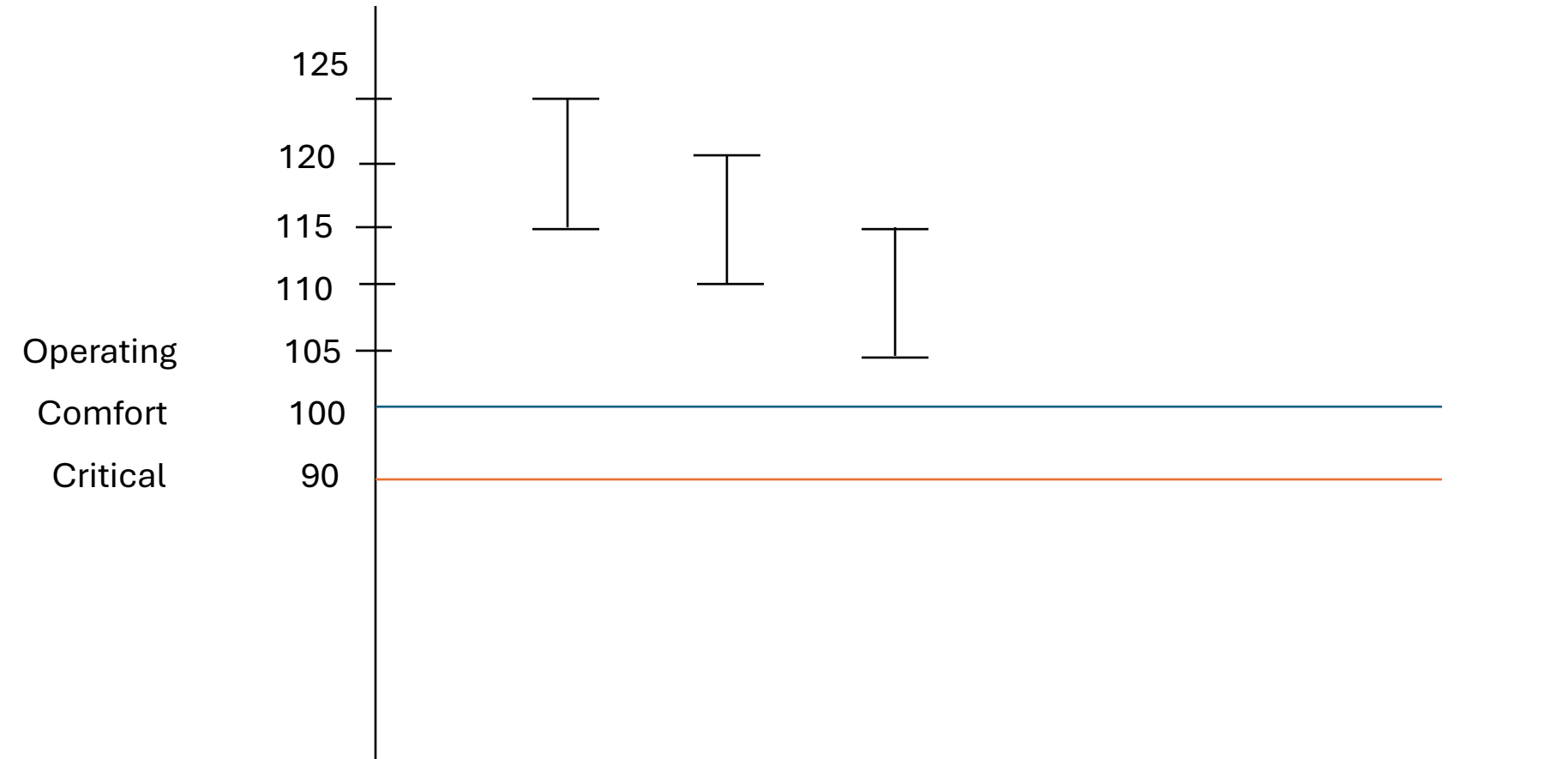
# Pressure Settings: Lead –Lag – Lag (cascade)

Pressure

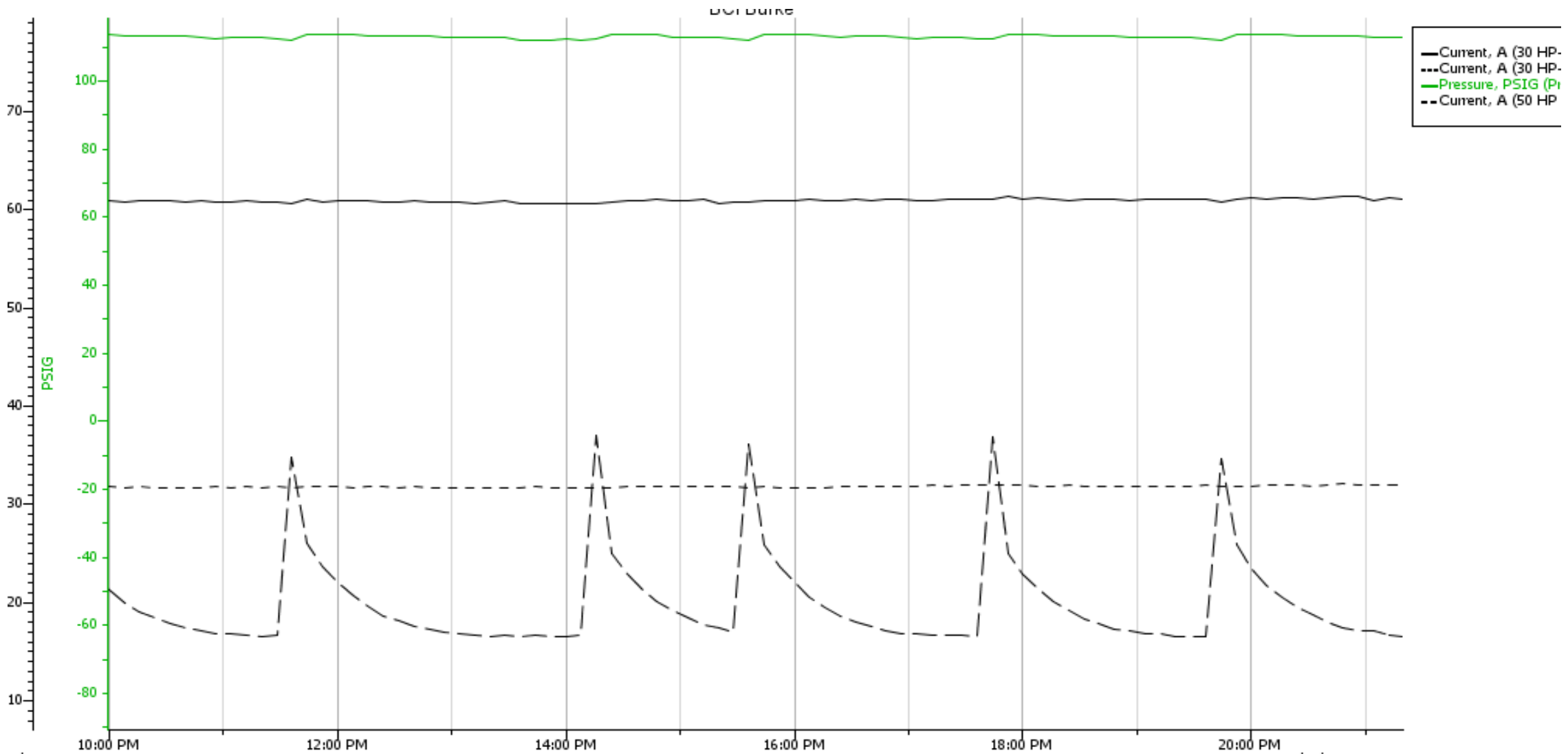
AC1

AC2

AC3



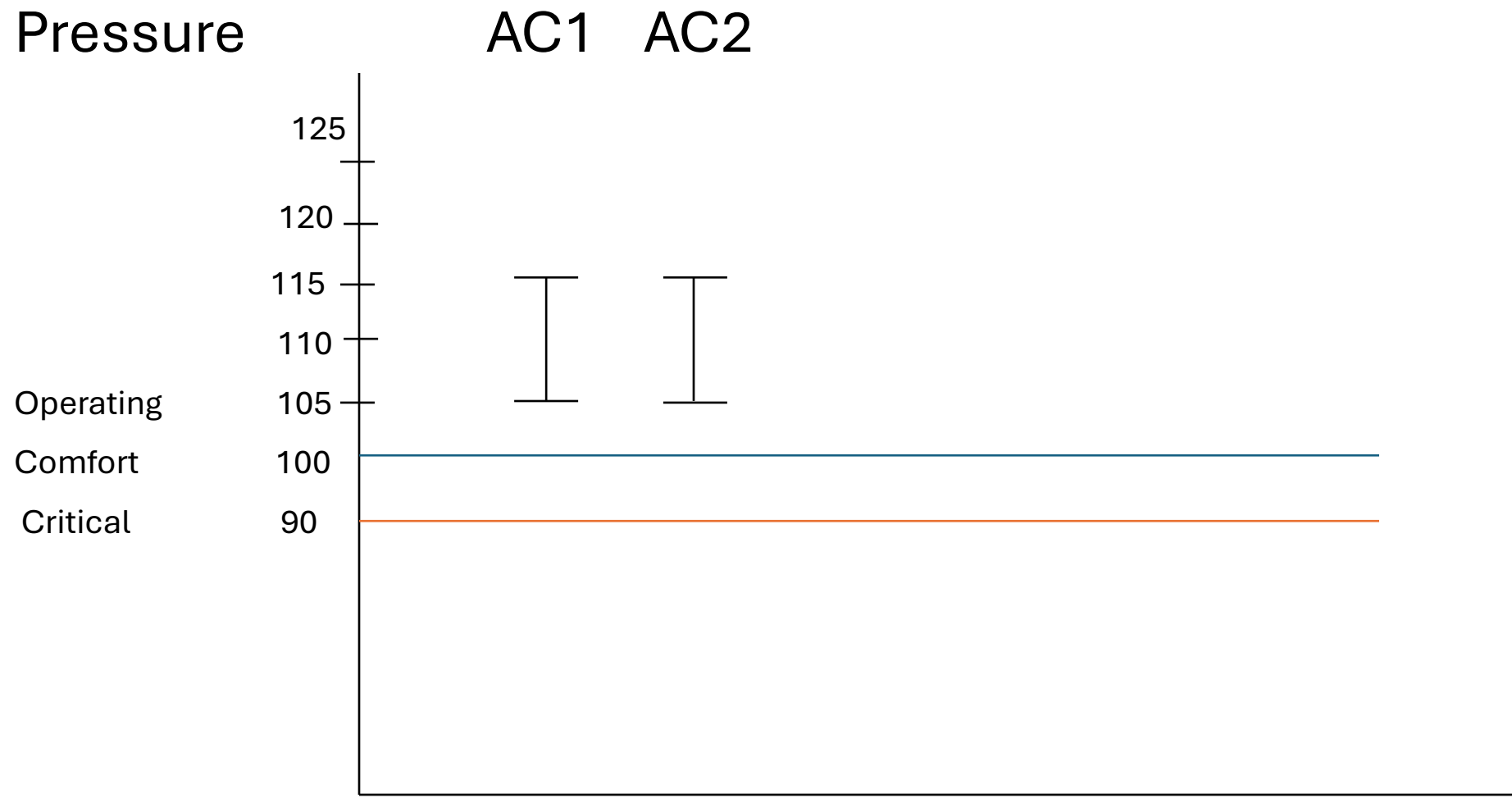
# Three machine set up



# Multiple Machine Systems - Challenges

- Not enough pressure band to accommodate cascade setup
- Mix of control types
- Mix of vintage control types – Electro Mech/ Microprocessor/ PLC
- High rate of pressure changes – demand profile/ storage etc
- Often results in simply turn them all on and leave running

# Pressure Setting – Too Close – “Fighting”



# “Fighting” Controls

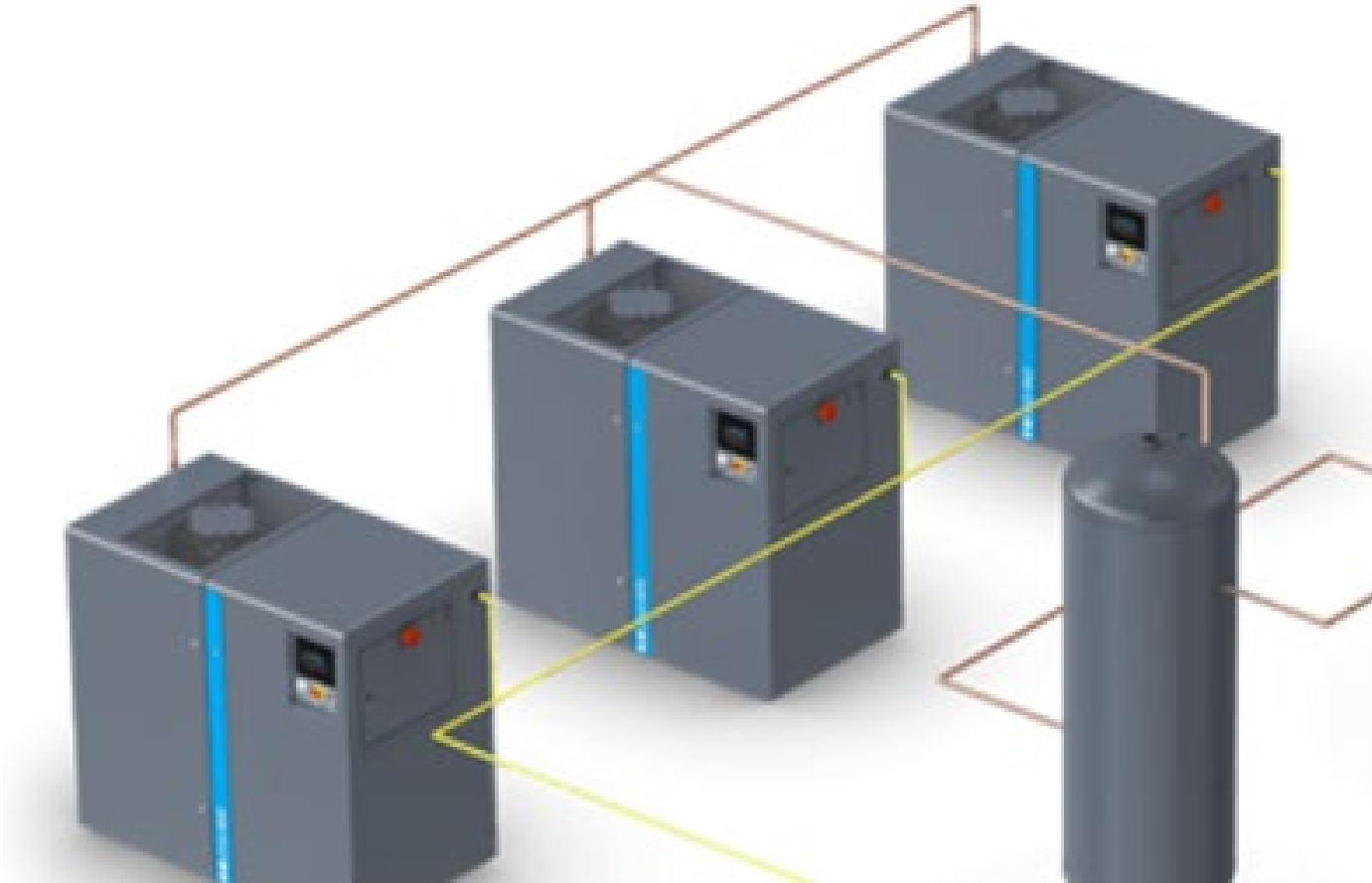


# “Networking” Compressor Controls

- Perhaps an on-board control capability w/ cabling
- Remote Sequencer/ Automation controller
- All compressors reacting to the same pressure
- Often PLC reading rate of pressure change rather than actual pressure



# Compressed Air Networking & Automation



# Compressor “Right” Sizing Summary

- Identify your critical pressure and determine your comfort and operating pressures.
- Identify your peak, low and “normal” demand ranges.
- Develop a control strategy that accommodates all demand levels.

# Greatest Cost

- The greatest, most critical cost associated with compressed air:
  - Lost production due to downtime
  - Product spoilage and contamination



Relatively rare occurrence but unrecoverable

# Redundancy – Compressed air capacity

- What level of redundancy do you have for compressed air capacity
- What is the system capacity with the largest compressor out of service

Anything less than FULL capacity results in compromised production



# Redundancy – Compressed Air capacity

- Compromised production levels = DECISIONS



- Which line will I shut down?
- How many people will I send home?
- If I keep running, what affect does lower pressure have on my product?

# COMPRESSED AIR SYSTEM REPORT CARD

*A subjective tool designed to promote evaluation and discussion regarding compressed air system operation and potential improvements.*

# SUPPLY SIDE VARIABLES

## INDIVIDUAL AIR COMPRESSOR PART LOAD CONTROL

Choose the control method on your trim/part load air compressor

### GRADE

○ Load/No Load (Grade based on storage capacity (gal) to rated flow (CFM) ratio)

- A** 5+ gallon per CFM
- B** 3 gallons per CFM
- C** 2 gallons per CFM
- D** 1 gallons per CFM

- A** Variable Speed
- B** Variable Displacement
- D** Modulation

**GRADE:** \_\_\_\_\_

## COMPRESSED AIR DRYER CONTROL

*Refrigerated Dryer*

*Desiccant Dryer*

### GRADE

- A** Cycling/VSD Control
- C** Non-Cycling Control

### GRADE

- A** Dew Point Demand Purge Control
- C** Standard Purge Operation

**GRADE:** \_\_\_\_\_

## SYSTEM STORAGE RATIO

*Gal/CFM (Non-Load/No Load Controlled Machines)*

### GRADE

- A** 5+ gal/CFM
- B** 3 gal/CFM
- C** 2 gal/CFM
- D** 1 gal/CFM
- F** 0 gal/CFM

**GRADE:** \_\_\_\_\_

**EXTRA CREDIT:** *Flow control valve installed*

## AUTOMATIC DRAINS



# IMPROVEMENT OPPORTUNITIES

## DEMAND SIDE OPPORTUNITIES

*Check any and all that apply to your system*

Does not have a comprehensive, on-going compressed air leak identification and repair program

Has elevated system operating pressure to compensate for piping, pressure drops, production interruption or operator complaint

Uses compressed air for open blowing applications such as water stripping, de dusting, conveyor clearing, sweeping or cooling

Has not calculated estimated compressed air operating costs in over 2 years

Has dead end piping runs rather than looped configuration

Does not have point of use storage installed at high flow, rapid cycle applications

## SUPPLY SIDE OPPORTUNITIES

*Check any and all that apply to your system*

Does not recover heat generated by the air compressor



# Independent Resources

- Compressed Air & Gas Institute: [www.cagi.org](http://www.cagi.org)
- Compressed Air Best Practices: [www.airbestpractices.com](http://www.airbestpractices.com)
- Compressed Air Challenge: [www.compressedairchallenge.org](http://www.compressedairchallenge.org)
- Wisconsin Focus on Energy: [www.focusonenergy.com](http://www.focusonenergy.com)

# QUESTIONS??

- THANK YOU FOR YOUR TIME AND ATTENTION

# Renewable Energy Certificates (RECs) and Their Role in Decarbonization Strategy

Kathleen Ellis  
Kakoon Buildings



SPONSORED BY



# Renewable Energy Certificates (RECs) and Their Role in Decarbonization Strategy

**Slipstream Training**  
June 2024



# Agenda

1. **Background**
2. Decarbonization and Energy Management Strategy
3. Renewable Energy Options
4. Pricing
5. Example – Manufacturing Company
6. How Can You Get Started?

# About Me

## **Kathleen Ellis**

### **Kakoon Buildings**

Kathleen has over a decade of experience in engineering, real estate, and sustainability management across multiple industries including commercial real estate, semiconductor manufacturing, and higher-education. Kathleen has advised numerous public and private companies on energy management, sustainability strategy and renewable energy procurement. In her previous role as the Global Sustainability Program Manager at Entegris she was responsible for managing global sustainability strategy and disclosure, and leading facilities teams to execute energy and water reduction projects. Prior to Entegris, Kathleen worked as a Senior Associate at Rocky Mountain Institute where she provided technical guidance to DOE funded HVAC systems companies and performed energy and renewables analysis for commercial real estate projects.

Education: MSc in Sustainable Engineering, Rochester Institute of Technology, Bachelor's in Physics from Cornell College.

Certifications: Certified Energy Manager (CEM), LEED AP, Certified Passive House Consultant (CPHC)



# Why Decarbonization and RECs?

## Increased Demand for Disclosure and Reduction of GHG emissions and Renewable energy

Regulation

Customer Demand / Supply Chain  
Pressure

Investor Requirements

Employee Demand

### GHG Emissions Reduction Targets

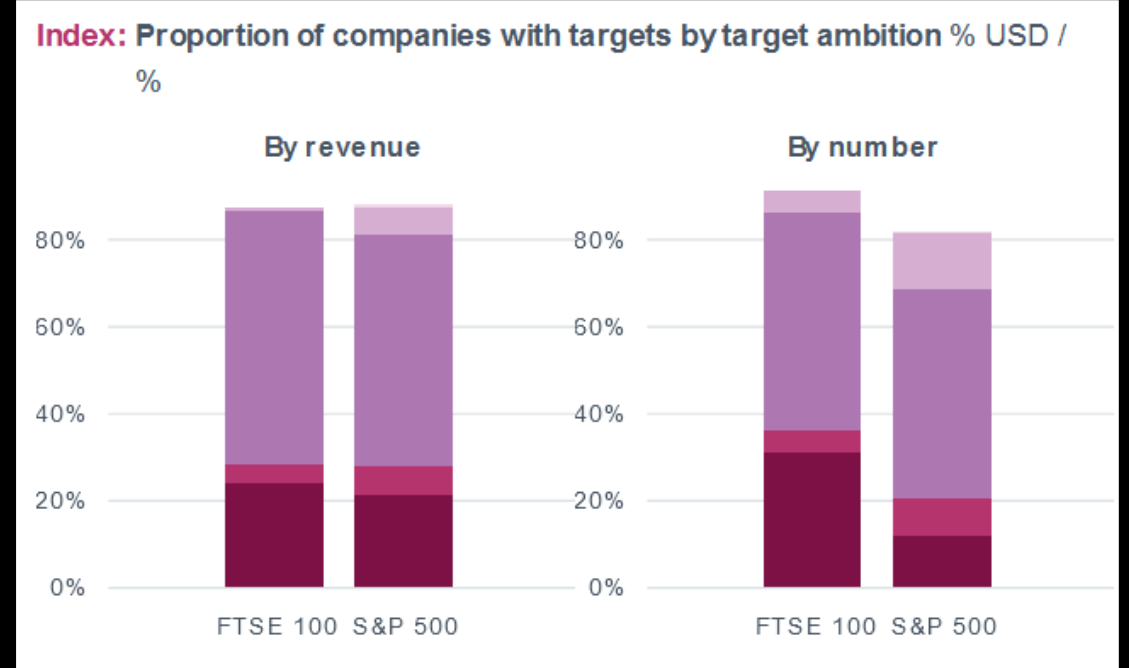
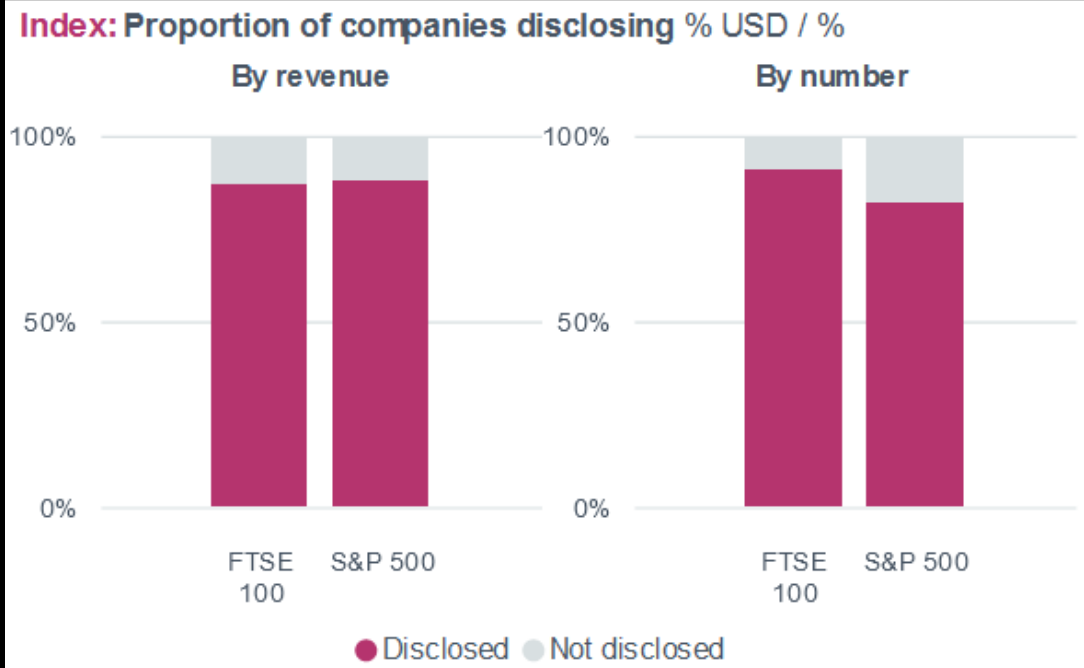


### Renewable Energy Targets



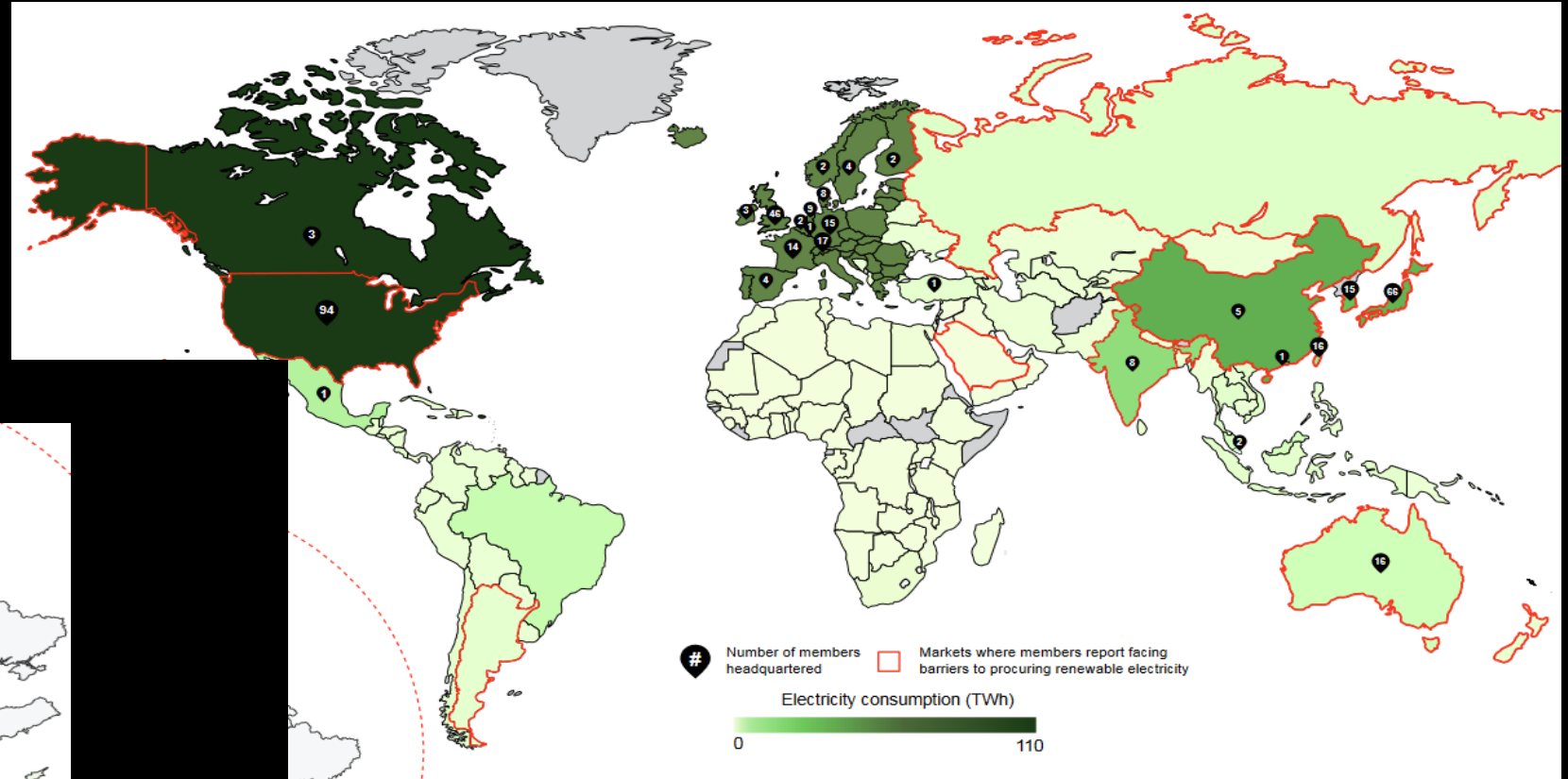
### Voluntary GHG Emissions Public Disclosure



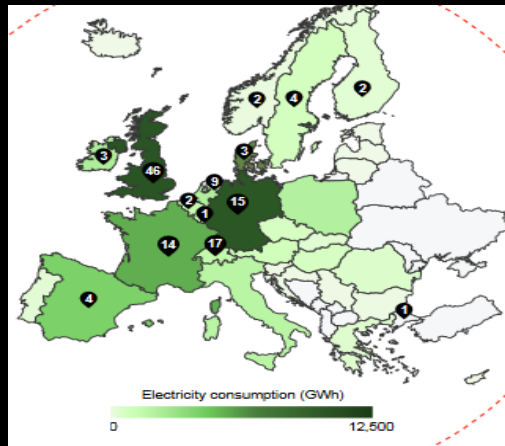




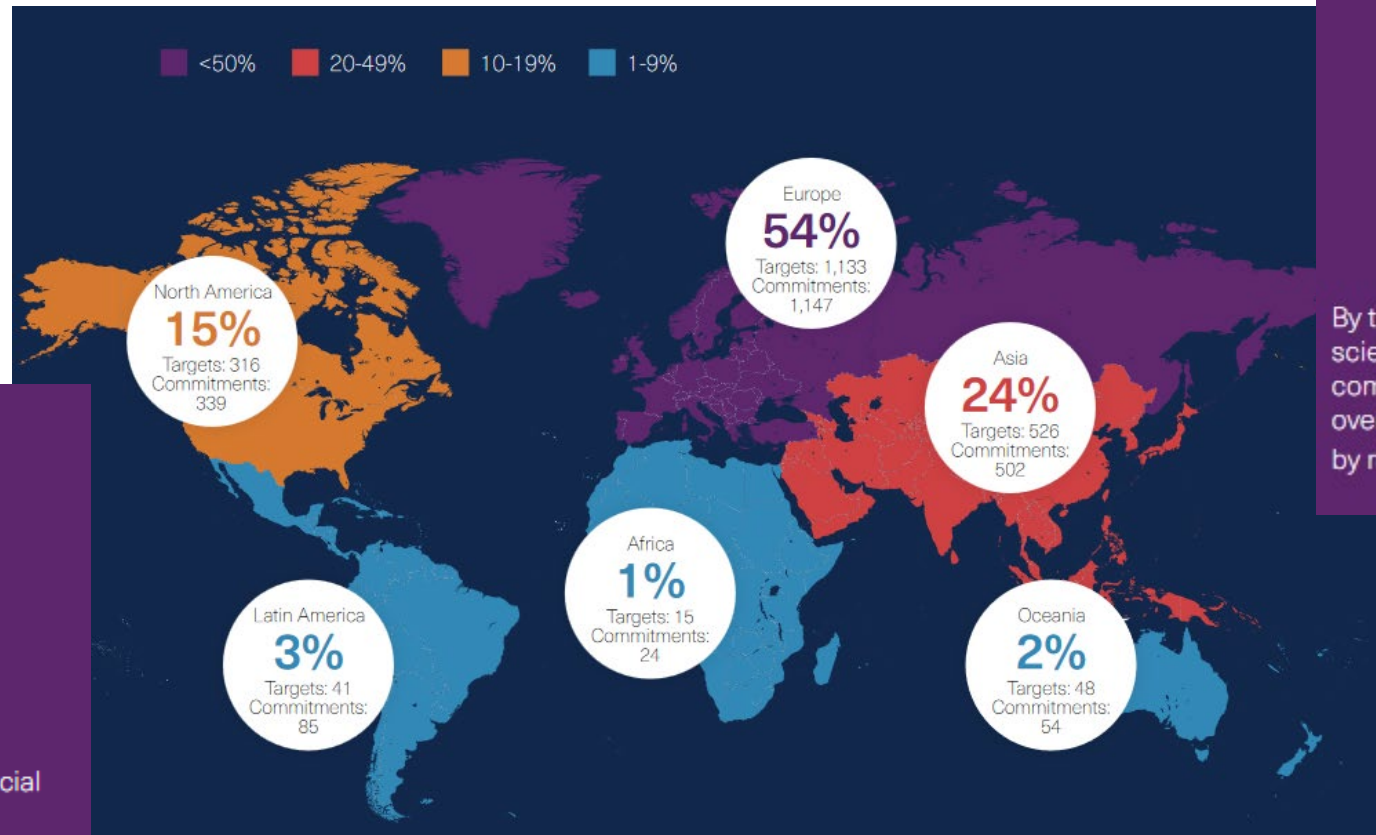
## RE100 Global Members and Electric Consumption



### Europe



# Science Based Targets Initiative (SBTi)



34%

By the end of 2022, companies with science-based targets or which had committed to set targets represented over a third (34%) of the global economy by market capitalization.

1,097

The number of companies and financial institutions setting science-based targets continued to grow. In 2022, 1,097 companies had their targets validated, a number greater than the total of the previous seven years combined.

Source: [Science Based Targets Initiative \(SBTi\) Monitoring Report 2022](#)

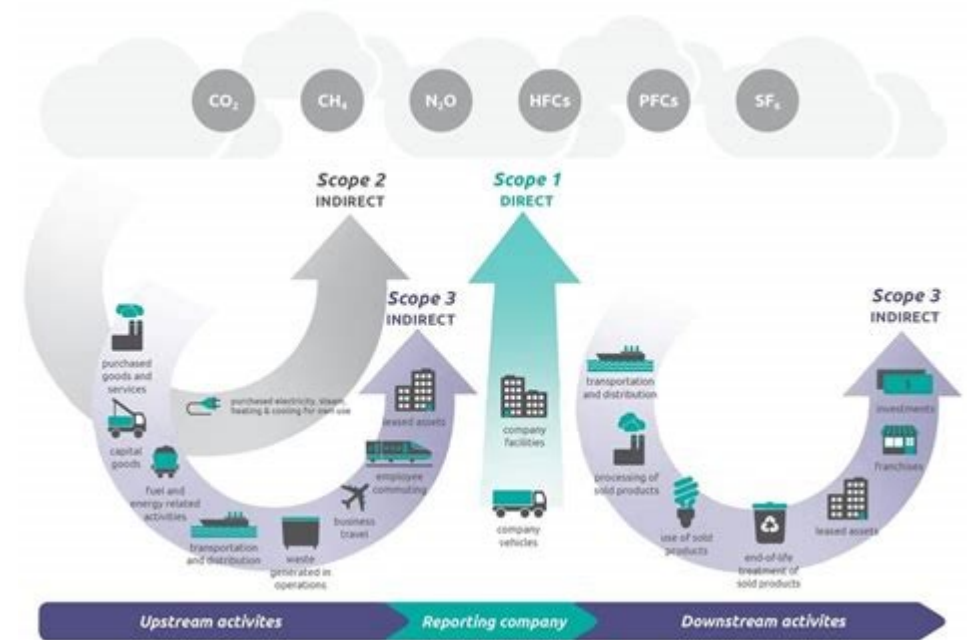
# GHG Reporting Regulation in the US

## CA Senate Bill (SB) 253

- SB-253 requires reporting on greenhouse gas (GHG) Scope 1, 2, and 3 emissions for US-based companies – public and private – with over \$1 billion in revenue that do business in California.
- SB-253 requires Scope 1 and 2 emissions reporting starting in 2026, and Scope 3 starting in 2027.
- Challenged by business groups in California's Central District in January 2024.

## SEC Regulation

- Requires disclosure of material scope 1 and 2 emissions for Large accelerated filers (LAF) in 2025 and Accelerated filers (AF) in 2026
- Voluntarily stayed pending judicial review



Sources:

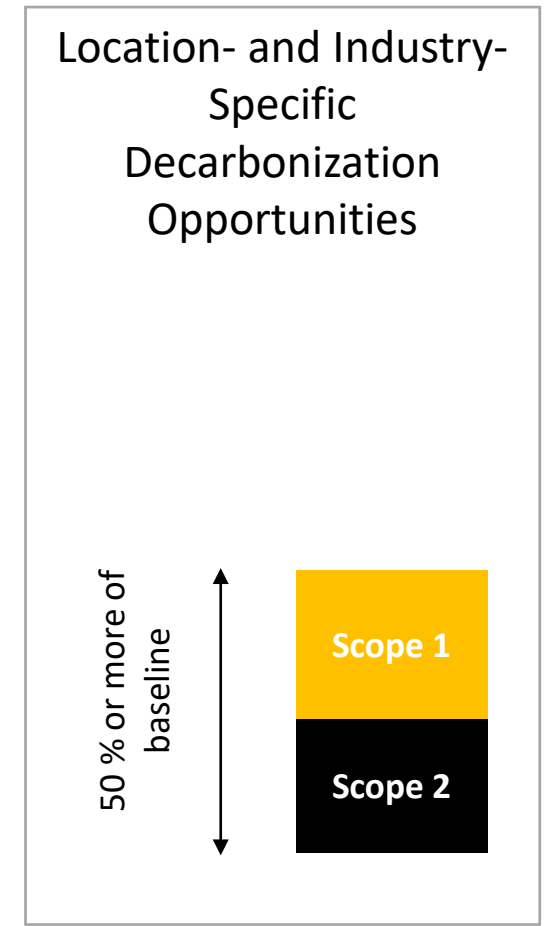
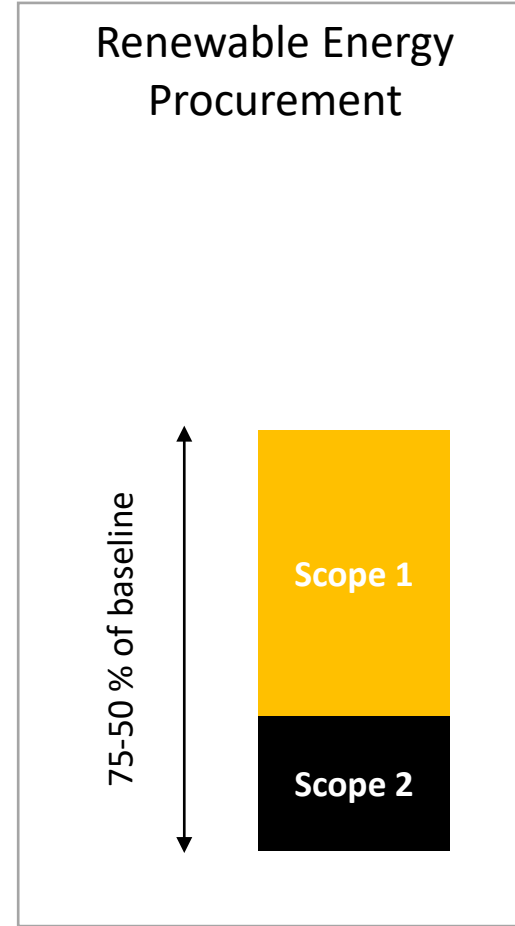
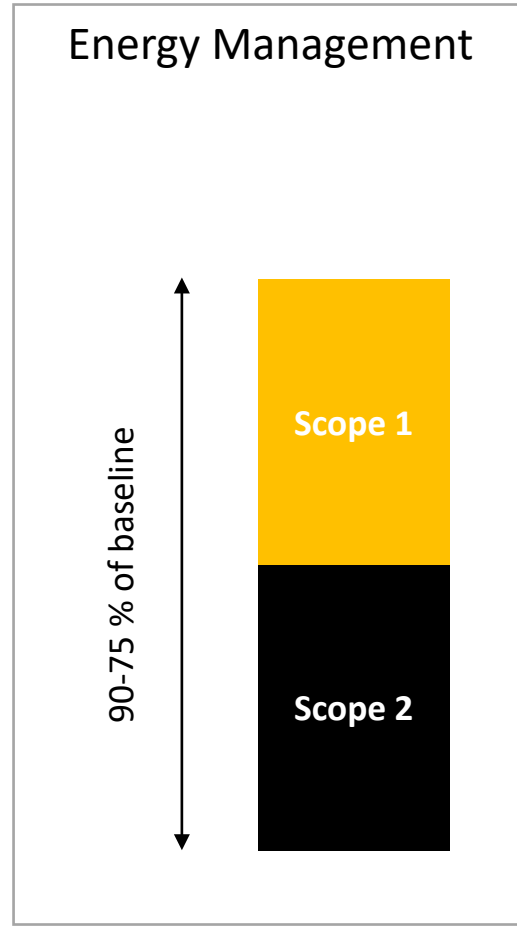
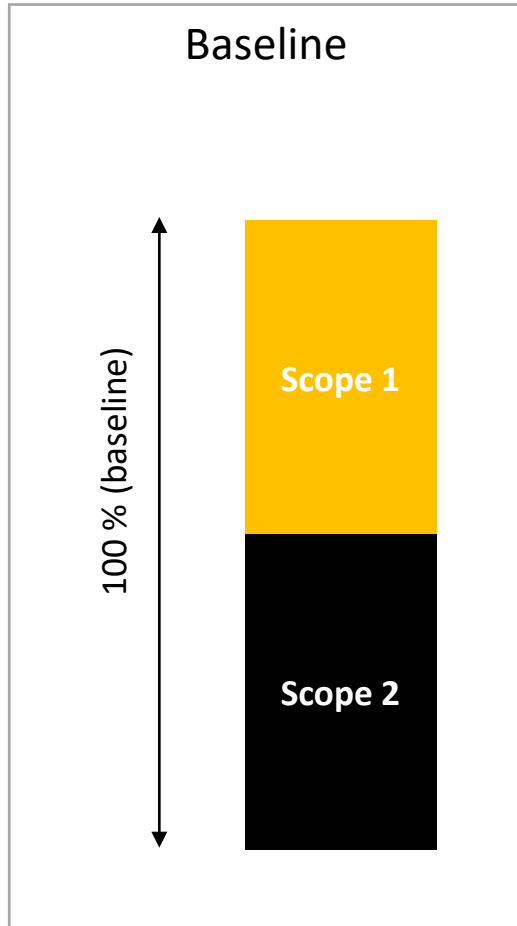
[CA Climate Bill 253](#)

[SEC Final rule: The enhancement and Standardization of Climate-Related Disclosure for Investors](#)

# Agenda

1. Background
- 2. Decarbonization and Energy Management Strategy**
3. Renewable Energy Procurement
4. Pricing
5. Example – Manufacturing Company
6. How Can You Get Started?

# Decarbonization and Energy Management Strategy



# Agenda

1. Background
2. Decarbonization and Energy Management Strategy
- 3. Renewable Energy Procurement**
4. Pricing
5. Example – Manufacturing Company
6. How Can You Get Started?

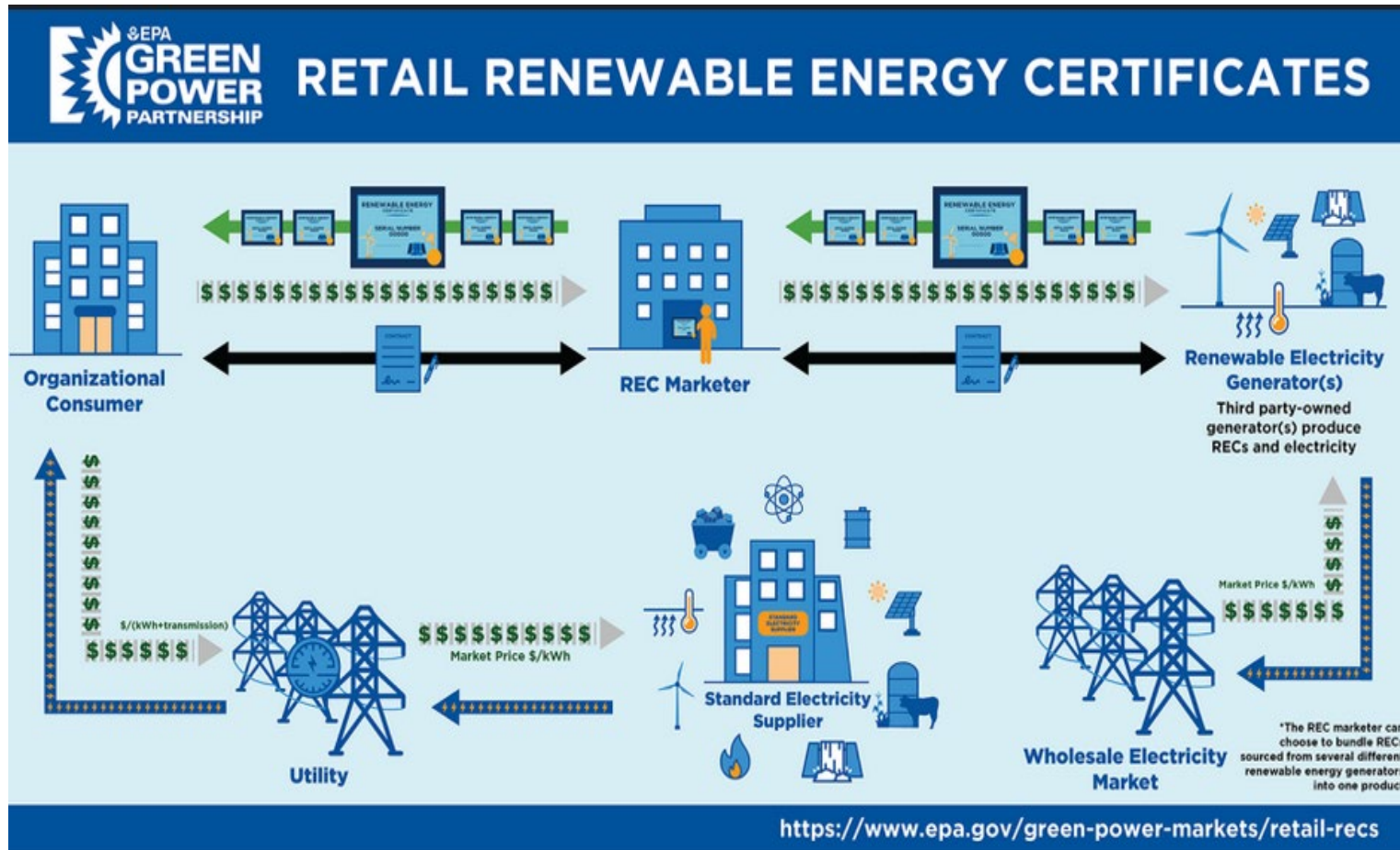
# Comparison of Renewable Energy Options for Companies

	Onsite Renewables	Power Purchase Agreements (PPAs)*	Green Tariffs	Renewable Energy Certificates (RECs)
Cost	Low	Low	High	Low
Purchasing Commitment	High	High	Low	Low
Operational Commitment	High	Low	Low	Low

\*This category includes Virtual (off-site) Power Purchase Agreements.



# Renewable Energy Certificates (RECs)



DOE Definition “**Renewable Energy Certificates (RECs) are tradable instruments that can be used to meet voluntary renewable energy targets.** Energy users can meet voluntary renewable energy goals and support the deployment of green power through the purchase of RECs. RECs are a credible and easy means to keep track of who can claim the environmental attributes of renewable electricity generation on the grid. Once a buyer makes an environmental claim based on a REC, the buyer can no longer sell the REC and the REC is considered permanently ‘retired.’”

## Green-e® Certification Requirements



1. Generation has come on line in last 15 years
2. REC must not be sold more than once
3. Annual verification process
4. Must not be counted against relevant electricity mandates (ie. RPS)

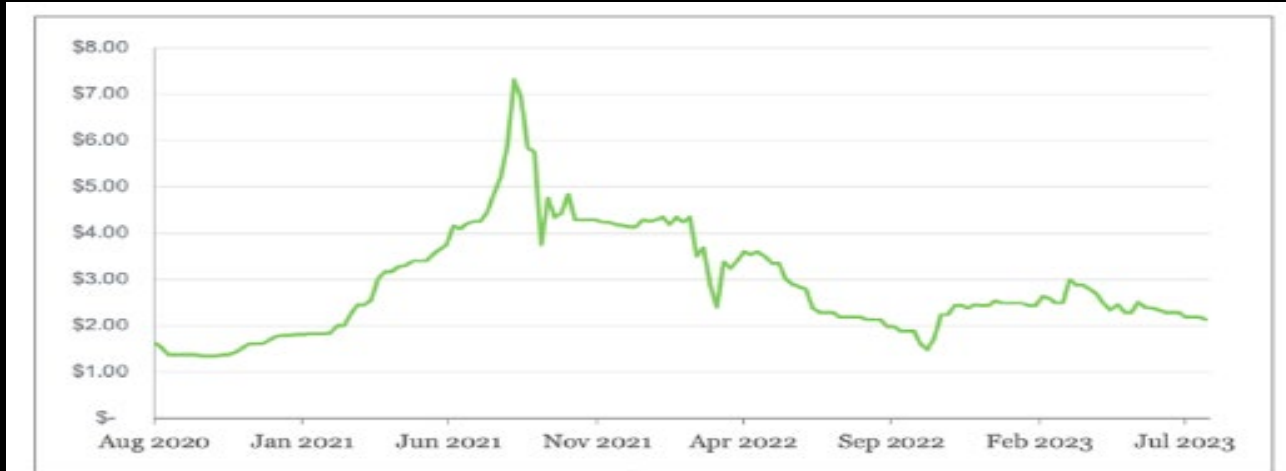


# Agenda

1. Background
2. Decarbonization and Energy Management Strategy
3. Renewable Energy Procurement
- 4. Pricing**
5. Example – Manufacturing Company
6. How Can You Get Started?

# Pricing

US Green-e<sup>®</sup> historical REC prices from 2020 through 2023 (Wind; \$/REC)



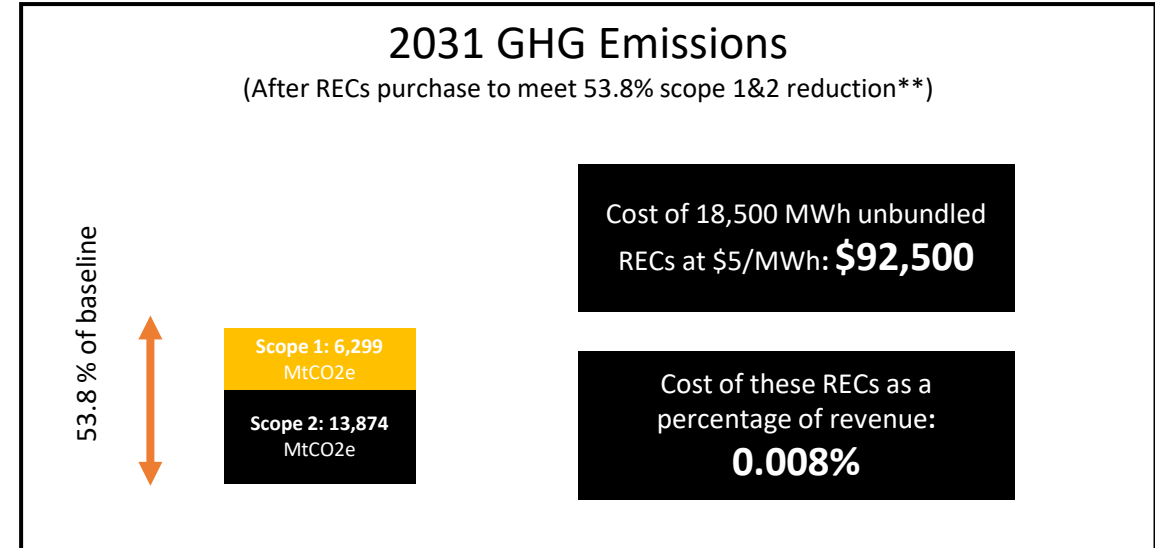
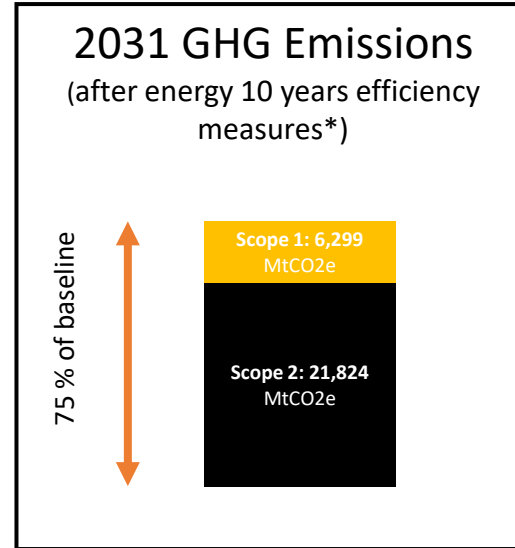
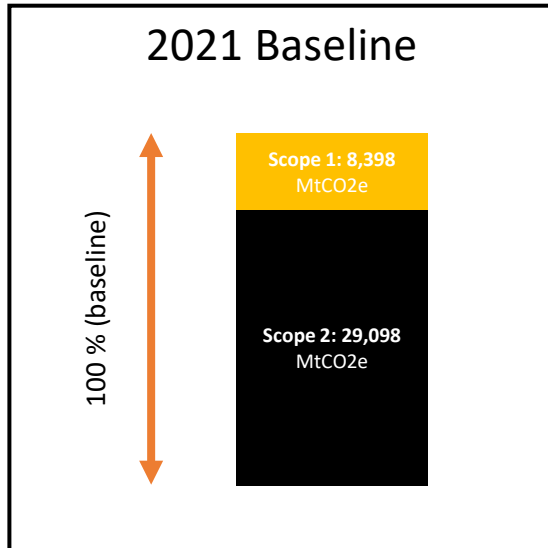
REC prices vary greatly based on:  
quantity, vintage, source and location.  
Generally, green-e certified North American  
RECs are running between **\$2.50 - \$10.00**.

# Agenda

1. Background
2. Decarbonization and Energy Management Strategy
3. Renewable Energy procurement
4. Pricing
- 5. Example – Manufacturing Company**
6. How Can You Get Started?

# Example – Manufacturing Company

CMC Materials is a semiconductor supply chain manufacturing company with **\$1.17 billion in revenue (2021)** whose customers are requesting GHG data and targets for GHG reduction. The example below uses publicly available data to demonstrate what GHG data and reduction targets look like for CMC.



As of 2021

Renewable Energy Target: None

GHG emissions Reduction Targets: “5% reduction in carbon emission intensity by 2026”

Voluntary GHG emissions Public Disclosure:



\*Based on DOE Better Plants program 25% energy reduction.

\*\*Based on CMC Materials 2021 CDP reported MWh energy usage and CO<sub>2</sub>e/MWh ratio and SBTi target setting tool.

# Agenda

1. Background
2. Decarbonization and Energy Management Strategy
3. Renewable Energy Procurement
4. Pricing
5. Example – Manufacturing Company
6. **How Can You Get Started?**

# How Can You Get Started?

1. Get a RECs quote for a portion of your usage from a Green-E certified provider
2. If you or a client are interested in starting the disclosure or verified target journey:
  1. Register for CDP
  2. Start scoping an SBTi target with the SBTi target setting tool
  3. Start your internal assurance process development and look for an assurance provider if you/your clients have over \$1 billion in revenue



# QUESTIONS?

**Let's stay in touch**

[KakoonBuildings.com](https://www.kakoonbuildings.com)

[Kathleen@kakoonbuildings.com](mailto:Kathleen@kakoonbuildings.com)

[linkedin.com/in/kathleenellis0](https://www.linkedin.com/in/kathleenellis0)



**Kathleen Ellis**

Engineering | Efficiency | Resiliency



# Lambeau Field Energy Conservations Measures

Justin Dantzman,  
Assistant Director of  
Facility Operations,  
Green Bay Packers



SPONSORED BY





# Tour Groups


**11:15 am – 12:30 pm | Tour Group #1**  
**11:30 am – 12:45 pm | Tour Group #2**



# Your Feedback is Important

Please fill out an evaluation by scanning the QR code or by paper to help us better serve your continuing education needs.





---

### Evaluation of this course

How successful were we at meeting these training objectives?	Failing		Excellent		
	F	D	C	B	A
How much do you agree or disagree with these statements regarding the training?	Strongly Disagree		Neither Agree nor Disagree		Strongly Agree
Training content	1	2	3	4	5
Presentation	1	2	3	4	5
Logistics	1	2	3	4	5





**Learn More**

[slipstreaminc.org/education](https://slipstreaminc.org/education)

# Learn more...

Check out the wide variety of courses available to you **for free** in our **Learning Management System**.

**Get started:**

<https://slipstreamcoassemblereg.paperform.co/>

**Browse courses:**

<https://slipstreaminc.org/resources/webinars-videos>

Browse our courses



## Your courses

All courses 76

To do 24

In progress 18

Completed 34

Search your courses...

Sort by Recently viewed



### High-performance homes

This video will be posted by October 13, 2021

Midwest consumers want high-performance homes. They see the benefit...

View course



### Making the case for ongoing commissioning

Ongoing commissioning (OCx) has become an industry buzzword in recent years. Typically, OCx applies to new, high-performance buildings, in which a buildin...

View course



### Electric Vehicles 101

Electric Vehicles (EVs) provide a new opportunity for cleaner and more efficient transportation. Current surveys show that about 30% of Americans would consider an EV as their next vehicle, inspiring auto ...

View course



# Thanks for joining us!

THANK YOU TO OUR SPONSOR



# Tour Groups

**11:15 am – 12:30 pm | Tour Group #1**

**11:30 am – 12:45 pm | Tour Group #2**

