While waiting for the workshop to start…

Get ready to participate!

- Turn on your camera
- Find the unmute button and say "Hi" to check your audio

- Find the "raise hand" button

Answer our opening question!

Why are you interested in compressed air audits?

Answer in the chat!

OCTOBER 2, 2025

Conducting compressed air audits

Jay Mullin
Energy Coach

Ron Marshall
Marshall Compressed Air Consulting

Follow along in the Participant Workbook!

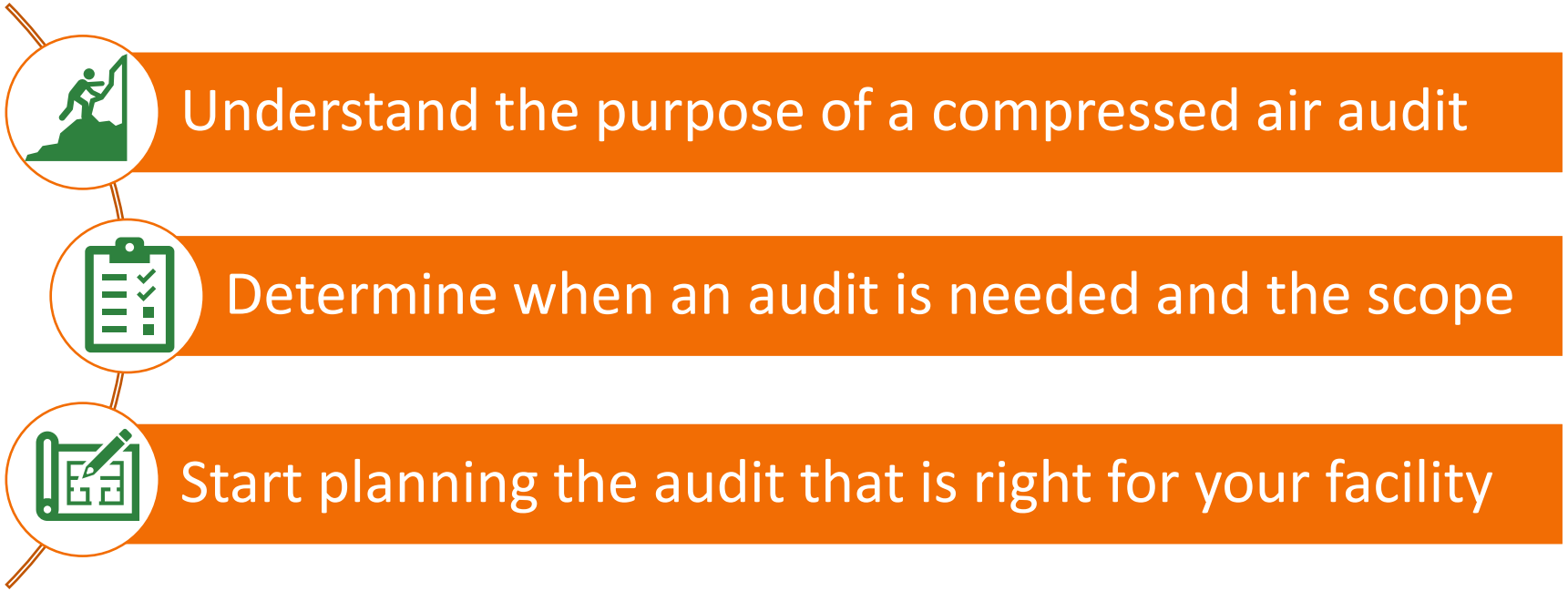
Have the workbook open

Where to find the workbook:

- In the chat

Watch for this icon to help follow along

Conducting compressed air audits



Why do facilities conduct compressed air audits?

Answer in the chat

Compressed air is your most expensive utility

Importantly, 98% of systems do not meter energy use.

Many do not even have flow meters.

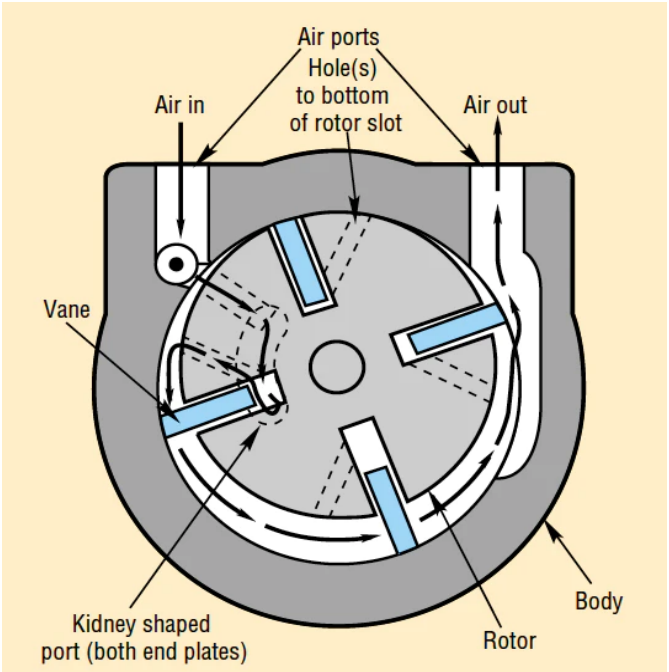
Without measurement, inefficiencies remain invisible.

Potential efficiency improvements are typically in the range of 20-50%.

Example: 1 horsepower (hp) air motor

Operating a **1 hp air motor requires 7-8 horsepower of electrical power** into the compressor:

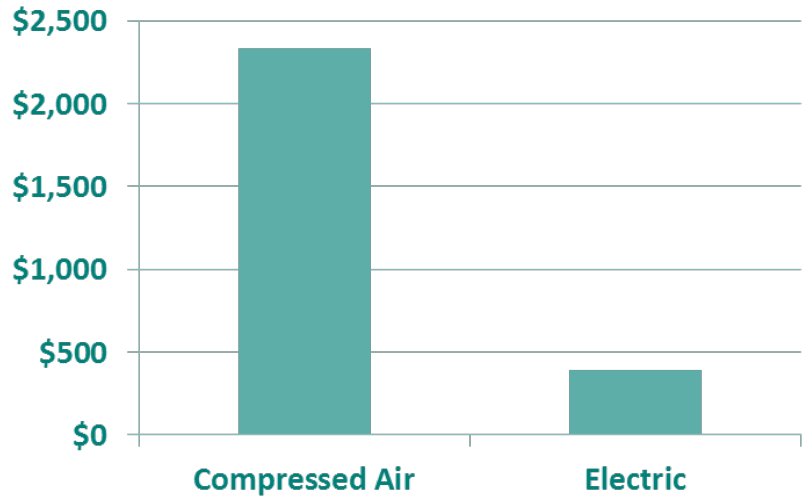
- 30 standard cubic feet per minute (scfm) @ 90 pounds per square inch gauge (psig) are produced by the 1 hp air motor
- 6-7 hp at the compressor shaft are required for 30 scfm
- 7-8 hp of electrical power are required to produce 6-7 hp at the compressor shaft



Source: compressed air challenge

Compressed air versus other energy sources

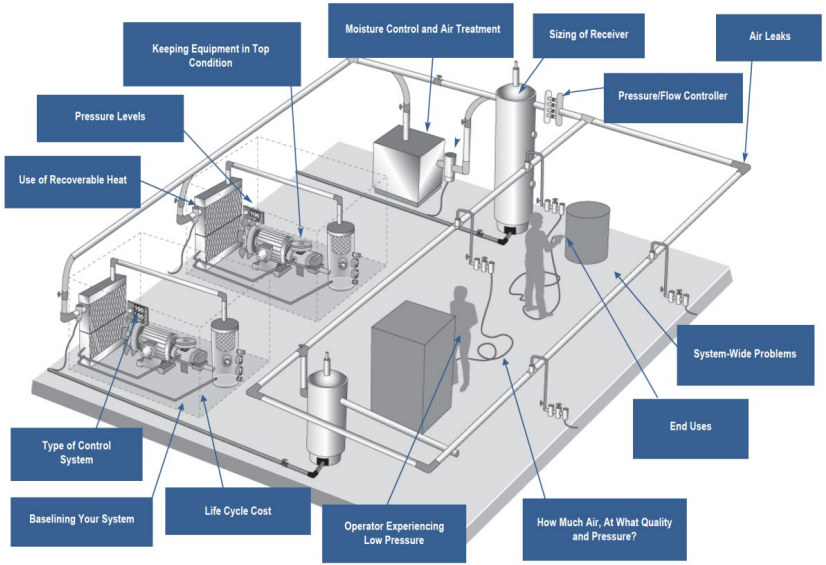
- The overall efficiency of a typical compressed air system can be as low as 10-15%.
- Annual energy costs for a 1 hp air motor versus a 1 hp electric motor, 5 days per week, two-shift operation, $0.10/kWh:
  - ……$2,330 (compressed air)
  - ……$390 (electric)



Source: compressed air challenge

Why audit?

- Provides visibility about system performance
- Serves to quantify waste and areas of concern
- Supports the required capital expenditure (CAPEX) decisions to make improvements



IMPROVING COMPRESSED AIR SYSTEM PERFORMANCE: A SOURCEBOOK FOR INDUSTRY

Most audits address operational issues

- Low pressure
- Water/oil contamination
- Equipment aging or failing
- Future expansion plans
- Corporate mandate

Energy savings come when these issues are solved properly.

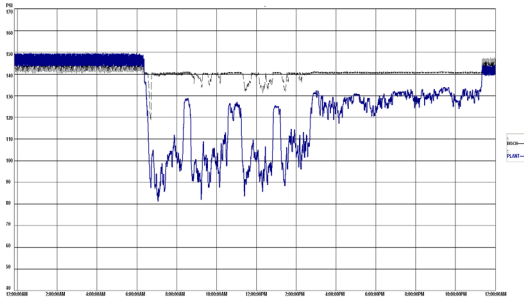
Case study: automotive plant

- An automotive manufacturer was experiencing compressor failure and occasional low-pressure levels
- Initiated a compressed air audit using an external expert
- Expert determined **low pressure was being caused by a failed valve** in a desiccant dryer
- Flow measurement determined a **smaller compressor could be purchased**, saving future costs
- **20% leakage level was found** and costs were further reduced when leakage repaired

Case study: fibreglass plant

A fibreglass parts manufacturer had a compressor system using a single 60 hp variable speed drive rotary screw compressor, a 50 hp fixed speed compressor and non-cycling refrigerated air dryer:

- Compressor ran at 140 psi, the highest pressure possible
- Poor performance on a key die cutter and other machines causing production delays
- Pressure-related problems on parts presses
- Unknown compressed air costs and flows



	Hours	kW	kWh	$ Cost
Compressor	8760	36.5	319,740	$ 31,974
Dryer	8760	2.5	21,900	$ 2,190
Heater	4300	15.0	64,500	$ 6,450
Total	8760	46.4	406,140	$ 40,614

Other Costs	
Maintenance	$ 5,000
Lost Production	$12,000
Total	$17,000

Case study: fibreglass plant (bis)

Data showed significant savings could be gained:

Measure	$ Saved	% Saved
New Comp/Pressure	$ 12,765	31%
Leaks	$ 4,995	12%
End Uses	$ 1,665	4%
Filters	$ 332	1%
Cycling Dryer	$ 2,100	5%
Heater	$ 6,450	16%
Turn off night/weekend	$ 1,850	5%
Total	$ 30,157	74%

Other Savings	
Maintenance	$ 3,000
Lost Production	$12,000
Total	$15,000

Beyond energy

Many operators just want their system to run in a trouble-free manner. Energy efficiency is important, but the most value is most often gained from:

- Reliability gains – the system runs continuously without interruption
- Better pressure stability – plant pressure is stable and within limits
- Air quality – the flow of air is clean and dry

What is a compressed air audit?

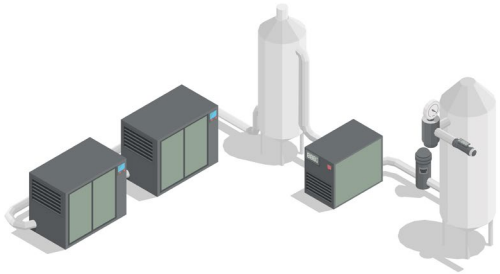
It is the systemic evaluation of compressed air system performance, including supply, distribution and demand.

Benefits include:

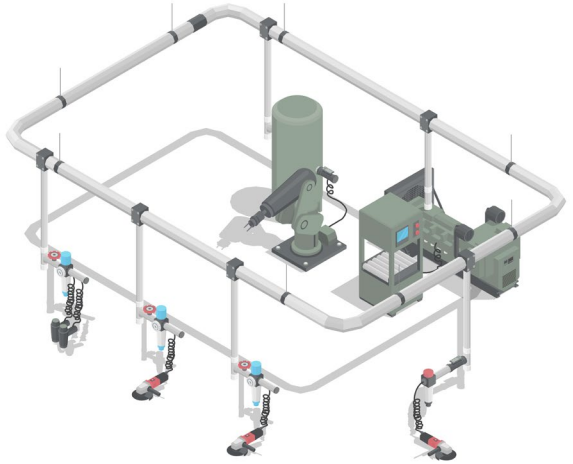
- Increased reliability
- Improved quality
- Lower maintenance
- Reduced operating costs
- Improved capital planning
- Identified hidden problems
- Helps build the case for improvement

What is involved

Supply side



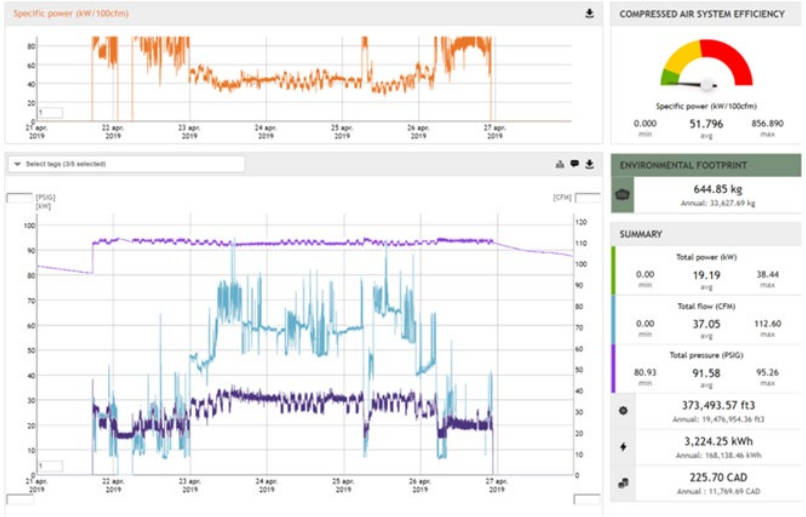
Demand side



Key performance indicators (KPIs)

When data are collected and processed KPIs can be calculated to tell the efficiency and effectiveness of the system:

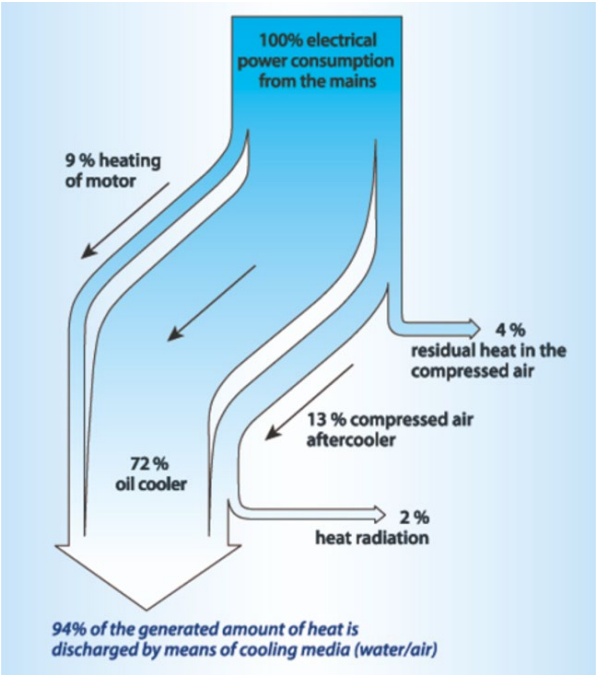
- **kWh** = overall energy use to track costs
- **kW/100 cfm** = specific power to show production efficiency
- **Leakage** as a percentage of flow to track waste
- Assessment of inappropriate uses



Key improvement principles

Basic ways to improve efficiency:

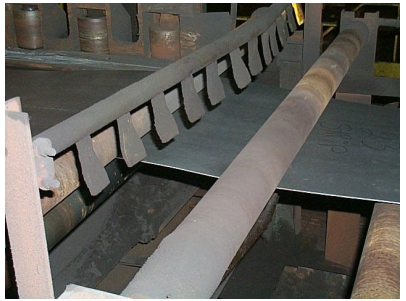
1. Compress air more efficiently
2. Use less compressed air
3. Reduce compressed air pressure
4. Use compression heat



Source: Compressed Air Best Practices

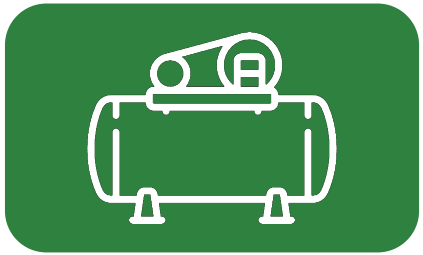
Sources of waste

- Leaks = 20-30%, sometimes as high as 80%
- Artificial demand 10-15%, due to higher pressure than needed
- Inappropriate uses 10-15%, due to misuse of compressed air
- Poor compressor controls due to unmanaged compressor settings
- Inefficient equipment, compressors, dryers, filters and drains



Who should conduct the audit?

Staff



Equipment supplier

Independent auditor

	Staff	Equipment supplier	Independent auditor
Pros:	Ongoing monitoring and identification of opportunities Lower cost	Knowledgeable Free	Includes demand side Unbiased Tend to find more demand-side savings
Cons:	May not have expertise to diagnose more complicated issues	Tend to focus on supply side	Not free Difficult to find qualified auditors

Using measurements

- Measurements take the "vital signs" of a compressed air system to see how it is operating and assess system efficiency.
- Once the system baseline is established, it can be tracked over time to monitor improvements or degradations in system performance.
- This information is then converted into dollars and communicated to management.

What gets measured?

Basic measurements

- ✓Flow out of compressor room
- ✓Pressure at compressor discharge
- ✓Power of compressors and dryers*
- ✓Leakage**
- ✓Temperature of compressors, dryers and various points**

Enhanced measurements

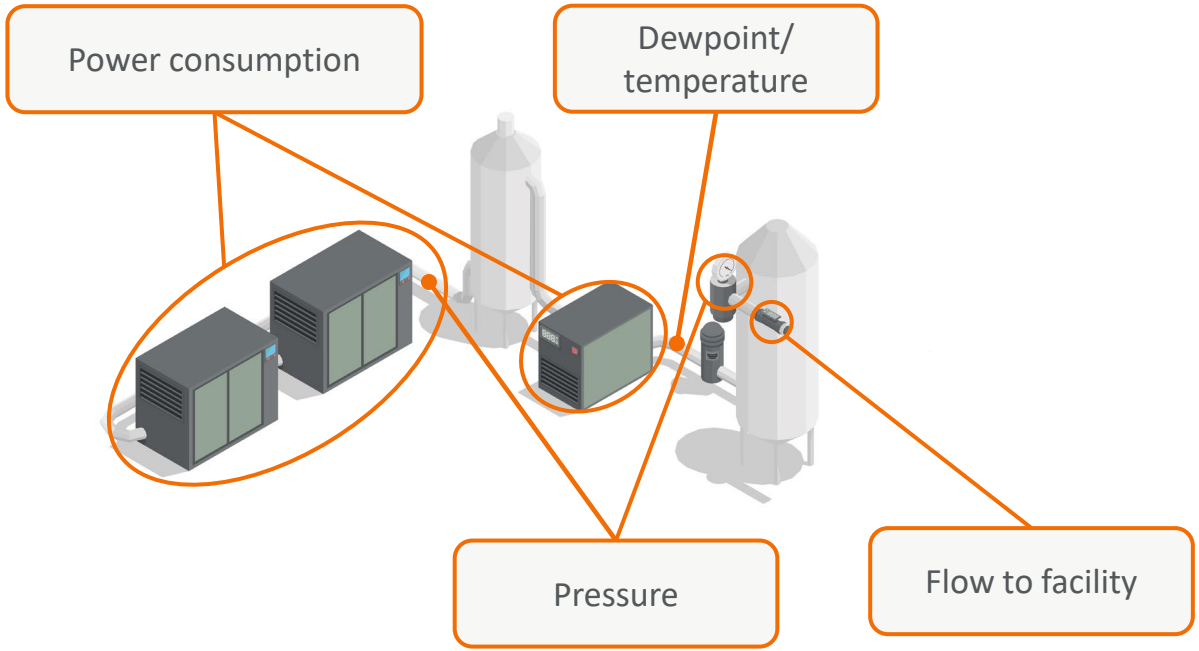
- ✓ Leaks
- ✓ Inappropriate uses
- ✓ Pressure drop
- ✓ Dewpoint
- ✓ Oil content of air
- ✓ Air contaminant particle size
- ✓ Microbial contamination
- ✓ System reliability

Audit duration

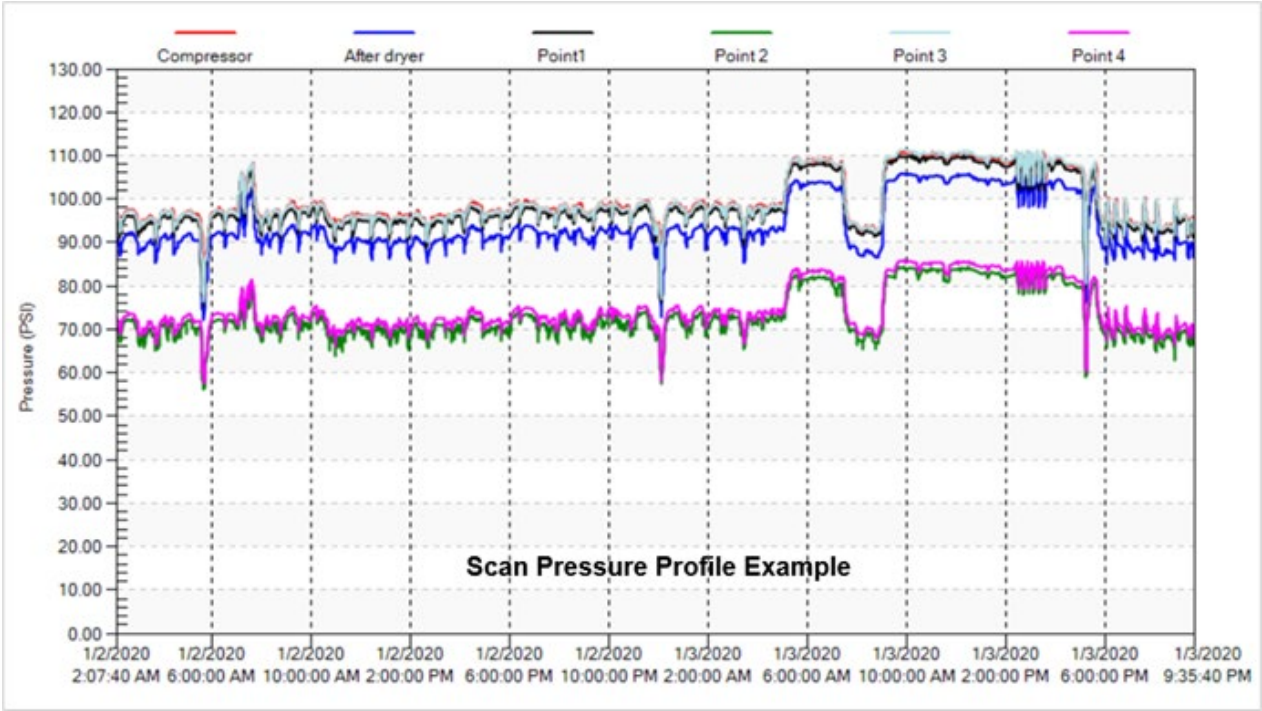
How long to measure?

- Full year is usually impractical
- Measure repeating periods
- Determine how many repeating periods in a year, multiply to annualize
- Care should be taken for seasonal plants
- Typical minimum measurement period of seven days
- Data analyzed in seven-day multiples
- Might need to divide data into day types

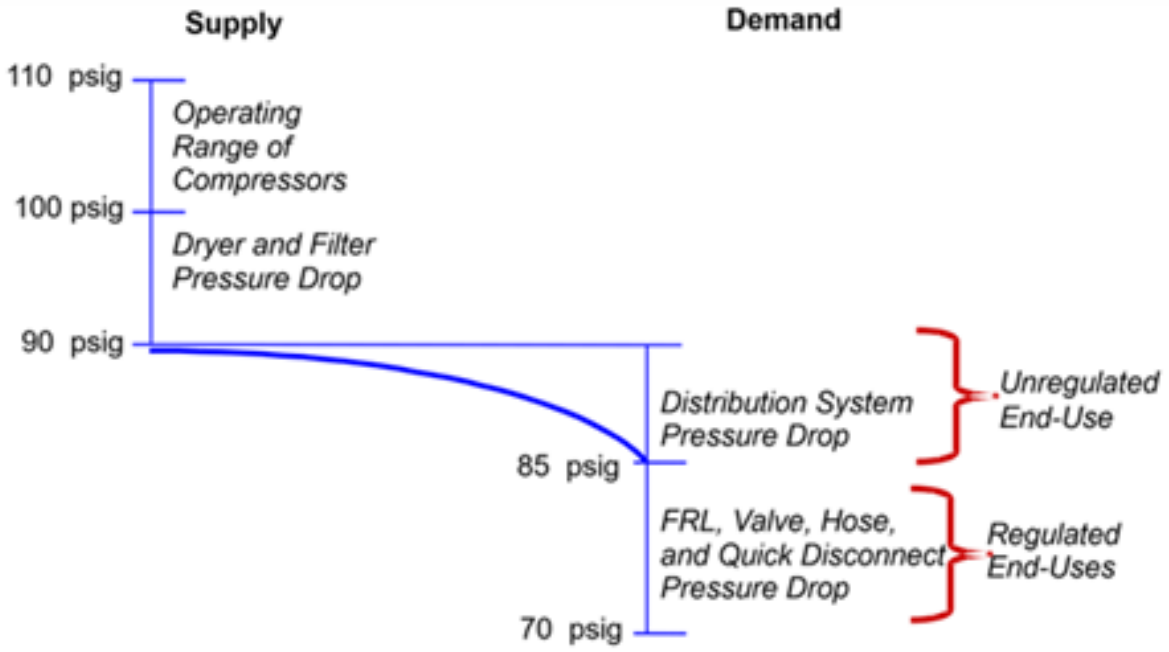
Should you consider permanent meters?



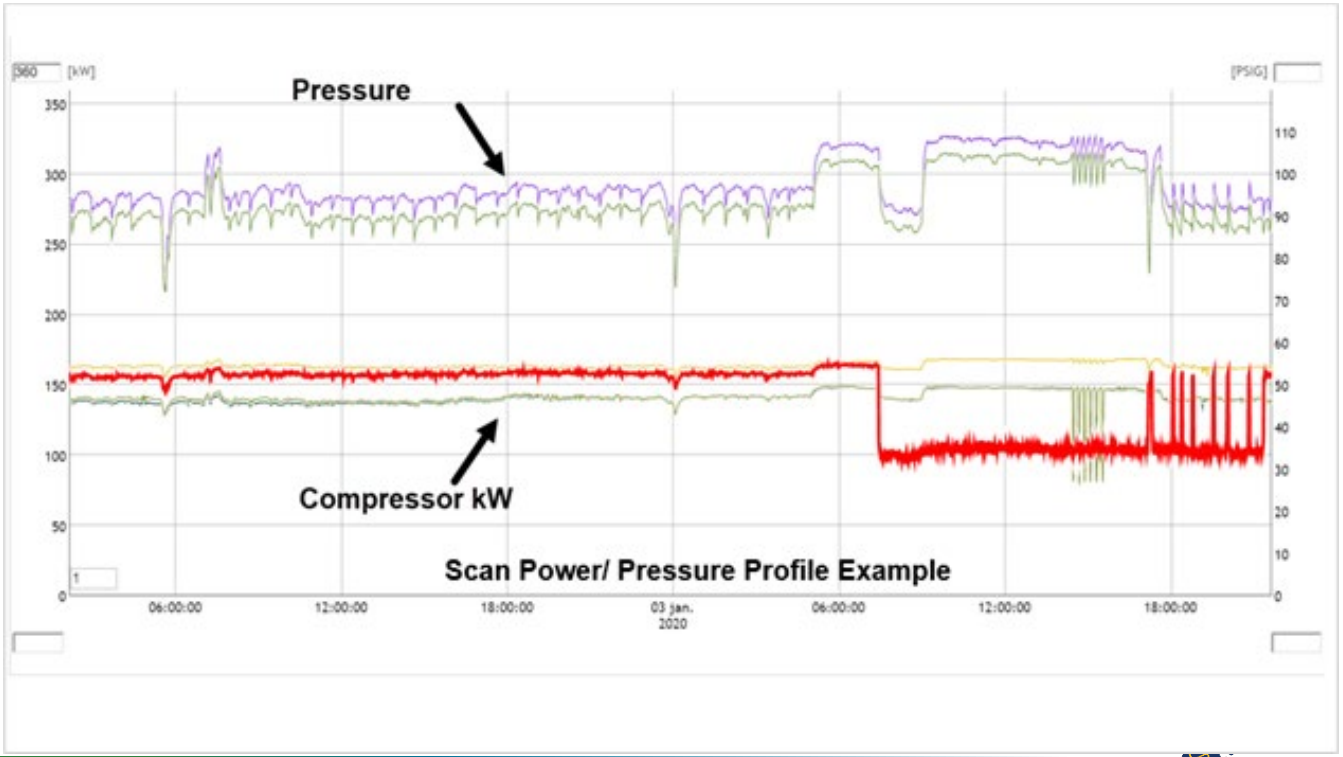
Example data chart: system pressure



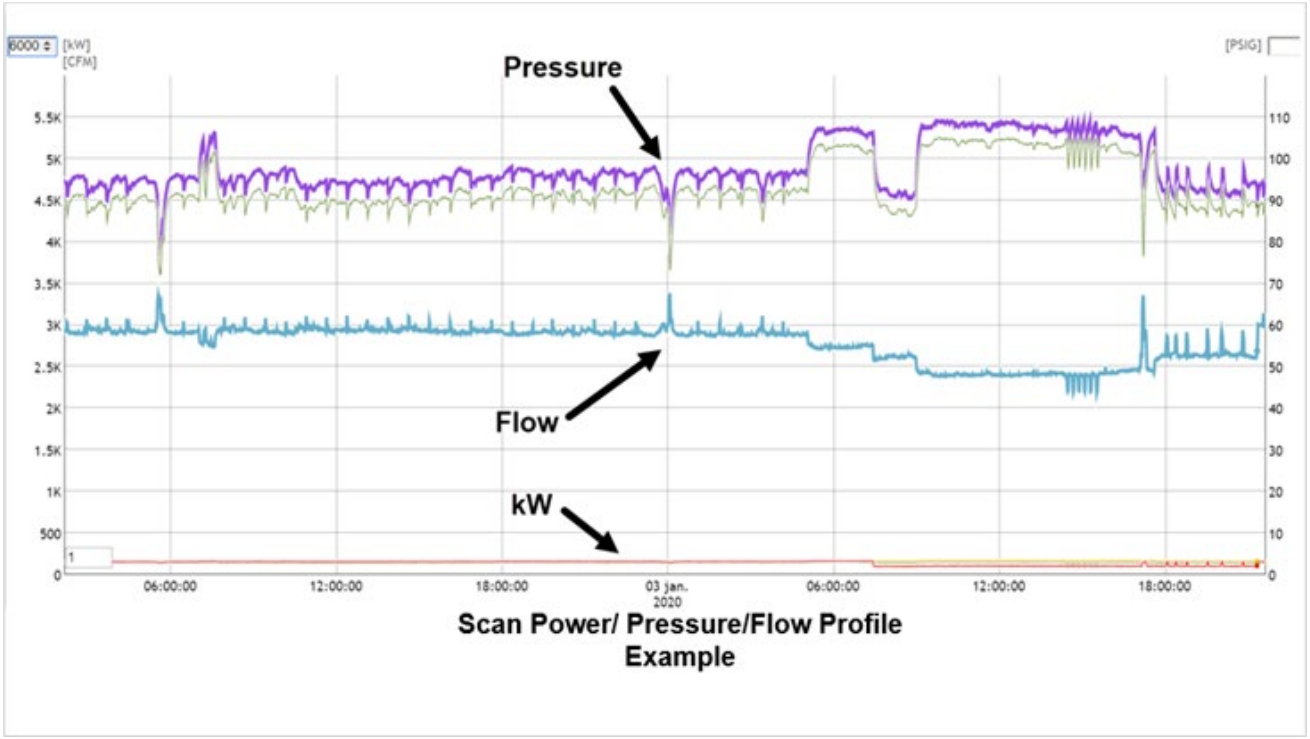
Example data chart: pressure drop



Example data chart: power



Example data chart: flow

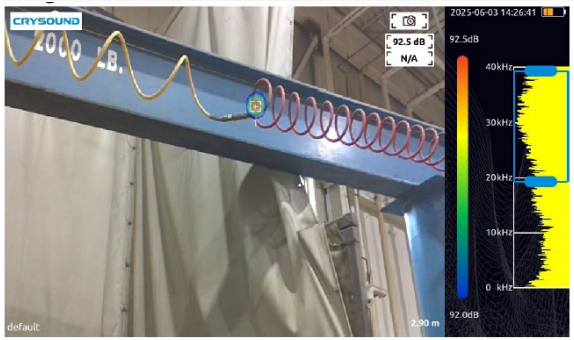


Example: leak survey

- 20-30% demand typically lost
- Ultrasonic detection or acoustic imaging
- Fast return on investment (ROI) if compressors controlled well
- Limited savings if poor control
- Should be done quarterly
- General leak levels can be seen on main flow meter

List of Repairs Remaining

Tag	Department	Workplace	Machine	Grade	Date of Repair	Est. Flow – m³/min	Est. Savings/yr
L0001	Boiler Room	Floor 1	Filter Drain	3	--	0.0646	$213
L0002	Boiler Room	Floor 1	Air Dryer	2	--	0.0233	$77
L0003	Boiler Room	Floor 1	Regulator By NW Door	1	--	0.0026	$9
L0004	Boiler Room	Floor 2	Expansion Tank	1	--	0.0026	$9
L0005	Boiler Room	Floor 2	Expansion Tank	1	--	0.0026	$9
L0006	Boiler Room	Floor 2	SW Corner N warehouse return valve	2	--	0.0233	$77
L0007	Cooker Room	Floor 1	Valve HV1136	3	--	0.0646	$213
L0008	Cooker Room	Floor 1	By HV1224	3	--	0.0646	$213
L0009	Cooker Room	Floor 1	Hot Cond Valve	2	--	0.0233	$77
L0010	Floor 10	Granary	Service Hose Drop	3	--	0.0646	$213
L0011	Floor 10	Granary	Chute 2	1	--	0.0026	$9
L0012	Floor 10	Granary	Chute 4	1	--	0.0026	$9
L0013	Floor 10	Granary	Chute 7	1	--	0.0026	$9
L0014	Floor 5	Granary	Filter 6	2	--	0.0233	$77
L0015	Floor 4	Yeast Room	Valve Hv 1275	3	--	0.0646	$213
L0016	Fermenting Room	Mezzanine	Fire System West End	4.02	--	0.1477	$486



When an audit is needed

- The plant may be expanding, sizing needed
- Low air pressure events need solving
- Air quality is poor
- Management wants to know the costs
- Management wants to know areas of improvement

Typical triggers

Operational issues

- Low-pressure issues
- Water/oil contamination
- Persistent downtimes

Energy savings

- High system hp
- High flow
- High kW/100 cfm

Capital planning

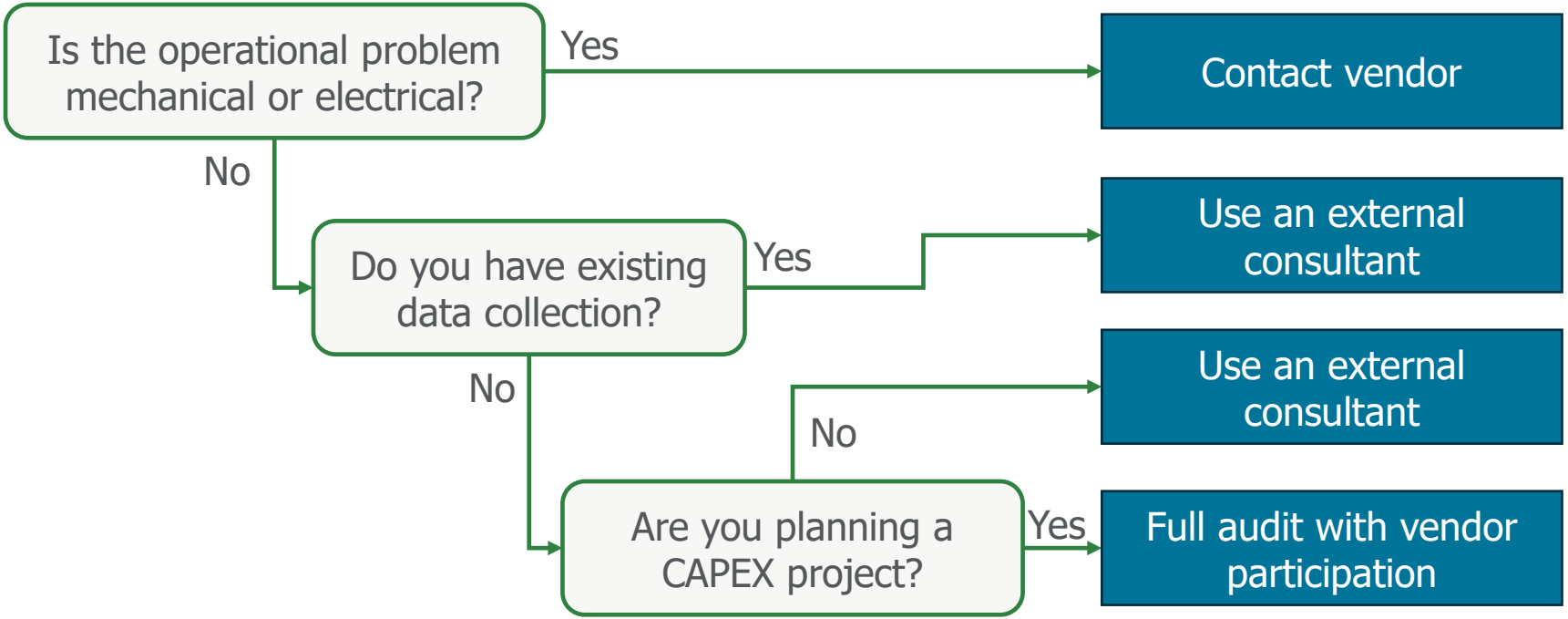
- Equipment nearing end of life
- Planned expansion
- Changing operational conditions

Proportionality principle

Level of study depends on system size and complexity:

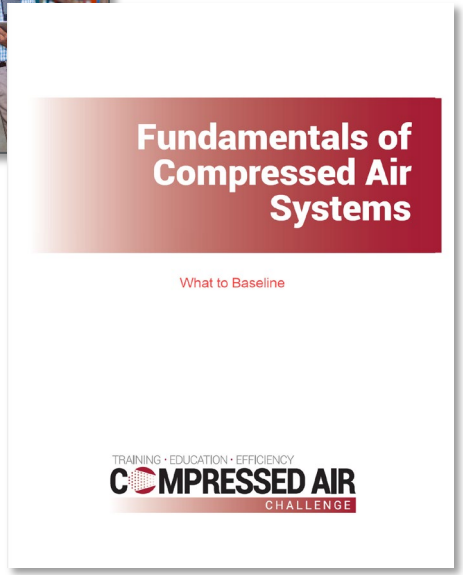
- **Small** = walkthrough may be adequate
- **Medium** = seven-day logging
- **Large** = full audit and permanent monitoring

Decision tree



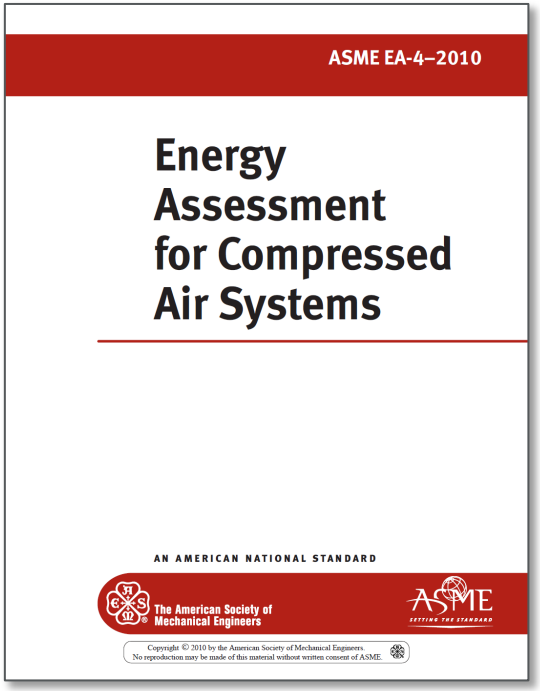
Awareness gaps

- Most systems run unmonitored, and operators do not know air system costs
- System KPIs are unknown
- Audits make waste visible
- Training increases awareness about issues and explains what to do about them
- Compressed Air Challenge training is available and qualifies for Save on Energy rebate



Compressed air audits

- The first step in optimizing any compressed air system is to conduct a thorough assessment.
- Measurements and data collection are required.
- No two compressed air systems are the same; however, there are always common elements.
- A good reference document is the ASME EA-4 "Energy Assessment for Compressed Air Systems" standard.



Compressed air audit needs

These things are needed:

- Sufficient resources and funding
- Full management support
- Good communication
- Access to all needed information
- Experienced personnel who know the plant
- Clear assessment goals
- Scope of work (SOW)

Internal resources needed

- Data loggers
- Permanent meters
- Trained and experienced staff - Compressed Air Challenge (CAC)
- By far, the easiest way to have a compressed air system measured is by bringing in a competent service company that already has a good set of measuring devices.
- Just make sure that company agrees to follow your measurement plan rather than just staying in the compressor room.

Example case study: gypsum board manufacturer

A gypsum board manufacturer was running with a compressed air system using two 100 hp screw compressors and two non-cycling refrigerated air dryers. The plant manager wanted to replace the failing air compressor but did not know what size to purchase.

Some of the initial problems experienced:

- Aging compressors with poor reliability
- Low-pressure problems at plant dust collectors
- Low pressure due to high flow transient events
- Water in the compressed air system in summer
- Frozen air lines in winter months

Example case study: gypsum board manufacturer (2)

Data analysis revealed the following:

- 4½ - 24-hour weekday shifts resulting in 5,280 hours per year
- Average flow 564 cfm, with 670 cfm peaks during main shifts
- Leakage 30 cfm
- Compressor average power 132 kW
- Dryer purge 180 cfm
- Compressor specific power calculated at 23.4 kW/100 cfm
- Including dryer, this totals 34.4 kW/100 cfm

	Hours	kW	kWh	$ Cost
Compressor	5280	132.0	696,960	$ 69,696
Dryers	5280	0.0	-	$ -
Total	5280	79.6	696,960	$ 69,696

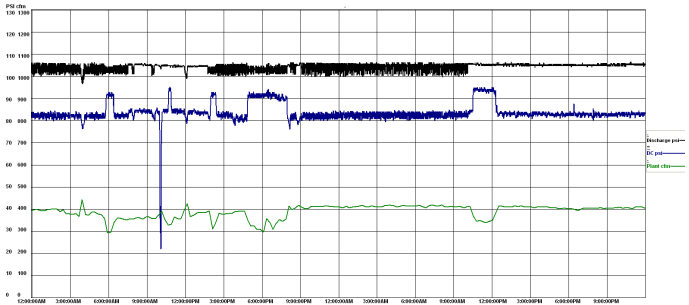
Other Costs	
Maintenance	$30,000
Lost Production	$ 5,000
Total	$35,000

Example case study: gypsum board manufacturer (3)

The consultant examined the plant pressure profile and found significant pressure loss in a short length of pipe. A butterfly valve was found partially closed with a broken handle that looked like it was open.

Supply-side improvement measures recommended:

- Replace one compressor with 150 hp two-stage VSD
- Configure second compressor for automatic start
- Install 2,000 gallons of main storage
- Replace dryer with externally-heated with dewpoint control
- Upsize filters to reduce pressure loss and pressure
- Install automatic mixing dampers on compressor to direct heat of compression into plant, displacing natural gas costs
- Install compressed air efficiency monitoring system



Example case study: gypsum board manufacturer (4)

Demand-side improvement measures recommended:

- Repair faulty butterfly valve
- Repair leaks
- Install receivers at dust collectors, reduce pulse frequency

Measure	$ Saved	% Saved
Control	$20,742	29.8%
Pressure (10 psi)	$2,152	3.1%
Leaks	$851	1.2%
Drains	$0	0.0%
Dryer Purge	$12,499	17.9%
End Uses	$0	0.0%
Filters	$502	0.7%
Dryer Heater	$997	-1.4%
Total	**$35,750**	**51%**

In addition to this some non-electrical savings were predicted:

Other Savings	
Maintenance	$15,000
Lost Production	$ 5,000
Gas Heating	$ 3,840
Total	$23,840

Example case study: gypsum board manufacturer (5)

The proposed project demonstrates a particularly good payback of 1.5 years. Again:

- Had the consultant simply focused on changing out the air compressor, the benefits to the customer would have been much lower.
- The problem with the closed valve was a significant find. The whole system approach was the primary factor in the success of this project.

Project Estimate	
Compressor	$ 64,700
Dryer	$ 30,000
Filter	$ 1,800
Filter	$ 1,800
Receiver	$ 5,000
Installation Mechanical	$ 9,000
Installation Electrical	$ 7,000
Efficiency Monitoring	$ 3,000
Installation Ventilation	$ 13,000
Total	**$ 135,300**

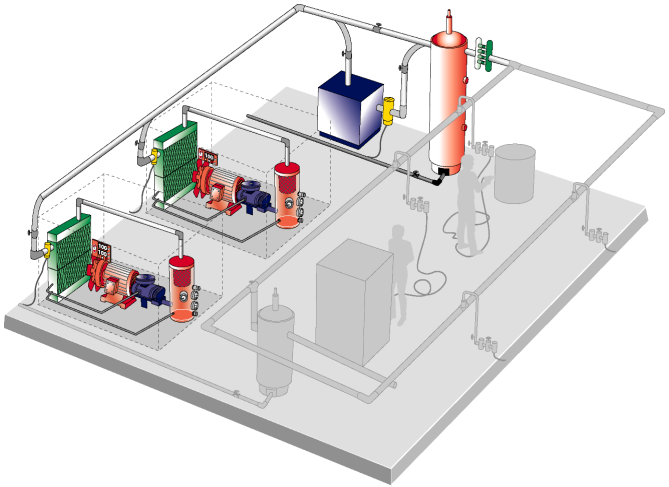
A summary of the project is as follows:

Total Project Benefits	
Electrical savings	$ 35,750
Other savings	$ 23,840
Total Benefits	$ 59,590

Project Cost	$ 135,300
Less Utility Incentive	$ 45,000
Total project cost	$ 90,300
Simple Payback (years)	1.5

Key considerations for audit scope

- **Facility size/goals** – determines audit type and duration
- **Data availability** – determines how much work is needed to capture a full set of profiles
- **Include supply + demand** – this is essential for a useful audit that captures all potential improvement measures



Scoping out your audit

Information to be gathered

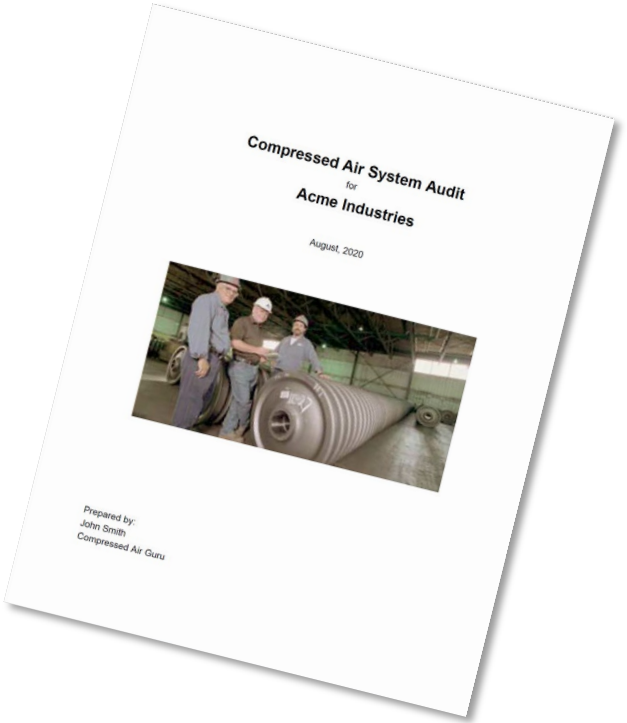
- Facility size
- Current equipment (specifications)
- Currently available data
- Purpose of audit

Scope to be defined

- Supply side versus demand side
- What needs to be measured
- How long to measure data
- Inclusion of raw data with report

Audit deliverables

- **Raw data** for review by others and to prove an initial baseline
- **KPIs**:
  - kW/100 cfm
  - kWh
  - leak %
- **Recommendations** for system improvements
- **Business case** ROI based on estimated savings



Choosing providers

Questions to ask and points to cover with potential service providers:

- How experienced are the staff providing assessment services?
- Ask for a sample of similar work, staff experience and client references
- While leak detection is useful to a system assessment, should the audit include more?
- Recommendations should be product-neutral
- Solutions should be recommended only if needed
- Solutions should be performance-based, not brand-based

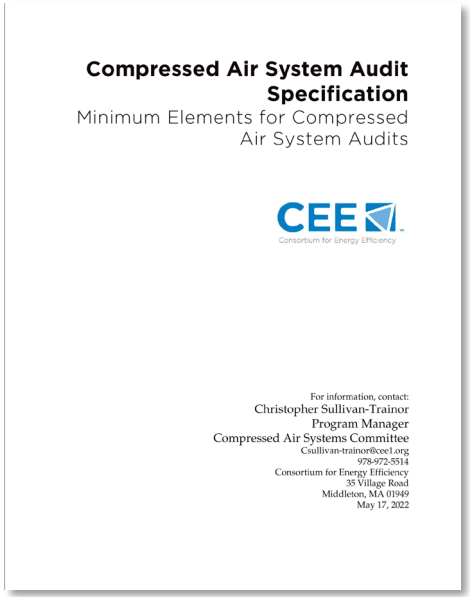
Assessing audit quotes

- Check if scope includes pressure, flow, power, Consortium for Energy Efficiency standard, etc.
- Ensure demand-side is included, not just compressor room
- Ask: Are assumptions realistic (hours, costs, leakage)?
- Are there any red flags that may suggest auditor bias?
- Look for demand assessment, including leaks and inappropriate uses
- Ensure measurement period matches plant characteristics
- Avoid vague scopes of work
- Ask for a detailed scope of work
- If you are the receiver of the quote, make sure you receive compressed air training beforehand so you understand what needs to be measured.

Check for minimum scope

As per the Consortium for Energy Efficiency, an audit should:

- Measure power, pressure and flow at minimum
- Include demand-side study
- Have seven-day minimum duration, more if the plant has highly variable demand
- Report should include raw data for assessment by others and to compare with baseline after a project



Compressed Air System Audit Specification

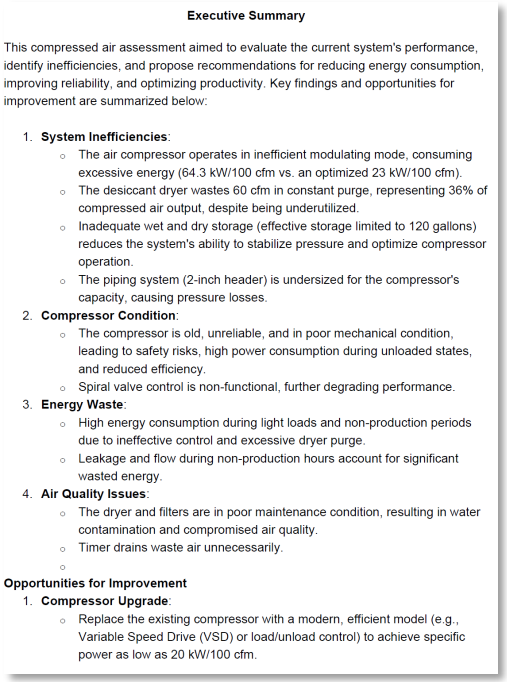
Minimum Elements for Compressed Air System Audits

CEE
Consortium for Energy Efficiency

For information, contact:
Christopher Sullivan-Trainor
Program Manager
Compressed Air Systems Committee
Csullivan-trainor@ceel.org
978-972-5514
Consortium for Energy Efficiency
35 Village Road
Middleton, MA 01949
May 17, 2022

Report to include

- Baseline profiles
- KPIs
- Document assumptions



Executive Summary

This compressed air assessment aimed to evaluate the current system's performance, identify inefficiencies, and propose recommendations for reducing energy consumption, improving reliability, and optimizing productivity. Key findings and opportunities for improvement are summarized below:

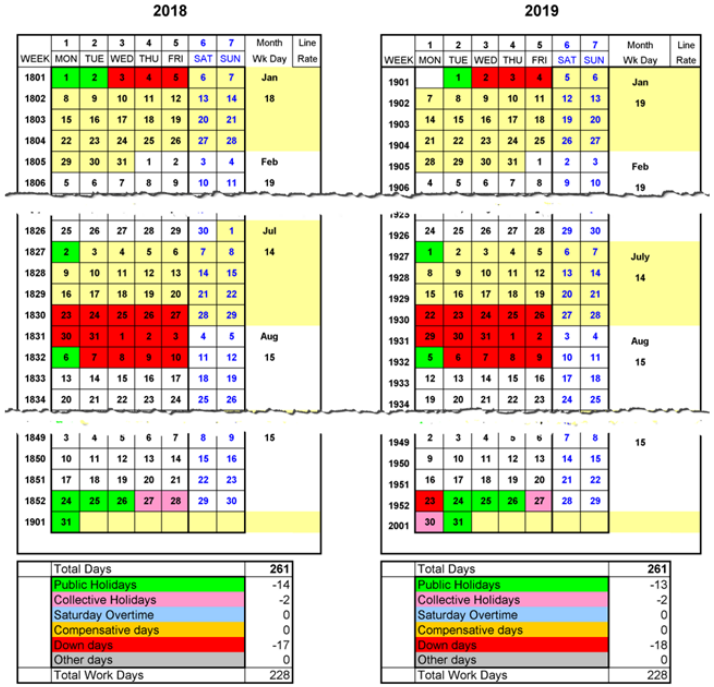
1. **System Inefficiencies**:
   - The air compressor operates in inefficient modulating mode, consuming excessive energy (64.3 kW/100 cfm vs. an optimized 23 kW/100 cfm).
   - The desiccant dryer wastes 60 cfm in constant purge, representing 36% of compressed air output, despite being underutilized.
   - Inadequate wet and dry storage (effective storage limited to 120 gallons) reduces the system's ability to stabilize pressure and optimize compressor operation.
   - The piping system (2-inch header) is undersized for the compressor's capacity, causing pressure losses.
2. **Compressor Condition**:
   - The compressor is old, unreliable, and in poor mechanical condition, leading to safety risks, high power consumption during unloaded states, and reduced efficiency.
   - Spiral valve control is non-functional, further degrading performance.
3. **Energy Waste**:
   - High energy consumption during light loads and non-production periods due to ineffective control and excessive dryer purge.
   - Leakage and flow during non-production hours account for significant wasted energy.
4. **Air Quality Issues**:
   - The dryer and filters are in poor maintenance condition, resulting in water contamination and compromised air quality.
   - Timer drains waste air unnecessarily.
   -

Opportunities for Improvement

1. **Compressor Upgrade**:
   - Replace the existing compressor with a modern, efficient model (e.g., Variable Speed Drive (VSD) or load/unload control) to achieve specific power as low as 20 kW/100 cfm.

Assumptions to question

- Operating hours
- Electricity rate
- Leakage % and estimated savings method (measured versus assumed)
- Baseline data quality



2018

WEEK	1 MON	2 TUE	3 WED	4 THU	5 FRI	6 SAT	7 SUN	Month Wk Day	Line Rate
1801	1	2	3	4	5	6	7	Jan	
1802	8	9	10	11	12	13	14	18	
1803	15	16	17	18	19	20	21		
1804	22	23	24	25	26	27	28		
1805	29	30	31	1	2	3	4	Feb	
1806	5	6	7	8	9	10	11	19	
1826	25	26	27	28	29	30	1	Jul	
1827	2	3	4	5	6	7	8	14	
1828	9	10	11	12	13	14	15		
1829	16	17	18	19	20	21	22		
1830	23	24	25	26	27	28	29		
1831	30	31	1	2	3	4	5	Aug	
1832	6	7	8	9	10	11	12	15	
1833	13	14	15	16	17	18	19		
1834	20	21	22	23	24	25	26		
1849	3	4	5	6	7	8	9	15	
1850	10	11	12	13	14	15	16		
1851	17	18	19	20	21	22	23		
1852	24	25	26	27	28	29	30		
1901	31								

Total Days	261
Public Holidays	-14
Collective Holidays	-2
Saturday Overtime	0
Compensative days	0
Down days	-17
Other days	0
Total Work Days	228

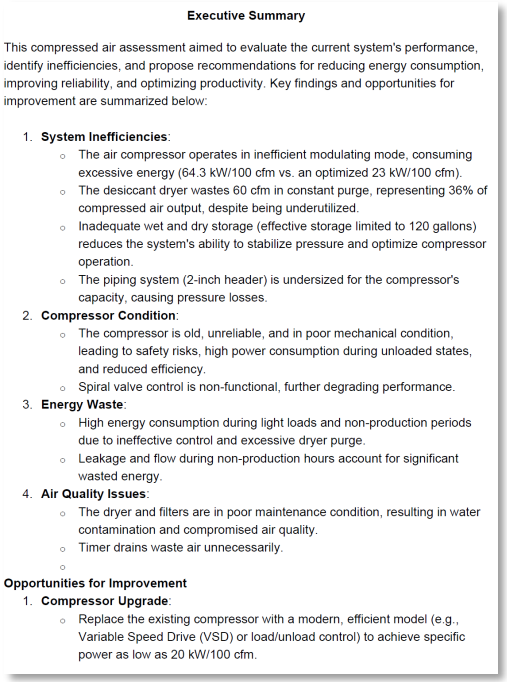
2019

WEEK	1 MON	2 TUE	3 WED	4 THU	5 FRI	6 SAT	7 SUN	Month Wk Day	Line Rate
1901		1	2	3	4	5	6	Jan	
1902	7	8	9	10	11	12	13	19	
1903	14	15	16	17	18	19	20		
1904	21	22	23	24	25	26	27		
1905	28	29	30	31	1	2	3	Feb	
1906	4	5	6	7	8	9	10	19	
1926	24	25	26	27	28	29	30		
1927	1	2	3	4	5	6	7	July	
1928	8	9	10	11	12	13	14	14	
1929	15	16	17	18	19	20	21		
1930	22	23	24	25	26	27	28		
1931	29	30	31	1	2	3	4	Aug	
1932	5	6	7	8	9	10	11	15	
1933	12	13	14	15	16	17	18		
1934	19	20	21	22	23	24	25		
1949	2	3	4	5	6	7	8	15	
1950	9	10	11	12	13	14	15		
1951	16	17	18	19	20	21	22		
1952	23	24	25	26	27	28	29		
2001	30	31							

Total Days	261
Public Holidays	-13
Collective Holidays	-2
Saturday Overtime	0
Compensative days	0
Down days	-18
Other days	0
Total Work Days	228

Report red flags

- Larger compressor recommended without demand reduction review
- Savings based on inflated rates or exaggerated run hours
- Leak savings do not account for compressor control type
- Generic reports or sales pitches



Executive Summary

This compressed air assessment aimed to evaluate the current system's performance, identify inefficiencies, and propose recommendations for reducing energy consumption, improving reliability, and optimizing productivity. Key findings and opportunities for improvement are summarized below:

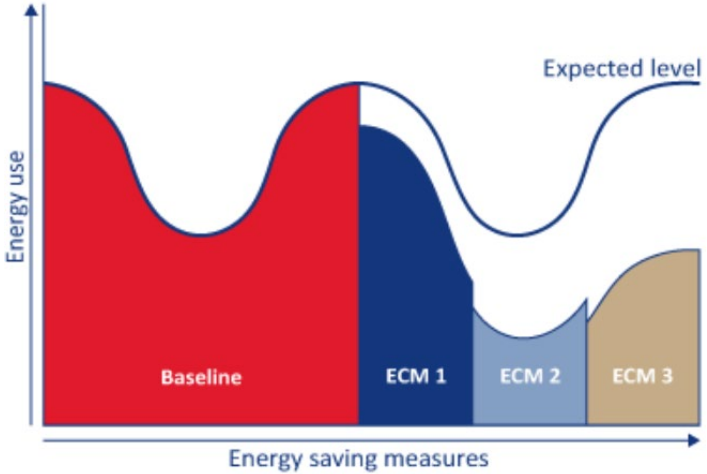
1. **System Inefficiencies**:
   - The air compressor operates in inefficient modulating mode, consuming excessive energy (64.3 kW/100 cfm vs. an optimized 23 kW/100 cfm).
   - The desiccant dryer wastes 60 cfm in constant purge, representing 36% of compressed air output, despite being underutilized.
   - Inadequate wet and dry storage (effective storage limited to 120 gallons) reduces the system's ability to stabilize pressure and optimize compressor operation.
   - The piping system (2-inch header) is undersized for the compressor's capacity, causing pressure losses.
2. **Compressor Condition**:
   - The compressor is old, unreliable, and in poor mechanical condition, leading to safety risks, high power consumption during unloaded states, and reduced efficiency.
   - Spiral valve control is non-functional, further degrading performance.
3. **Energy Waste**:
   - High energy consumption during light loads and non-production periods due to ineffective control and excessive dryer purge.
   - Leakage and flow during non-production hours account for significant wasted energy.
4. **Air Quality Issues**:
   - The dryer and filters are in poor maintenance condition, resulting in water contamination and compromised air quality.
   - Timer drains waste air unnecessarily.
   -

Opportunities for Improvement

1. **Compressor Upgrade**:
   - Replace the existing compressor with a modern, efficient model (e.g., Variable Speed Drive (VSD) or load/unload control) to achieve specific power as low as 20 kW/100 cfm.

Plan on verification to prove savings

- Savings must be measured
- Measurement and verification (M&V) ensures credibility and proves savings
- Avoid paper savings
- Use the same monitoring system as the original baseline, preferably permanent monitoring



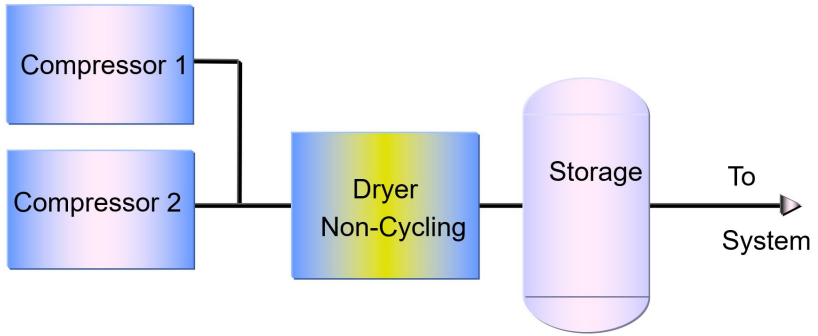
Case study example: tractor plant

Tractor plant:

- 2 x 200 hp compressors, 100 psi
- Load/unload control
- Two 2,000 cfm water-cooled non-cycling dryers

Problems experienced:

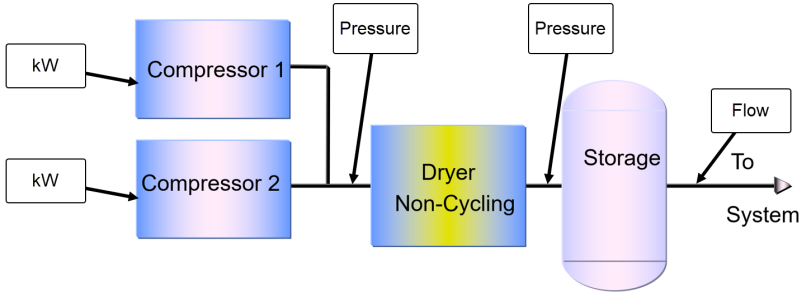
- Air system ran 24 hours per day, seven days per week, but production shift was only 8 hours x 5 days per week
- Unknown compressed air energy costs and flows



Case study example: tractor plant (2)

Monitoring with data loggers:

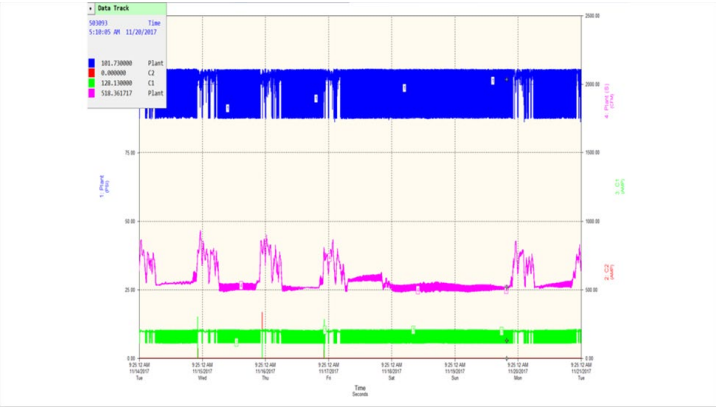
- Air pressure before and after the air dryer
- Air compressor power input to create a power profile
- Compressed air plant flow to create a flow profile
- No demand-side study requested



Case study example: tractor plant (3)

Data analysis demonstrated the following:

- Plant pressurized 24 hours x 7 days per week
- Production 10 hours, 5 days per week
- Average pressure 98 psi
- Average flow 540 cfm
- Non-production flow 510 cfm
- Compressor average power 148 kW
- Dryer average power 14 kW
- Compressor specific power: 27 kW/100 cfm
- Including dryer specific power: 30 kW/100 cfm



	Hours	kW	kWh	$ Cost
Compressor	8760	148	1,296,480	$ 31,974
Dryer	8760	14	122,640	$ 2,190
Total	8760	162	1,419120	$ 141,912

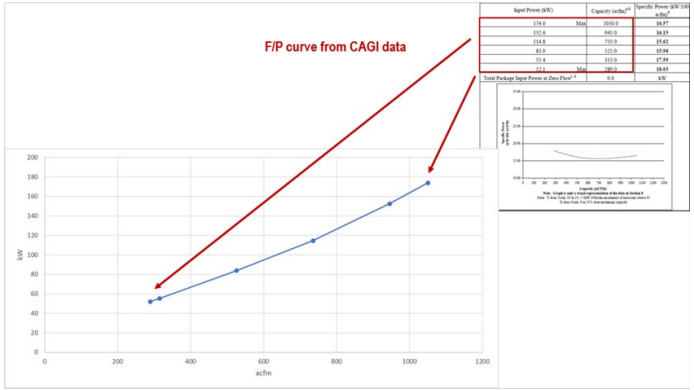
Case study example: tractor plant (4)

Customer wants:

- New two-stage VSD compressor
- Cycling dryer

Additional measures recommended by consultant:

- Reduce leaks
- Eliminate off-hour end uses
  - Air motors to mix paint found to be not needed
  - Office HVAC system pneumatics 2 cfm
- Turn off compressed air system 70 hours per week
- Right size the dryers



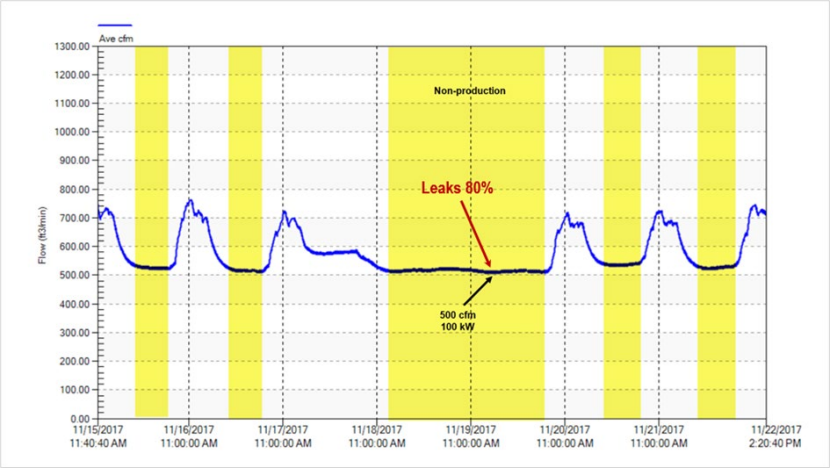
Case study example: tractor plant (5)

Leakage repair:

- Using 16 kW/100 cfm, 100 cfm reduction = 16 kW
- About 140,000 kWh in annual reduction expected
- $14,000 in reduced cost

Reduced run time:

- 52 kW at 510 cfm
- Estimated 70 hours per week
- 3,650 fewer hours operating
- 309,000 kWh for $30,900 in savings
- Small HVAC compressor added at $440 per year



Case study example: tractor plant (6)

Dryer savings:

- 1,200 cfm resize consumes 10.5 kW
- About 140,000 kWh reduction expected
- At 45% loading, 8.4 kW saved compared to previous large units
- 73,600 kWh and $7,360 savings

% Flow	Savings
100	0%
80	17%
60	34%
40	51%
20	68%
0	85%

Savings summary:

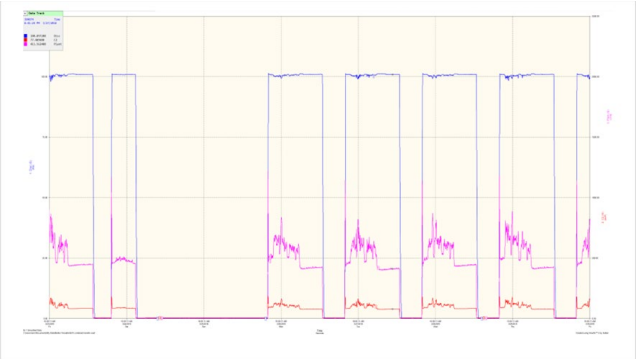
- Based on preliminary estimate, payback period should be less than one year
- Heat recovery $3,500 per year
- Reduced maintenance $2,500 per year
- Energy saved 309,000 kWh for $30,900
- Attractive savings approved by management

Measure	Saved kWh	Saved $	Cost $
New VSD Compressor	512,585	$ 51,259	$120,000
New Cycling Dryer	73,661	$ 7,366	$ 17,500
Reduced Hours	309,009	$ 30,901	$ 3,000
Reduced Leakage	84,826	$ 8,483	$ 2,000
Install costs			$ 30,000
Subtotal		$ 98,008	$172,500
Less Incentive			$ 88,000
Final Estimate		$ 98,008	$ 84,500

Case study example: tractor plant (7)

Verification logging:

- Demonstrated savings slightly less than expected
- Investigation revealed fewer leaks repaired than expected
- Leak repair still ongoing
- Turning off the system during off hours indirectly reduced leakage load by 40%



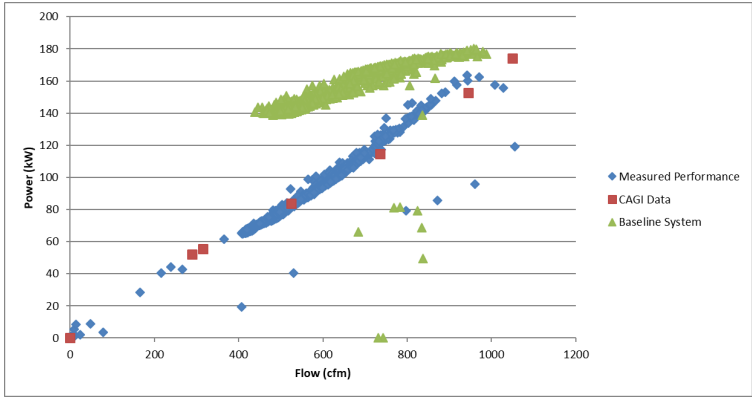
	Hours	kW	kWh	$ Cost
Compressor	5110	95	486,180	$ 48,618
Dryer	5110	6	30,660	$ 3,066
Total	5110	162	516,840	$ 51,684
Saved	3650	103	902,280	$ 90,228

Case study example: tractor plant (8)

Total savings:

- Additional benefits added to electrical savings
- Project payback less than one year
- System curve illustrates good savings from base case, compressor operation near expected

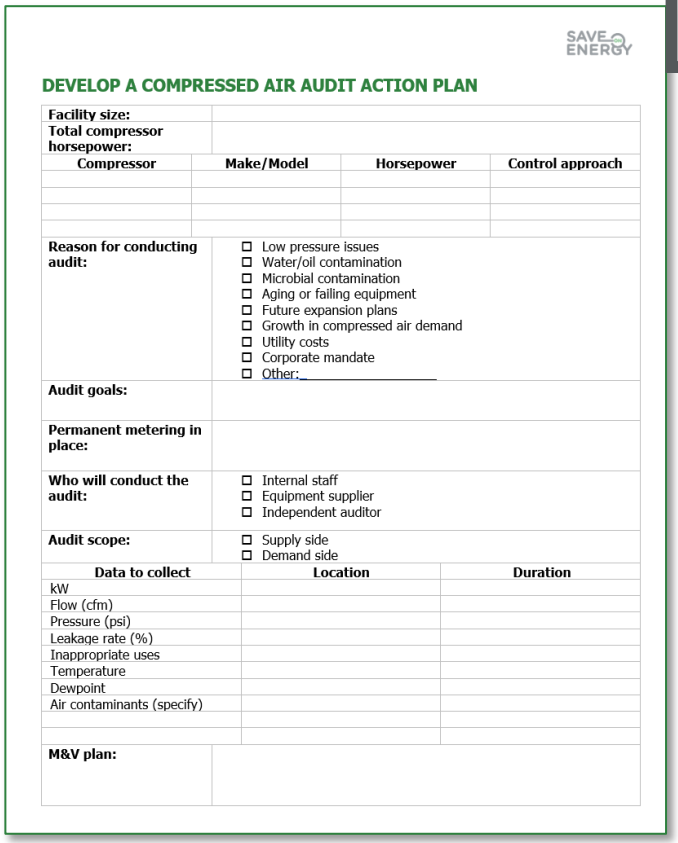
	Savings Annual	Install Cost
Electrical Savings	$ 90,280	$ 84,500
Heat Recovery	$ 3,500	$ -
Reduced Maintenance	$ 2,500	$ -
Total	$ 96,280	$ 84,500
Simple Payback	10.5	months



Developing your action plan

- Review action plan template on page 10 of the Participant Workbook
- Get started by filling it out to plan your audit

Ask Ron questions!



SAVE ON ENERGY

DEVELOP A COMPRESSED AIR AUDIT ACTION PLAN

Facility size:	
Total compressor horsepower:	

Compressor	Make/Model	Horsepower	Control approach

Reason for conducting audit:	☐ Low pressure issues ☐ Water/oil contamination ☐ Microbial contamination ☐ Aging or failing equipment ☐ Future expansion plans ☐ Growth in compressed air demand ☐ Utility costs ☐ Corporate mandate ☐ Other:_____
Audit goals:	
Permanent metering in place:	
Who will conduct the audit:	☐ Internal staff ☐ Equipment supplier ☐ Independent auditor
Audit scope:	☐ Supply side ☐ Demand side

Data to collect	Location	Duration
kW		
Flow (cfm)		
Pressure (psi)		
Leakage rate (%)		
Inappropriate uses		
Temperature		
Dewpoint		
Air contaminants (specify)		

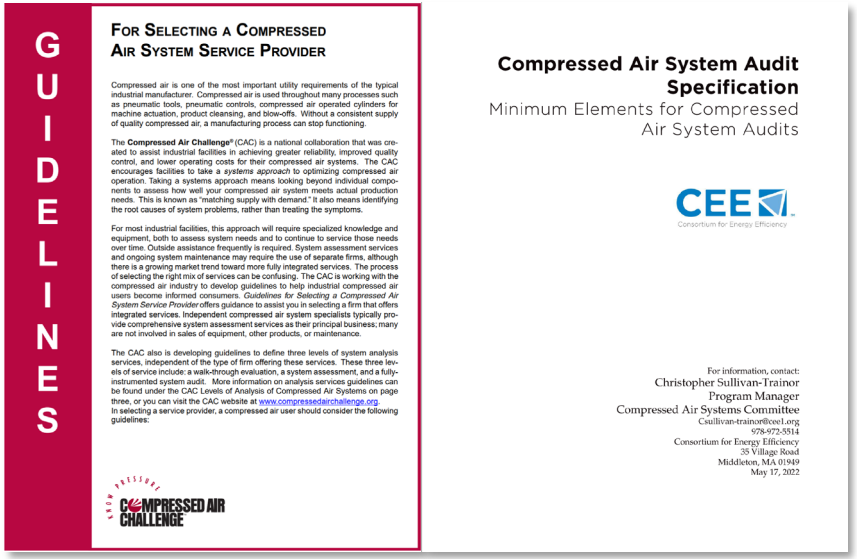
M&V plan:	

Call to action

- Compressed air is too costly to ignore
- Conducting study reveals hidden savings
- Savings can be electrically, reliability or productivity-related
- Take training to understand system issues
- Audit your system to find issues
- Take action to save operating costs and increase profits

Resources

- In Compressed Air Challenge Library
- Consortium for Energy Efficiency (CEE)



Upcoming training opportunity

Fundamentals of Compressed Air Systems – November 13

Organized by CIET

- Covers best practices for compressed air system optimization
- Qualifies for Save on Energy 50% rebate
- Great option for facilities planning deeper engagement after this workshop

Stay connected with tools and resources

- Virtual one-on-one coaching: post-webinar support intake form for tailored support for organizations to manage energy resources effectively
- Monthly bulletin: sign up to receive monthly training updates on all Save on Energy training and support new tools and resources
- Live training calendar: visit this page to easily register for upcoming events and workshops
- Training and support webpage: visit this page to access all training and support materials

A podcast by Save on Energy: The Energy Manager's Playbook

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- ❑ Features real-world stories from Ontario's energy management community
- ❑ Covers the industrial, institutional, commercial and municipal sectors
- ❑ Focused on challenges, successes and practical insights
- ❑ Bite-sized episodes for quick and impactful learning
- ❑ A resource for energy professionals and decision-makers

Questions or feedback?
trainingandsupport@ieso.ca

Tune in on your preferred platform:
saveonenergy.ca/training-and-support/podcast

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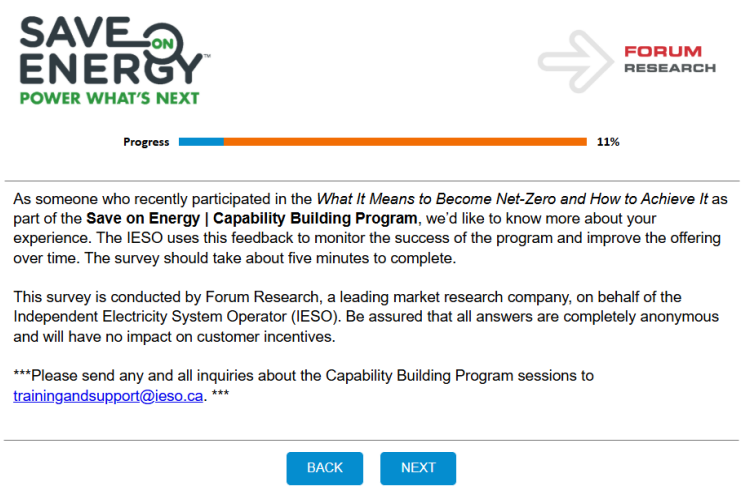
SAVE ON ENERGY POWER WHAT'S NEXT

Upcoming survey: we want your feedback!



- Check your email! A survey is coming your way soon.
- Why? Help us improve our training programs.
- Who? Conducted by Forum Research on behalf of the IESO.
- Time? Takes only five minutes to complete.
- Confidentiality: Your responses are anonymous and won't impact participation or incentives.

The survey will be sent from:
surveyinfo@forumresearch.com

One last question…

What is **one thing** you will do in the next week to plan your next compressed air audit?

Thank you!

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