



Alternative Fuel

Available fuel type is a limiting factor for many facilities in need of a rental boiler. Depending on



the location, certain fuels simply may not be available due to utilities not being run at the time of construction or geographic restrictions for moving a fuel type to the site. For example, certain rail yards that require steam for cleaning out railcars may be situated in extremely remote locations where it is not practical to run a natural gas line, therefore, burning fuel oil may be a more reasonable option to the rail company. That is a common scenario. Every once in a while, however, one may find that there is an unexpected resource that can be harnessed and utilized to great benefit.

Since WARE provides rental boilers to a wide variety of customers nationwide, there have been many projects for which a customized solution was implemented. One such project that recently concluded was for a chemical company in Georgia that found itself with a surplus fuel problem. Through one of their chemical processes,

a very large amount of hydrogen was being created as a byproduct, and they were facing stringent EPA regulations and costs to capture and safely dispose of the volatile gas. Since hydrogen is combustible, Ware was able to work with them to engineer a solution utilizing a 75,000 pound per hour 350 psi design Nebraska watertube boiler to burn the hydrogen and generate process steam for the plant.

The burner had to be slightly modified to pack a tighter flame pattern than that which is optimal for natural gas (hydrogen has about 325 Btu/cu. ft. compared to ~1,000 Btu/cu ft for natural gas). Another issue that came up in the process of operating with hydrogen was corrosion; the moisture content of the fuel was carrying through and causing significant corrosion on the fire side of the boiler. It was decided that installing a dryer system for the hydrogen gas would mitigate that problem, and the boiler has been operating well ever since. Do not think that this was just some makeshift solution that was run for a couple months and then shut down...no, this project continued for the past seven years, since June 2008, in fact.

This company was able to utilize a fuel that they were already generating on-site. Incurring the operating cost of a rental boiler may be a tax deduction, but for this customer, the real savings were found in no longer having to capture and remove a volatile gas that could also incur heavy fines if not disposed of properly. Piping the fuel over to a boiler and getting the additional benefit of cheap steam was a more beneficial solution than burning it off or transporting it to a disposal facility. Whether you are limited by your available fuel or find that you have a surplus fuel source (such as hydrogen, propane, or methane, etc.), WARE can help you find a solution to get steam or hot water for your facility.

WARE Cares – Prevention of Safety Violations

With boilers becoming increasingly advanced with automation and controls, it is easy for operators to neglect simple safety considerations. These automated safety features lead plant personnel to become “comfortable,” which leads to assuming that it is safe to ignore routine equipment checks.

Routine checks of your boiler and its equipment is the first step in the right direction to prevent safety mishaps. Not only will you improve plant safety, you will improve your boiler’s efficiencies and catch problem areas before they become catastrophic.

Two of the most common OSHA violations that occur in and around boiler operations are related to:

1) Fall Prevention – It seems simple, however slips, trips and falls are the number one cause of OSHA recordables in the United States. Keeping the area around your boiler clear of debris, hoses, tools and ladders will go a long way in keeping your operation safe.

2) Lockout Tag out Procedures: Improper or incomplete lockout tagout procedures are the 2nd largest cause of OSHA recordables as it relates to boiler operation. Following a well-defined lockout tagout procedure will greatly reduce the number of safety violations. See the list below for an example of a thorough lockout tagout procedure:

1. Turn off boiler at the control panel
2. Turn off control power on control panel
3. Turn off power at main breaker panel then lock the control panel
5. Shut off main gas valve and lock
6. Close pilot light valve
7. After boiler has stopped generating steam, close main header valve and lock
8. Lock blow down line in closed position
9. Switch feed water pump off to boiler
10. Close feed water valve
11. Open atmospheric valve on main steam header valve



Here are a few additional checks that can help prevent safety violations and dangerous conditions as it pertains to your boiler operation. In no way is this list exhaustive, but it serves as starting point to begin applying fundamental safety principles.

- Be sure there is a minimum clear space of 18 inches on all sides of the boiler. As a minimum, all other sides comply with the boiler manufacturer’s installation instructions for clearances to combustible materials.
- Have the boiler manufacturer’s installation instructions, operating manual and safety guidelines in an accessible location.
- Make sure the acceptable level of noise does not exceed the OSHA guidelines; if the guidelines are exceeded, hearing protection is required to avoid OSHA violations.
 - 90dBA.....8hrs/day
 - 92dBA.....6hrs/day
 - 95dBA.....4hrs/day
 - 97dBA.....3hrs/day
 - 100dBA.....2hrs/day
 - 105dBA.....1hr/day
- Make sure the storage method of chemicals used in the treatment and cleaning process is in compliance with state EPA guidelines.

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Short Cycling - Don't Short Change Your Boilers Efficiency

If you went deer hunting, which weapon would be more appropriate: a bazooka or a rifle? Obviously you would not use a bazooka as it would be a little overkill. In a similar way, sizing your boiler applies. Too large a boiler for your application actually hurts your efficiency and greatly reduces the usable life of your boiler. Finding a partner that can work with you to select the best fit for your application is key in preventing short cycling.



What is short cycling and why is it important?

A boiler short cycle happens most often when an oversized boiler (Bazooka from the example above) quickly satisfies steam demands, then shuts down until steam is required again. In plants, steam demands can change over time, and many times boilers are installed with the notion that additional steam will be needed in the future. When those additional steam demands never come to fruition, you are left with boiler that is simply too large for your application – the main culprit of short cycling.

According to the U.S. Department of Energy a short cycling boiler is typically 10% to 15% less efficient than a normal boiler operating at low firing rates. Not only is it less efficient, but short cycling also greatly reduces the life of your boiler. Fuel train components take the largest toll when short cycling occurs. If your boiler cycles every five minutes, those components are subject to over 100,000 cycles per year.

Another common cause on hot water boiler for short cycling includes an improper controls strategy and incorrect set points. Reset controls are available that help to regulate feed water temperature as the outdoor temperature changes. It does this by continuously monitoring the temperature differential. This differential helps dictate

the boiler's on/off cycle; if the differential is narrow, the boiler is more subject to short cycling.

Here are a few tips in short cycle prevention:

- Maximize multiple boiler operations: The most efficient boilers should be brought on-line as loads increase, while less-efficient units taken off-line first as loads drop off.
- Utilize burners with a high turndown ratio
- Boiler downsizing: Fuel savings can be achieved by adding a smaller boiler sized to meet average loads at your facility or by re-engineering the plant to consist of multiple smaller boilers. Multiple small boilers offer reliability and flexibility to operators to follow load swings without over-firing and short cycling.
- Partner with an expert: Because boiler short cycling is largely dependent upon selecting the correct size for your steam requirements, it is critical to partner with an industry expert to guide you through your selection process. In a similar way, if you required open heart surgery, you wouldn't go to a general practitioner—you would go to a heart specialist.

WARE is that specialist as it relates to boilers. Call WARE today to discuss your steam needs. (800)-228-8861



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WARE
new and used
List

All equipment listed is for sale or lease and subject to availability

Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
779	82,500	2013	Victory Energy Limpsfield	G/#2	Steam	350	IRI
767	75,000	2011	Victory Energy	G/#2	Steam/SH	750/750	IRI
747	75,000	2000	B&W (Low NOx)	G/#2	Steam/SH	750/750	IRI
750	70,000	1996	Nebraska (Low NOx)	G/#2	Steam/SH	750/750	IRI
709	60,000	1979	Zurn (Low NOx)	G/#2	Steam	500	IRI
741	60,000	1979	Zurn	G/#2	Steam	550	IRI
SB79	40,000	1986	Cleaver Brooks	Gas	Steam	260	IRI
496	800	1990	York-Shipley (Low NOx)	G/#2	Steam	200	IRI
634	800	1972	York-Shipley	G/#2	Steam	150	IRI
620	800	1975	York-Shipley	G/#2	Steam	250	IRI
SB139	500	2001	Cleaver Brooks		Steam	150	
SB200	400	2014	York-Shipley (Low NOx)	G/#2	Steam	150	UL/CSD1
SB138	350	1994	Cleaver Brooks		Steam	150	
SB137	250	1994	Cleaver Brooks		Steam	150	
415	250	1980	Eclipse	#2 Oil	HT/HW	954	IRI
SB148	200	1995	Kewanee	Gas	Steam	325	IRI
SB146	200	1995	Kewanee	Gas	Steam	325	IRI
SB216	250XID	2015	York-Shipley(Low NOx)	G/#2	Steam	150	UL/CSD1
SB213	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB220	175XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB210	175XID	2014	York-Shipley	G/#2	Steam	150	UL/CSD1
SB217	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB214	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB224	150	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
RB769	150	1998	Precision	Electric	Steam	150	UL
SB225	100XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB219	100XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB221	100XID	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB223	70	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB222	50	2015	York-Shipley	G/#2	Steam	150	UL/CSD1
SB211	50	2014	York-Shipley	G/#2	Steam	150	UL/CSD1

One hour quote on-line at www.wareinc.com or call 800-228-8861

continued
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Unit	HP/PPH	Year	Manf.	Fuel	Type	PSI	Ctrl.
SSB33	50 hp	2015	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB21	70 hp	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB31	100XID	2014	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB32	150	2015	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB20	175XID	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB25	250XID	2012	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB14	300XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB15	500XID	2011	York Shipley	(Low NOx) G/#2	Steam	150	UL/CSD-1
SSB28	600XID	2012	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1
SSB30	800XID	2014	York Shipley	(Low NOx) G/#2	Steam	250	UL/CSD-1

Unit	Size	Manf.	Volt.	Type	Year
RC-24	30 ton	Mc Quay	480v	3 ph	2000
RC-21	40 Ton	Mc Quay	480 v	3 ph	1999
RC-1	60 Ton	Mc Quay	480 v	3 ph	1995
RC-2	60 Ton	Mc Quay	480 v	3 ph	1995
RC-13	60 Ton	Trane	200-230 v	3 ph	1989
RC-5	95 Ton	Mc Quay	480 v	3 ph	1995
RC-6	105 Ton	Mc Quay	480 v	3 ph	1995
RC-8	155 Ton	Mc Quay	480 v	3 ph	1995
RC-10	195 Ton	Mc Quay	480 v	3 ph	1995
RC-11	195 Ton	Mc Quay	480 v	3 ph	1995
RC-25	300 Ton	Mc Quay	480 v	3 ph	2003

Chillers



Contact your local representative (800-228-8861) for Steam Studies

Meet WARE at the following shows:
POWER GEN 2015
 December 8 - 10 in Las Vegas, NV
AHR EXPO 2016
 January 25 - 27 in Orlando, FL





- Be sure no fuel leaks from fuel tanks are present
- Have fire extinguishing devices nearby and make sure they have been recently inspected.

Checklist : Your Water Level Indicators and Water Column

- Check that the lowest visible part of the water gauge glass is at least one inch above the lowest permissible water level recommended by the boiler manufacturer.
- Be sure all trip alarm points are within the visible range of the gauge glass.
- Make sure the ball check valves in upper and lower fittings open by gravity, and the lower ball check valve rises vertically to its seat.
- Make sure that gauge glasses required by code are connected directly to the shell or drum of the boiler or to an intervening water column.
- Make sure that sludge and sediment is cleaned from the water column or connecting pipes to reduce false water level indications.
- If there are shut off valves between the steam boiler and water column, they must be of through-flow design and physically locked open.

For additional information about boiler safety attend our next scheduled Boiler University. The next class offered is December 8th – 10th in Chattanooga, Tennessee.



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Accepting the award on behalf of the great employees at WARE is: From left to right Gerald Blain, Ritchie Ware From Limpsfield: Keith Knowles.

WARE BOILER UNIVERSITY

Next Available 2015 Classes

Chattanooga, TN
December 8 - 10

Next Available 2016 Classes

Chattanooga, TN	Jeffersonville, IN
January 12 - 14	May 10 - 12
July 12 - 14	September 20 - 22
November 8 - 10	

WKU
March 8 - 10

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