	1
Brief Title of Activity:	**Reduce minimum condensing pressure**

Energy Efficiency Activity Description

Summary of activity performed	We determined that the compressors and refrigeration system are designed to operate as low as 90 psig. We reduced the minimum condensing pressure set point from 100 psig to 90 psig. The limiting factor is the compressor oil separator, which is designed to operate to a minimum of 90 psig condensing pressure at 0 psig suction pressure. The control system increases the condensing pressure set point during defrost, so defrost performance is not affected.
What was the baseline (existing) condition?	We originally had the minimum condensing pressure set point at 100 psig. The system operates at the minimum set point except during defrost (around 50% of annual hours) or when it is too hot outside to maintain the minimum set point (around 20% of annual hours, half of which are during defrost). As a result, the system operates at the minimum set point approximately 40% of annual hours.
What is the implemented condition?	We now have the minimum condensing pressure set to 90 psig if no zones are in defrost.
Did the activity directly save energy or support energy savings?	Saves energy. Reducing the condensing pressure reduces compressor energy 1.5% for every degree of reduction. It will likely increase the condenser fan energy use slightly as the condensers have to work harder to drive the condensing pressure down, but the compressor savings outweigh the increase.
Any recommendations you would have for peers regarding this activity?	Common barriers to minimum condensing pressure include defrost, hot gas heating, oil separator sizing, liquid injection oil cooling, direct expansion valve pressure requirements, etc.
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	89,172
Activity Savings as a % of Subsystem Energy Use	3.0%
Dollar Savings	$5,350
Measure Life	5

Attachments

1	Energy Savings Estimate Documentation
2	
3	
4	
5	

Suggested Attachments

1	Compressor manufacturer ratings showing compressors are designed to operate at the proposed conditions.
2	Control system screenshot showing enabled settings.
3	System set point documentation showing this feature is to be used as a SOP.
4	
5	

	2
Brief Title of Activity:	**Reduce defrost condensing pressure**

Energy Efficiency Activity Description

Summary of activity performed	We reduced the condensing pressure set point during defrost from 120 psig to 110 psig. We determined that the evaporators defrost effectively at the lower condensing pressure. See attachment 1 for details.
What was the baseline (existing) condition?	We originally had the condensing pressure set point during defrost at 120 psig and 90 psig if no zones are in defrost. Because there are many defrost zones, the system runs at the defrost pressure set point about 50% of the year.
What is the implemented condition?	We now have the condensing pressure set to 110 psig during defrost and 90 psig if no zones are in defrost.
Did the activity directly save energy or support energy savings?	Saves energy. Reducing the condensing pressure reduces compressor energy 1.5% for every degree of reduction. It will likely increase the condenser fan energy use slightly as the condensers have to work harder to drive the condensing pressure down, but the compressor savings outweigh the increase.
Any recommendations you would have for peers regarding this activity?	Approach defrost changes gradually and check evaporators daily for signs of ice buildup.
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	98,601
Activity Savings as a % of Subsystem Energy Use	3.3%
Dollar Savings	$5,916
Measure Life	5

Attachments

1	Activity Detail Description
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
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	3
Brief Title of Activity:	**Enable "WB approach" floating condensing pressure control**

Energy Efficiency Activity Description

Summary of activity performed	We enabled the "Wet Bulb Approach" floating condensing pressure control to ensure the optimal condensing pressure set point is used throughout the range of outdoor wet bulb temperatures observed. Set to **12°F** approach to wet bulb.
What was the baseline (existing) condition?	We originally had the minimum condensing pressure set to a fixed 90 psig set point. We had the WB approach control feature available but were not using it.
What is the implemented condition?	We enabled the "Wet Bulb Approach" floating condensing pressure control and set to 12°F approach to wet bulb.
Did the activity directly save energy or support energy savings?	Saves energy. Using the lowest possible condensing pressure set point saves energy most of the time, but when it is hot enough outside that the wet bulb temperature gets close to the condensing temperature set point, the condensers can't keep up and the VFD fans ramp up in speed dramatically. Allowing the condensing pressure to float to 12°F above the wet bulb temperature uses a little more compressor energy, but allows the condenser fans to slow down significantly, taking advantage of big VFD "cubic law" fan savings.
Any recommendations you would have for peers regarding this activity?	We simply checked a box on the control system to enable a feature we hadn't been using. This is no-cost, easy way to achieve significant annual energy savings.
Other Benefits (non-energy)	Gaining familiarity and a better understanding of our refrigeration control system.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Condensers
Baseline Energy Use of Subsystem Impacted	622,902
Activity Energy Savings	48,708
Activity Savings as a % of Subsystem Energy Use	7.8%
Dollar Savings	$2,922
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
5	

	4
Brief Title of Activity:	**Night and weekend suction pressure set back**

Energy Efficiency Activity Description

Summary of activity performed	We increased the suction pressure set point when the freeze tunnels are not running on weekends and during the daily four hour cleanup shift. During this time the coldest load on the system is the -15°F cold storage freezer which can run at a higher suction pressure.
What was the baseline (existing) condition?	Originally, we had the low stage suction pressure set at 4 inHg (-33°F) all of the time.
What is the implemented condition?	We increased the suction pressure to 0 psig (-28°F) when the freeze tunnels are not in operation, 4 hours each week day and all weekend.
Did the activity directly save energy or support energy savings?	Saves energy. Increasing the suction pressure reduces compressor energy 2% for every degree.
Any recommendations you would have for peers regarding this activity?	
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	124,932
Activity Savings as a % of Subsystem Energy Use	4.2%
Dollar Savings	$7,496
Measure Life	5

Attachments

1	Energy Savings Estimate Documentation
2	
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
5	

	5
Brief Title of Activity:	**Evaporator VFD min/max speed settings**

Energy Efficiency Activity Description

Summary of activity performed	We reduced the evaporator fan VFD minimum and maximum speed set points. We determined that evaporators can operate as low as 40% speed without affecting product temperatures or causing motor issues.
What was the baseline (existing) condition?	Originally, we had the evaporator maximum VFD speed set to 100% and minimum VFD speed set to 70%.
What is the implemented condition?	We set the evaporator maximum VFD speed to 90% and set the minimum VFD speed to 40%.
Did the activity directly save energy or support energy savings?	Saves energy. Keeping evaporators at lower speeds takes advantage of "cubic law" fan energy savings. Evaporators use about 75% power at 90% speed, 38% power at 70% speed and only 8% power at 40% speed.
Any recommendations you would have for peers regarding this activity?	Make sure evaporator fan motors are compatible with minimum fan speed settings. 40% is a typical minimum for evaporator fans, but your electrical contractor should be consulted to determine the appropriate setting for your equipment.
Other Benefits (non-energy)	Reduced fan speed reduces product moisture loss, increasing profits. Evaporator fans are a little quieter at 90% speed, improving the work environment for the workers.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Evaporators
Baseline Energy Use of Subsystem Impacted	783,797
Activity Energy Savings	24,829
Activity Savings as a % of Subsystem Energy Use	3.2%
Dollar Savings	$1,490
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
5	

	6
Brief Title of Activity:	**Evaporator VFD "grouped" fan control**

Energy Efficiency Activity Description

Summary of activity performed	We enabled the evaporator "grouped" fan control to control all the evaporators in each cold storage space to the same speed.
What was the baseline (existing) condition?	Each evaporator controls speed according to its local temperature probe. We had the grouped fan control feature available but were not using it.
What is the implemented condition?	Grouped fan control now averages all the room temperature probes in each cold storage space and controls all evaporators to the same speed to meet the set point for the space.
Did the activity directly save energy or support energy savings?	Saves energy. Using the lowest average fan speed possible takes advantage of VFD "cubic law" fan savings. For example, running evaporator "A" at 100% speed and evaporator "B" at 0% speed would result in an average power for the two of 50%. Alternatively if both evaporators are run together at 50% speed, the average power is only 16% thanks to VFD "cubic laws".
Any recommendations you would have for peers regarding this activity?	We simply checked a box on the control system to enable a feature we hadn't been using. This is no-cost, easy way to achieve significant annual energy savings.
Other Benefits (non-energy)	Gaining familiarity and a better understanding of our refrigeration control system.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Evaporators
Baseline Energy Use of Subsystem Impacted	783,797
Activity Energy Savings	22,774
Activity Savings as a % of Subsystem Energy Use	2.9%
Dollar Savings	$1,366
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
5	

	7
Brief Title of Activity:	**Evaporator fan cycling**

Energy Efficiency Activity Description

Summary of activity performed	We enabled fan cycling for the non-VFD evaporators so that the evaporator fans turn off with the liquid solenoid when the space temperature is satisfied. This way the fans only run when the evaporator is actually cooling.
What was the baseline (existing) condition?	The non-VFD evaporator fans used to run at full speed all of the time except during defrost.
What is the implemented condition?	Evaporator fans now cycle off when space temperature is satisfied. There is a 5 minute stir cycle every 30 minutes.
Did the activity directly save energy or support energy savings?	Saves energy. When the evaporators aren't cooling the fans don't need to be on. The reduced fan heat also reduces the refrigeration load.
Any recommendations you would have for peers regarding this activity?	
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Evaporators
Baseline Energy Use of Subsystem Impacted	783,797
Activity Energy Savings	82,080
Activity Savings as a % of Subsystem Energy Use	10.5%
Dollar Savings	$4,925
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
5	

	8
Brief Title of Activity:	**Condenser staging**

Energy Efficiency Activity Description

Summary of activity performed	We revised the condenser staging to run pumps and fans together whenever possible, run the most efficient condensers first, and run all online condenser fans at the same speed.
What was the baseline (existing) condition?	All condenser pumps used to run all the time. Condenser fans ramped up in speed individually as loads increased.
What is the implemented condition?	We now only run the condenser pumps and fan together. All online condenser fans run at the same fan speed. Once condenser fan speed reaches 80%, another condenser is started.
Did the activity directly save energy or support energy savings?	Saves energy. Running the condenser pump without the fan can cut the efficiency by more than 50%. Also, just 1/16" of scale can reduce condenser capacity by 50%, so running our most scaled condensers last saves a lot of energy. Using the lowest average fan speed possible takes advantage of VFD "cubic law" fan savings. For example, running condenser fan "A" at 100% speed and condenser fan "B" at 0% speed would result in an average power for the two of 50%. Alternatively if both evaporators are run together at 50% speed, the average power is only 16% thanks to VFD "cubic laws".
Any recommendations you would have for peers regarding this activity?	We simply checked a box on the control system to enable a feature we hadn't been using. This is no-cost, easy way to achieve significant annual energy savings.
Other Benefits (non-energy)	Gaining familiarity and a better understanding of our refrigeration control system.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Condensers
Baseline Energy Use of Subsystem Impacted	622,902
Activity Energy Savings	31,145
Activity Savings as a % of Subsystem Energy Use	5.0%
Dollar Savings	$1,869
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
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	9
Brief Title of Activity:	**Run-time defrost**

Energy Efficiency Activity Description

Summary of activity performed	We enabled the "liquid run-time" defrost control so it only initiates a defrost after 10 hours of accumulated liquid run time. This means that if an evaporator doesn't do any cooling that would result in frost buildup, it won't get put through a defrost.
What was the baseline (existing) condition?	Originally, all evaporators defrosted on time clocks twice a day for forty minutes of hot gas.
What is the implemented condition?	We enabled "liquid run-time" defrost control to only initiate a defrost after 10 hours of accumulated refrigerant liquid run time.
Did the activity directly save energy or support energy savings?	Saves energy by reducing unnecessary defrost load on the refrigeration system. It is estimated that defrost heat makes up at least 5% of the refrigeration load and that the evaporators defrost around 30% less since the change.
Any recommendations you would have for peers regarding this activity?	Approach defrost changes gradually and check evaporators daily for signs of ice buildup.
Other Benefits (non-energy)	Gaining familiarity and a better understanding of our refrigeration control system.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	44,727
Activity Savings as a % of Subsystem Energy Use	1.5%
Dollar Savings	$2,684
Measure Life	5

Attachments

1	Worksheet - "Use Your Control System Features"
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Control system screenshot showing enabled settings.
2	System set point documentation showing this feature is to be used as a SOP.
3	
4	
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	10
Brief Title of Activity:	**Regular condenser and non-condensable check**

Energy Efficiency Activity Description

Summary of activity performed	We adopted a written procedure for checking condenser energy performance and incorporated it into scheduled maintenance so we perform the process twice annually. Includes checking for non-condensable gases in condenser and completing a checklist for other condenser performance issues. On our first check we found 10 psi of non-condensable gases in the condenser and were able to fix the auto-purger to eliminate these non-condensables.
What was the baseline (existing) condition?	Originally, we didn't inspect the condensers for energy performance. When we did, we found that the auto purger was not working and 10 psi of non-condensables had built up in the condensers.
What is the implemented condition?	We have scheduled a condenser check for every March and September. An automatic work order will be generated alerting maintenance personal to perform the procedure. This time around, we fixed the auto purger to allow for automatic purging of non-condensables.
Did the activity directly save energy or support energy savings?	This supports energy savings on an ongoing basis, but on our first check we did find 10 psi of non-condensable gases in the condenser. We found out the auto-purger wasn't working properly, and after addressing the issues we were able to purge the non-condensables, which is equivalent to the energy savings from lowering the head pressure by 10 psi all year round. In the future the check will help to make sure the condensers are running efficiently. Properly performing condensers are important for the whole system to operate efficiently, specifically reducing condenser fan and pump energy and reducing condensing pressure to save compressor energy.
Any recommendations you would have for peers regarding this activity?	Incorporate check into scheduled maintenance program to make sure it doesn't get overlooked. It is important to have a written procedure that details what is to be checked.
Other Benefits (non-energy)	Increased condenser reliability. Also lower summer condensing pressures prevent compressor shut downs from high amps that sometimes cause production stoppages.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Compressors and condensers
Baseline Energy Use of Subsystem Impacted	3,604,721
Activity Energy Savings	222,930
Activity Savings as a % of Subsystem Energy Use	6.2%
Dollar Savings	$13,376
Measure Life	5

Attachments

1	Procedure - Condenser Check
2	Procedure - Non-condensable Check
3	Energy Savings Estimate Documentation
4	
5	

Suggested Attachments

1	Scheduled maintenance program work order and schedule.
2	
3	
4	
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	11
Brief Title of Activity:	**Regular compressor check**

Energy Efficiency Activity Description

Summary of activity performed	We adopted a written procedure for checking compressor energy performance and incorporated this into scheduled maintenance so the process is performed twice annually. The procedure includes checking set points, calibrating pressure transducers, slide valve calibration, volume ratio, current limiting calibration, checking oil cooling settings and checking economizer operation. On our first check we found that we were using the wrong volume index (Vi) setting for compressor #1, and we adjusted the Vi to the proper setting.
What was the baseline (existing) condition?	Originally, we didn't check the compressors for energy performance. We had set the compressor #1 Vi to a low compression ratio setting, but the compressor actually operates in a high compression ratio at the current suction and discharge pressures.
What is the implemented condition?	We have scheduled a condenser check for every March and September. An automatic work order will be generated alerting maintenance personal to perform the procedure. This time around, we revised compressor #1 Vi to the high compression ratio setting.
Did the activity directly save energy or support energy savings?	This supports energy savings on an ongoing basis, but on our first check we found the compressors were using the wrong Vi setting. A simple set point change on the compressor microprocessor control panels fixed this and helps the compressors run more efficiently. Typical compressor #1 amps were reduced from 250 to 240, a savings of about 4%. Properly performing compressors are important for the whole system to operate efficiently.
Any recommendations you would have for peers regarding this activity?	Incorporate check into scheduled maintenance program to make sure it doesn't get overlooked. It is important to have a written procedure that details what is to be checked.
Other Benefits (non-energy)	Increased compressor reliability. Also using the correct, calibrated current limiting settings prevent compressor shut downs from high amps that sometimes cause production stoppages.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	50,909
Activity Savings as a % of Subsystem Energy Use	1.7%
Dollar Savings	$3,055
Measure Life	5

Attachments

1	Procedure - Compressor Check
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Scheduled maintenance program work order and schedule.
2	
3	
4	
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	12
Brief Title of Activity:	**Defrost management**

Energy Efficiency Activity Description

Summary of activity performed	We adopted a written procedure for checking evaporator defrost performance and incorporated this into scheduled maintenance so the process is performed twice annually. The procedure includes observing each evaporator as it goes through a defrost to ensure we are using proper set points and checking for common valve malfunctions. On our first check we found that we needed to increase the pump out phase from 5 minutes to 15 minutes and we could reduce the hot gas phase from 40 minutes to 20 minutes. All of the frost was clear after 15 minutes of hot gas, and after that we were just adding heat to the space.
What was the baseline (existing) condition?	We were not inspecting the evaporators for energy performance.
What is the implemented condition?	We have scheduled a defrost check for every March and September. An automatic work order will be generated alerting maintenance personal to perform the procedure. This time around, the pump out phase was increased from 5 minutes to 15 minutes and hot gas phase was reduced from 40 minutes to 20 minutes.
Did the activity directly save energy or support energy savings?	This supports energy savings on an ongoing basis, but on our first check we found that the pump out phase needed to be extended and the hot gas phase could be cut in half. This will reduce the defrost load on the refrigeration system by half. Properly performing evaporators and defrost are important for the whole system to operate efficiently.
Any recommendations you would have for peers regarding this activity?	It is important to adjust evaporator settings seasonally for seasonal variations in humidity and operating conditions, so spring and fall are the best time to check them. Incorporate check into scheduled maintenance program to make sure it doesn't get overlooked. It is important to have a written procedure that details what is to be checked.
Other Benefits (non-energy)	Increased evaporator reliability. Addressing root problems like a failed solenoid valve really helps to manage frost problems better than just increasing hot gas time or pressure.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration system
Baseline Energy Use of Subsystem Impacted	4,388,517
Activity Energy Savings	149,091
Activity Savings as a % of Subsystem Energy Use	3.4%
Dollar Savings	$8,945
Measure Life	5

Attachments

1	Procedure - Defrost Check
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Scheduled maintenance program work order and schedule.
2	
3	
4	
5	

	13
Brief Title of Activity:	**Evaporator liquid hand expansion valve tuning**

Energy Efficiency Activity Description

Summary of activity performed	We adopted a written procedure for checking evaporator liquid hand expansion (LHX) valve settings and incorporated the procedure into scheduled maintenance to make sure we perform the process annually. The procedure includes observing evaporator air delta T and ensuring that LHX settings optimize evaporator cooling performance. The goal is to make sure evaporators are getting the correct liquid flow in order to maximize their cooling. On our first check we found an evaporator that had a failed liquid solenoid valve that was not cooling at all. By fixing the evaporator we increased the available cooling capacity and allowed the evaporators to run at a lower fan speed.
What was the baseline (existing) condition?	We were not inspecting the evaporators for energy performance.
What is the implemented condition?	We have scheduled a LHX check for every March. An automatic work order will be generated alerting maintenance personal to perform the procedure. This time around, we fixed a failed evaporator liquid solenoid that was starving the evaporator of liquid.
Did the activity directly save energy or support energy savings?	This supports energy savings on an ongoing basis, but on our first check we found a failed liquid solenoid valve that was starving an evaporator of liquid. Fixing the evaporator increased the available cooling capacity and allowed the evaporators to run at a lower fan speed. Properly performing evaporators are important for the whole system to operate efficiently. If the evaporator is getting too much or too little liquid it can significantly affect it's cooling performance.
Any recommendations you would have for peers regarding this activity?	Incorporate check into scheduled maintenance program to make sure it doesn't get overlooked. It is important to have a written procedure that details what is to be checked.
Other Benefits (non-energy)	Improved evaporator cooling performance is good for production and meeting temperature requirements.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Evaporators
Baseline Energy Use of Subsystem Impacted	783,797
Activity Energy Savings	60,258
Activity Savings as a % of Subsystem Energy Use	7.7%
Dollar Savings	$3,615
Measure Life	5

Attachments

1	Procedure - Evaporator LHX Valve Tuning
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Scheduled maintenance program work order and schedule.
2	
3	
4	
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	14
Brief Title of Activity:	**Test for water in ammonia charge**

Energy Efficiency Activity Description

Summary of activity performed	We adopted a written procedure for checking ammonia charge for water and incorporated this procedure into scheduled maintenance so to make sure we perform the process at least annually. On our first check we found 10% water present, which is about a 7% compressor power penalty. We rented equipment to remove the water from the system.
What was the baseline (existing) condition?	We were not testing for water in the ammonia. Our first check found 10% water present.
What is the implemented condition?	We have schedule a water test for every March. An automatic work order will be generated alerting maintenance personal to perform the procedure. We rented equipment to remove the water from the system that was found this time around.
Did the activity directly save energy or support energy savings?	This supports energy savings on an ongoing basis, but on our first check we found 10% water in our system. Addressing this results in about a 7% compressor power savings.
Any recommendations you would have for peers regarding this activity?	We have incorporated a check into our scheduled maintenance program to make sure this check doesn't get overlooked. It is important to have a written procedure that details what is to be checked.
Other Benefits (non-energy)	Improved evaporator cooling performance is good for production and meeting temperature requirements.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration compressors
Baseline Energy Use of Subsystem Impacted	2,981,818
Activity Energy Savings	208,727
Activity Savings as a % of Subsystem Energy Use	7.0%
Dollar Savings	$12,524
Measure Life	5

Attachments

1	Procedure - Measuring Water in Ammonia
2	Energy Savings Estimate Documentation
3	
4	
5	

Suggested Attachments

1	Scheduled maintenance program work order and schedule.
2	
3	
4	
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	15
Brief Title of Activity:	**Switch to non-clogging condenser nozzles**

Energy Efficiency Activity Description

Summary of activity performed	We switched our condenser nozzles to the new "non-clogging" style. The new nozzle kit only cost a few thousand dollars and we were able to install them in-house.
What was the baseline (existing) condition?	We found that around 30% of condenser nozzles were clogged. The condensers were not getting their full water flow and portions of the tube bundle were fully dry.
What is the implemented condition?	With the new non-clogging nozzles, condensers are getting their full water flow.
Did the activity directly save energy or support energy savings?	Achieves energy savings. To achieve the same condensing pressure, the condenser fans were estimated to work 15% harder to compensate for having 30% less water flow.
Any recommendations you would have for peers regarding this activity?	This was a cheap fix that increases our condenser capacity, improves efficiency and reduces the maintenance of nozzle cleaning. No brainer!
Other Benefits (non-energy)	We have reduced the time we spend on condenser maintenance because we don't have to clean out the condenser nozzles every few months. This maintenance cost savings more than paid for the cost of the new nozzles.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Condensers
Baseline Energy Use of Subsystem Impacted	622,902
Activity Energy Savings	59,271
Activity Savings as a % of Subsystem Energy Use	9.5%
Dollar Savings	$3,556
Measure Life	5

Attachments

1	Energy Savings Estimate Documentation
2	
3	
4	
5	

Suggested Attachments

1	Pictures of condenser spray flow before and after nozzle replacement.
2	
3	
4	
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	16
Brief Title of Activity:	**Switch to notched condenser fan belts**

Energy Efficiency Activity Description

Summary of activity performed	We switched our condenser fan belts to the more efficient "v-notched" style.
What was the baseline (existing) condition?	We used to use regular fan belts.
What is the implemented condition?	As the existing condenser belts wear out, we are replacing them with the notched style.
Did the activity directly save energy or support energy savings?	Achieves energy savings. The new belts have less friction loss and are expected to save around 2% of fan energy.
Any recommendations you would have for peers regarding this activity?	Making sure the fan belts are at the right tension is also important for them to operate efficiently.
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Condensers
Baseline Energy Use of Subsystem Impacted	622,902
Activity Energy Savings	7,903
Activity Savings as a % of Subsystem Energy Use	1.3%
Dollar Savings	$474
Measure Life	5

Attachments

1	Energy Savings Estimate Documentation
2	
3	
4	
5	

Suggested Attachments

1	
2	
3	
4	
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	17
Brief Title of Activity:	**Setup a method to track energy intensity with production and weather**

Energy Efficiency Activity Description

Summary of activity performed	We setup a system to track our utility use with production and weather so we can determine our overall facility energy performance on a basis of kWh per pound of production. We review these numbers every month at our energy team meetings, and if there is a change in performance we can discuss it with production, maintenance and management together to figure out what is going on. We set a goal for a 10% reduction in kWh/pound over the next two years and this gives us the ability to track our progress towards that goal.
What was the baseline (existing) condition?	Originally, the refrigeration system operators didn't see the utility bills, so they didn't even know how that the facility spends almost $500,000/yr on electricity.
What is the implemented condition?	Now we put the monthly utility bill information in a spreadsheet with monthly production totals and monthly average dry bulb temperature. Dividing monthly kWh by monthly total production pounds gives us a simple kWh/pound metric to evaluate how efficient the facility is operating from month to month.
Did the activity directly save energy or support energy savings?	Supports energy savings. Raises awareness and gives us a method to track our performance towards our energy savings goal.
Any recommendations you would have for peers regarding this activity?	Raising awareness about how much the facility spends on electricity goes a long way in engaging staff.
Other Benefits (non-energy)	Improved communication and collaboration between production and maintenance.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Entire facility
Baseline Energy Use of Subsystem Impacted	8,000,000
Activity Energy Savings	0
Activity Savings as a % of Subsystem Energy Use	0.0%
Dollar Savings	$0
Measure Life	5

Attachments

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Suggested Attachments

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	18
Brief Title of Activity:	**Institute system set point SOP documentation**

Energy Efficiency Activity Description

Summary of activity performed	We setup a standard operating procedure document that lists all of the set points for efficiently running our refrigeration system. We post this in our control room, and if we need to make a change to the document all of our maintenance staff is informed. This way we know the system is run consistently from shift to shift and everyone is aware of the correct settings.
What was the baseline (existing) condition?	Different operators had individual preferences for how to run the system, so set points would change frequently.
What is the implemented condition?	Now we document key set points in a standard operating procedure that we post in the control room and use to train all system operators.
Did the activity directly save energy or support energy savings?	Supports energy savings by making sure the efficient set points we have achieved stay in place.
Any recommendations you would have for peers regarding this activity?	Discussing key set points in shift hand off meetings helps to make sure that everyone is on board.
Other Benefits (non-energy)	More consistent system operation and better support from all production shifts with standardized set points.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Entire facility
Baseline Energy Use of Subsystem Impacted	8,000,000
Activity Energy Savings	0
Activity Savings as a % of Subsystem Energy Use	0.0%
Dollar Savings	$0
Measure Life	5

Attachments

1	Refrigeration system set point SOP
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Suggested Attachments

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	19
Brief Title of Activity:	**Facility baseline energy use summary**

Energy Efficiency Activity Description

Summary of activity performed	We went through all of our major equipment and estimated the energy use based on total horsepower and run hours, and determined what the breakdown of energy use is at our facility.
What was the baseline (existing) condition?	We didn't really know the breakdown of energy use in our facility.
What is the implemented condition?	We did an inventory of the horsepower and run hours of the major equipment and came up with a baseline energy use estimate by sub-system.
Did the activity directly save energy or support energy savings?	Supports energy savings. Raises awareness and having a baseline energy number helps us to estimate energy savings potential. For example, if we think raising the suction pressure is going to save 10% of the compressor power, we need to know how much baseline energy the compressors use to get a savings number.
Any recommendations you would have for peers regarding this activity?	Raising awareness about how much the facility spends on electricity goes a long way in engaging staff.
Other Benefits (non-energy)	

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Entire facility
Baseline Energy Use of Subsystem Impacted	8,000,000
Activity Energy Savings	0
Activity Savings as a % of Subsystem Energy Use	0.0%
Dollar Savings	$0
Measure Life	5

Attachments

1	Facility Baseline Energy Use Worksheet
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Suggested Attachments

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Brief Title of Activity:	**Freezer door management**

Energy Efficiency Activity Description

Summary of activity performed	We are working with the forklift operators to keep the freezer doors closed as much as possible. We put up signs to remind warehouse staff that leaving a freezer door open costs ~$75 a day (~2,300/month) from the increased refrigeration load. We also installed buzzers that go off if the freezer doors are propped open for more than one minute.
What was the baseline (existing) condition?	Freezer doors were often left open and forklift operators weren't aware of the energy cost to the company.
What is the implemented condition?	We put up signs to remind warehouse staff that leaving a freezer door open costs ~$75 a day (~2,300/month) from the increased refrigeration load. We also installed buzzers that go off if the freezer doors are propped open for more than one minute.
Did the activity directly save energy or support energy savings?	Saves energy. We think each of the four freezer doors is staying closed an average of at least 30 minutes more every day.
Any recommendations you would have for peers regarding this activity?	Raising awareness about how much the facility spends on electricity goes a long way in engaging staff.
Other Benefits (non-energy)	Keeping the freezer doors closed helps maintain a more consistent product temperature and prevent frost from getting in the freezer. The floors seem safer with less frost buildup.

Facility Energy Use and Activity Savings Information

Facility Wide Energy Use	8,000,000
Subsystem Impacted	Refrigeration system
Baseline Energy Use of Subsystem Impacted	4,388,517
Activity Energy Savings	46,136
Activity Savings as a % of Subsystem Energy Use	1.1%
Dollar Savings	$2,768
Measure Life	5

Attachments

1	Freezer door sign example
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Suggested Attachments

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