

Whelen Engineering – Charlestown, NH

Two Boiler Systems Burning PDCs



Project Description:

- Goal: To minimize heating costs of a 330,000 square foot manufacturing facility
- Included were existing buildings (circa 1970s) plus a new building which was designed to meet the highest energy efficiency standards.
- Two new boiler rooms were built with integrated fuel storage silos. The boilers and integrated fuel silos are able to store and transport either PDCs or pellets.
- New piping was installed to tie multiple existing buildings into the new biomass boiler systems.
- Existing oil boilers remain for peaking & back-up—giving Whelen the security of multiple fuel sources.
- The new District hot water distribution system was also installed by Froling Energy
- ***The low cost of PDCs made this project viable!***



Both Boiler Rooms look nearly identical

Each of the two biomass boiler rooms contain:

- 4 - Froling TX-150 Dry Chip/Pellet Boilers, each with output of 1/2 million BTU/hr. **Total Output of all 8 boilers = 4 million BTUs per hour**
- Each interior storage silo holds 36 tons of Froling Energy's PDCs (Precision Dry Wood Chips) for a total storage capacity of 288 tons



4000 Gallon Buffer Tank



Total Biomass Fuel Burned in 2014: 1533 Tons of PDCs
Delivered Cost of PDCs in 2014: \$168,630
Value of Thermal RECs Generated: \$69,900 (at \$15 each)

Quantity of Fuel Oil Displaced by Biomass in 2014: 143,500 Gallons of Oil
Net Cost of PDC Biomass Fuel: \$98,712 — The Equivalent of 69 cents per Gallon Oil

WHELEN 2

Customer Usage

Date	Number	Material	Quantity	Net	\$ / Unit	Material \$	Delivery \$	Misc \$	Tax \$	Total \$
WHELEN B5 -										
No Order										
2/1/2016	319	Dry chips	0.00	10.12	\$110.00 / tn	\$1,113.20	\$0.00	\$0.00	\$0.00	\$1,113.20
2/9/2016	330	Dry chips	0.00	14.91	\$110.00 / tn	\$1,640.10	\$0.00	\$0.00	\$0.00	\$1,640.10
2/15/2016	337	Dry chips	0.00	15.02	\$110.00 / tn	\$1,652.20	\$0.00	\$0.00	\$0.00	\$1,652.20
2/19/2016	345	Dry chips	0.00	16.23	\$110.00 / tn	\$1,785.30	\$0.00	\$0.00	\$0.00	\$1,785.30
2/29/2016	352	Dry chips	0.00	15.52	\$110.00 / tn	\$1,707.20	\$0.00	\$0.00	\$0.00	\$1,707.20
3/8/2016	360	Dry chips	0.00	14.46	\$110.00 / tn	\$1,590.60	\$0.00	\$0.00	\$0.00	\$1,590.60
3/15/2016	365	Dry chips	0.00	14.71	\$110.00 / tn	\$1,618.10	\$0.00	\$0.00	\$0.00	\$1,618.10
3/25/2016	373	Dry chips	0.00	15.40	\$110.00 / tn	\$1,694.00	\$0.00	\$0.00	\$0.00	\$1,694.00
9/27/2016	392	Dry chips	0.00	13.40	\$120.00 / tn	\$1,608.00	\$0.00	\$0.00	\$0.00	\$1,608.00
9/28/2016	395	Dry chips	0.00	13.37	\$120.00 / tn	\$1,604.40	\$0.00	\$0.00	\$0.00	\$1,604.40
9/29/2016	397	Dry chips	0.00	13.35	\$110.00 / tn	\$1,468.50	\$0.00	\$0.00	\$0.00	\$1,468.50
10/10/2016	405	Dry chips	0.00	13.45	\$120.00 / tn	\$1,614.00	\$0.00	\$0.00	\$0.00	\$1,614.00
10/13/2016	410	Dry chips	0.00	13.96	\$120.00 / tn	\$1,675.20	\$0.00	\$0.00	\$0.00	\$1,675.20
10/27/2016	421	Dry chips	0.00	12.66	\$120.00 / tn	\$1,519.20	\$0.00	\$0.00	\$0.00	\$1,519.20
10/31/2016	425	Dry chips	0.00	13.66	\$120.00 / tn	\$1,639.20	\$0.00	\$0.00	\$0.00	\$1,639.20
11/4/2016	433	Dry chips	0.00	13.80	\$120.00 / tn	\$1,656.00	\$0.00	\$0.00	\$0.00	\$1,656.00
11/10/2016	438	Dry chips	0.00	13.86	\$120.00 / tn	\$1,663.20	\$0.00	\$0.00	\$0.00	\$1,663.20
11/17/2016	445	Dry chips	0.00	13.16	\$120.00 / tn	\$1,579.20	\$0.00	\$0.00	\$0.00	\$1,579.20
11/17/2016	446	Dry chips	0.00	13.38	\$120.00 / tn	\$1,605.60	\$0.00	\$0.00	\$0.00	\$1,605.60
11/28/2016	450	Dry chips	0.00	13.02	\$120.00 / tn	\$1,562.40	\$0.00	\$0.00	\$0.00	\$1,562.40
11/30/2016	453	Dry chips	0.00	12.95	\$120.00 / tn	\$1,554.00	\$0.00	\$0.00	\$0.00	\$1,554.00
12/2/2016	456	Dry chips	0.00	13.10	\$120.00 / tn	\$1,572.00	\$0.00	\$0.00	\$0.00	\$1,572.00
12/5/2016	459	Dry chips	0.00	14.10	\$120.00 / tn	\$1,692.00	\$0.00	\$0.00	\$0.00	\$1,692.00
12/8/2016	468	Dry chips	0.00	14.59	\$120.00 / tn	\$1,750.80	\$0.00	\$0.00	\$0.00	\$1,750.80
12/13/2016	477	Dry chips	0.00	14.72	\$120.00 / tn	\$1,766.40	\$0.00	\$0.00	\$0.00	\$1,766.40
12/14/2016	480	Dry chips	0.00	15.79	\$120.00 / tn	\$1,894.80	\$0.00	\$0.00	\$0.00	\$1,894.80
12/22/2016	493	Dry chips	0.00	14.24	\$120.00 / tn	\$1,708.80	\$0.00	\$0.00	\$0.00	\$1,708.80
12/22/2016	494	Dry chips	0.00	13.66	\$120.00 / tn	\$1,639.20	\$0.00	\$0.00	\$0.00	\$1,639.20
12/28/2016	498	Dry chips	0.00	14.20	\$120.00 / tn	\$1,704.00	\$0.00	\$0.00	\$0.00	\$1,704.00
1/2/2017	502	Dry chips	0.00	13.44	\$120.00 / tn	\$1,612.80	\$0.00	\$0.00	\$0.00	\$1,612.80

SYSTEM APPROVED FOR
 T-REGENERATION
 ON 2-16-2016

Q1-2016
 91.34

Q3-2016
 40.12

Q4-2016
 248.30

WHELEN 2

Date	Number	Material	Quantity	Net	\$ / Unit	Material \$	Delivery \$	Misc \$	Tax \$	Total \$
11/29/2017	791	Dry chips	0.00	14.31	\$120.00 / tn	\$1,717.20	\$0.00	\$0.00	\$0.00	\$1,717.20
11/30/2017	793	Dry chips	0.00	13.56	\$120.00 / tn	\$1,627.20	\$0.00	\$0.00	\$0.00	\$1,627.20
12/8/2017	810	Dry chips	0.00	13.86	\$120.00 / tn	\$1,663.20	\$0.00	\$0.00	\$0.00	\$1,663.20
12/8/2017	811	Dry chips	0.00	14.25	\$120.00 / tn	\$1,710.00	\$0.00	\$0.00	\$0.00	\$1,710.00
12/15/2017	818	Dry chips	0.00	13.16	\$120.00 / tn	\$1,579.20	\$0.00	\$0.00	\$0.00	\$1,579.20
12/15/2017	819	Dry chips	0.00	14.06	\$120.00 / tn	\$1,687.20	\$0.00	\$0.00	\$0.00	\$1,687.20
12/27/2017	836	Dry chips	0.00	12.25	\$120.00 / tn	\$1,470.00	\$0.00	\$0.00	\$0.00	\$1,470.00
12/31/2017	849	Dry chips	0.00	15.01	\$120.00 / tn	\$1,801.20	\$0.00	\$0.00	\$0.00	\$1,801.20
12/31/2017	850	Dry chips	0.00	15.65	\$120.00 / tn	\$1,878.00	\$0.00	\$0.00	\$0.00	\$1,878.00
1/9/2018	871	Dry chips	0.00	15.14	\$120.00 / tn	\$1,816.80	\$0.00	\$0.00	\$0.00	\$1,816.80
1/11/2018	876	Dry chips	0.00	14.42	\$120.00 / tn	\$1,730.40	\$0.00	\$0.00	\$0.00	\$1,730.40
1/11/2018	877	Dry chips	0.00	15.37	\$120.00 / tn	\$1,844.40	\$0.00	\$0.00	\$0.00	\$1,844.40
1/15/2018	881	Dry chips	0.00	13.03	\$120.00 / tn	\$1,563.60	\$0.00	\$0.00	\$0.00	\$1,563.60
1/19/2018	889	Dry chips	0.00	14.39	\$120.00 / tn	\$1,726.80	\$0.00	\$0.00	\$0.00	\$1,726.80
1/22/2018	897	Dry chips	0.00	14.18	\$120.00 / tn	\$1,701.60	\$0.00	\$0.00	\$0.00	\$1,701.60
1/26/2018	915	Dry chips	0.00	14.14	\$120.00 / tn	\$1,696.80	\$0.00	\$0.00	\$0.00	\$1,696.80
2/2/2018	941	Dry chips	0.00	14.33	\$120.00 / tn	\$1,719.60	\$0.00	\$0.00	\$0.00	\$1,719.60
2/2/2018	942	Dry chips	0.00	14.75	\$120.00 / tn	\$1,770.00	\$0.00	\$0.00	\$0.00	\$1,770.00
2/8/2018	953	Dry chips	0.00	14.01	\$120.00 / tn	\$1,681.20	\$0.00	\$0.00	\$0.00	\$1,681.20
2/12/2018	966	Dry chips	0.00	13.51	\$120.00 / tn	\$1,621.20	\$0.00	\$0.00	\$0.00	\$1,621.20
2/19/2018	986	Dry chips	0.00	14.25	\$120.00 / tn	\$1,710.00	\$0.00	\$0.00	\$0.00	\$1,710.00
2/19/2018	987	Dry chips	0.00	14.35	\$120.00 / tn	\$1,722.00	\$0.00	\$0.00	\$0.00	\$1,722.00
2/22/2018	995	Dry chips	0.00	13.17	\$120.00 / tn	\$1,580.40	\$0.00	\$0.00	\$0.00	\$1,580.40
2/22/2018	1000	Dry chips	0.00	13.25	\$120.00 / tn	\$1,590.00	\$0.00	\$0.00	\$0.00	\$1,590.00
2/28/2018	1011	Dry chips	0.00	13.24	\$120.00 / tn	\$1,588.80	\$0.00	\$0.00	\$0.00	\$1,588.80
3/2/2018	1021	Dry chips	0.00	13.18	\$120.00 / tn	\$1,581.60	\$0.00	\$0.00	\$0.00	\$1,581.60
3/5/2018	1023	Dry chips	0.00	13.88	\$120.00 / tn	\$1,665.60	\$0.00	\$0.00	\$0.00	\$1,665.60
3/8/2018	1031	Dry chips	0.00	14.10	\$120.00 / tn	\$1,692.00	\$0.00	\$0.00	\$0.00	\$1,692.00
Non Order Totals				1292.12		\$153,692.30	\$0.00	\$0.00	\$0.00	\$153,692.30
WHELEN B5 - Totals				1292.12		\$153,692.30	\$0.00	\$0.00	\$0.00	\$153,692.30
Tickets: 94 WHELEN 2										
Report Totals				1292.12		\$153,692.30	\$0.00	\$0.00	\$0.00	\$153,692.30
Total Tickets: 94										

Q4-2017
247.02 T

WHELEN 1

Customer Usage

Date	Number	Material	Quantity	Net	\$ / Unit	Material \$	Delivery \$	Misc \$	Tax \$	Total \$
WHELEN B1 NORTH -										
No Order										
2/1/2016	320	Dry chips	0.00	15.38	\$110.00 / tn	\$1,691.80	\$0.00	\$0.00	\$0.00	\$1,691.80
2/4/2016	324	Dry chips	0.00	15.62	\$110.00 / tn	\$1,718.20	\$0.00	\$0.00	\$0.00	\$1,718.20
2/8/2016	326	Dry chips	0.00	15.04	\$110.00 / tn	\$1,654.40	\$0.00	\$0.00	\$0.00	\$1,654.40
2/11/2016	333	Dry chips	0.00	8.59	\$110.00 / tn	\$944.90	\$0.00	\$0.00	\$0.00	\$944.90
2/16/2016	338	Dry chips	0.00	15.53	\$110.00 / tn	\$1,707.75	\$0.00	\$0.00	\$0.00	\$1,707.75
2/18/2016	344	Dry chips	0.00	16.53	\$110.00 / tn	\$1,817.75	\$0.00	\$0.00	\$0.00	\$1,817.75
2/22/2016	346	Dry chips	0.00	15.10	\$110.00 / tn	\$1,661.00	\$0.00	\$0.00	\$0.00	\$1,661.00
2/26/2016	351	Dry chips	0.00	15.91	\$110.00 / tn	\$1,750.10	\$0.00	\$0.00	\$0.00	\$1,750.10
3/1/2016	355	Dry chips	0.00	10.22	\$110.00 / tn	\$1,124.20	\$0.00	\$0.00	\$0.00	\$1,124.20
3/4/2016	356	Dry chips	0.00	11.70	\$110.00 / tn	\$1,287.00	\$0.00	\$0.00	\$0.00	\$1,287.00
3/7/2016	358	Dry chips	0.00	15.46	\$110.00 / tn	\$1,700.60	\$0.00	\$0.00	\$0.00	\$1,700.60
3/10/2016	362	Dry chips	0.00	3.84	\$110.00 / tn	\$422.40	\$0.00	\$0.00	\$0.00	\$422.40
3/14/2016	363	Dry chips	0.00	14.79	\$110.00 / tn	\$1,626.90	\$0.00	\$0.00	\$0.00	\$1,626.90
3/17/2016	367	Dry chips	0.00	3.89	\$110.00 / tn	\$427.90	\$0.00	\$0.00	\$0.00	\$427.90
3/23/2016	371	Dry chips	0.00	14.63	\$110.00 / tn	\$1,609.30	\$0.00	\$0.00	\$0.00	\$1,609.30
3/30/2016	375	Dry chips	0.00	14.53	\$110.00 / tn	\$1,598.30	\$0.00	\$0.00	\$0.00	\$1,598.30
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9/16/2016	391	Dry chips	0.00	20.87	\$120.00 / tn	\$2,504.40	\$0.00	\$0.00	\$0.00	\$2,504.40
9/27/2016	393	Dry chips	0.00	13.79	\$120.00 / tn	\$1,654.80	\$0.00	\$0.00	\$0.00	\$1,654.80
9/29/2016	396	Dry chips	0.00	13.40	\$120.00 / tn	\$1,608.00	\$0.00	\$0.00	\$0.00	\$1,608.00
9/30/2016	398	Dry chips	0.00	13.82	\$110.00 / tn	\$1,520.20	\$0.00	\$0.00	\$0.00	\$1,520.20
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10/12/2016	408	Dry chips	0.00	14.08	\$120.00 / tn	\$1,689.60	\$0.00	\$0.00	\$0.00	\$1,689.60
10/28/2016	423	Dry chips	0.00	13.40	\$120.00 / tn	\$1,608.00	\$0.00	\$0.00	\$0.00	\$1,608.00
11/1/2016	426	Dry chips	0.00	12.74	\$120.00 / tn	\$1,528.80	\$0.00	\$0.00	\$0.00	\$1,528.80
11/7/2016	434	Dry chips	0.00	14.59	\$120.00 / tn	\$1,750.80	\$0.00	\$0.00	\$0.00	\$1,750.80
11/11/2016	440	Dry chips	0.00	12.60	\$120.00 / tn	\$1,512.00	\$0.00	\$0.00	\$0.00	\$1,512.00
11/18/2016	447	Dry chips	0.00	13.46	\$120.00 / tn	\$1,615.20	\$0.00	\$0.00	\$0.00	\$1,615.20
11/29/2016	451	Dry chips	0.00	13.75	\$120.00 / tn	\$1,650.00	\$0.00	\$0.00	\$0.00	\$1,650.00
12/5/2016	458	Dry chips	0.00	9.03	\$120.00 / tn	\$1,083.60	\$0.00	\$0.00	\$0.00	\$1,083.60
12/15/2016	487	Dry chips	0.00	13.24	\$120.00 / tn	\$1,588.80	\$0.00	\$0.00	\$0.00	\$1,588.80
12/23/2016	495	Dry chips	0.00	13.80	\$120.00 / tn	\$1,656.00	\$0.00	\$0.00	\$0.00	\$1,656.00

Q1-2016
 206.76 TONS

Q3-2016
 61.68

SEE NEXT PAGE

WHELEN 1

Date	Number	Material	Quantity	Net	\$ / Unit	Material \$	Delivery \$	Misc \$	Tax \$	Total \$
2/12/2018	968	Dry chips	0.00	13.67	\$120.00 / tn	\$1,640.40	\$0.00	\$0.00	\$0.00	\$1,640.40
2/13/2018	972	Dry chips	0.00	13.86	\$120.00 / tn	\$1,663.20	\$0.00	\$0.00	\$0.00	\$1,663.20
2/27/2018	1007	Dry chips	0.00	13.54	\$120.00 / tn	\$1,624.80	\$0.00	\$0.00	\$0.00	\$1,624.80
3/13/2018	1036	Dry chips	0.00	14.13	\$120.00 / tn	\$1,695.60	\$0.00	\$0.00	\$0.00	\$1,695.60
Non Order Totals				948.78		\$111,648.26	\$0.00	\$0.00	\$0.00	\$111,648.26
WHELEN B1 NORTH - Totals				948.78		\$111,648.26	\$0.00	\$0.00	\$0.00	\$111,648.26
Tickets: 70										
Report Totals				948.78		\$111,648.26	\$0.00	\$0.00	\$0.00	\$111,648.26
Total Tickets: 70										

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 6:57:26 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2016/1	NON60529	HMS 1	0.000	0.000	0.000
2016/2	NON60529	HMS 1	0.000	0.000	0.000
2016/3	NON60529	HMS 1	0.000	0.000	0.000
2016/2	NON60530	Whelen 1	284.000	0.000	284.000
2016/3	NON60530	Whelen 1	236.000	0.000	236.000
2016/2	NON60531	Whelen 2	68.000	0.000	68.000
2016/3	NON60531	Whelen 2	147.000	0.000	147.000

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 6:59:07 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2016/4	NON60529	HMS 1	0.000	0.000	0.000
2016/5	NON60529	HMS 1	0.000	0.000	0.000
2016/6	NON60529	HMS 1	0.000	0.000	0.000
2016/4	NON60530	Whelen 1	134.000	0.000	134.000
2016/4	NON60531	Whelen 2	108.000	0.000	108.000

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 6:59:59 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2016/7	NON60529	HMS 1	25.000	0.000	25.000
2016/8	NON60529	HMS 1	23.000	0.000	23.000
2016/9	NON60529	HMS 1	29.000	0.000	29.000
2016/9	NON60530	Whelen 1	80.000	0.000	80.000
2016/9	NON60531	Whelen 2	47.000	0.000	47.000

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 7:00:30 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2016/10	NON60529	HMS 1	63.000	0.000	63.000
2016/11	NON60529	HMS 1	102.000	0.000	102.000
2016/12	NON60529	HMS 1	137.000	0.000	137.000
2016/10	NON60530	Whelen 1	174.000	0.000	174.000
2016/11	NON60530	Whelen 1	163.000	0.000	163.000
2016/12	NON60530	Whelen 1	234.000	0.000	234.000
2016/10	NON60531	Whelen 2	182.000	0.000	182.000
2016/11	NON60531	Whelen 2	213.000	0.000	213.000
2016/12	NON60531	Whelen 2	294.000	0.000	294.000
2016/12	NON93900	Whelen 3	149.000	0.000	149.000

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 7:00:59 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2017/1	NON60529	HMS 1	152.000	0.000	152.000
2017/2	NON60529	HMS 1	138.000	0.000	138.000
2017/3	NON60529	HMS 1	146.000	0.000	146.000
2017/1	NON60530	Whelen 1	157.000	0.000	157.000
2017/2	NON60530	Whelen 1	139.000	0.000	139.000
2017/3	NON60530	Whelen 1	236.000	0.000	236.000
2017/1	NON60531	Whelen 2	268.000	0.000	268.000
2017/2	NON60531	Whelen 2	279.000	0.000	279.000
2017/3	NON60531	Whelen 2	286.000	0.000	286.000
2017/1	NON93900	Whelen 3	243.000	0.000	243.000
2017/2	NON93900	Whelen 3	231.000	0.000	231.000
2017/3	NON93900	Whelen 3	251.000	0.000	251.000

CURRENT QUARTERLY GENERATION

Print Date: 3/26/2018 7:01:25 PM

Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2017/4	NON60529	HMS 1	72.000	0.000	72.000
2017/5	NON60529	HMS 1	62.000	0.000	62.000
2017/6	NON60529	HMS 1	31.000	0.000	31.000
2017/4	NON60530	Whelen 1	115.000	0.000	115.000
2017/5	NON60530	Whelen 1	1.000	0.000	1.000
2017/4	NON60531	Whelen 2	123.000	0.000	123.000
2017/5	NON60531	Whelen 2	50.000	0.000	50.000
2017/4	NON93900	Whelen 3	172.000	0.000	172.000
2017/5	NON93900	Whelen 3	159.000	0.000	159.000
2017/6	NON93900	Whelen 3	23.000	0.000	23.000
2017/6	NON95026	Froling PDC1	0.000	0.000	0.000

CURRENT QUARTERLY GENERATION

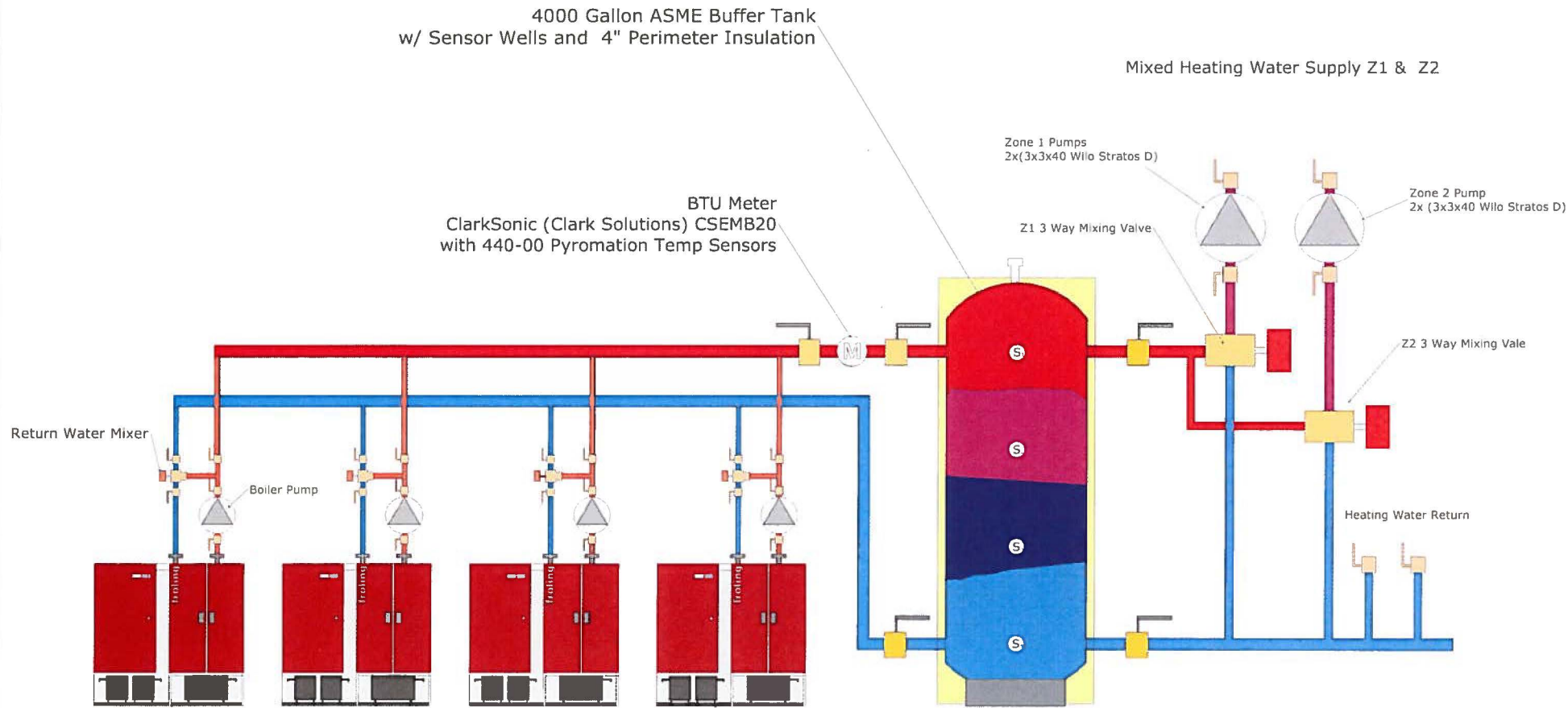
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Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2017/7	NON60529	HMS 1	29.000	0.000	29.000
2017/8	NON60529	HMS 1	24.000	0.000	24.000
2017/9	NON60529	HMS 1	29.000	0.000	29.000
2017/9	NON60530	Whelen 1	202.000	0.000	202.000
2017/7	NON60531	Whelen 2	0.000	0.000	0.000
2017/8	NON60531	Whelen 2	0.000	0.000	0.000
2017/9	NON60531	Whelen 2	0.000	0.000	0.000
2017/8	NON93900	Whelen 3	10.000	0.000	10.000
2017/9	NON93900	Whelen 3	66.000	0.000	66.000
2017/7	NON95026	Froling PDC1	0.000	0.000	0.000
2017/8	NON95026	Froling PDC1	0.000	0.000	0.000
2017/9	NON95026	Froling PDC1	0.000	0.000	0.000

CURRENT QUARTERLY GENERATION

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Month of Generation	Unit ID	Generator Plant-Unit Name	Generation	MMA	Adjusted Generation
2017/10	NON60529	HMS 1	47.000	0.000	47.000
2017/11	NON60529	HMS 1	107.000	0.000	107.000
2017/12	NON60529	HMS 1	118.000	0.000	118.000
2017/10	NON60530	Whelen 1	122.000	0.000	122.000
2017/11	NON60530	Whelen 1	264.000	0.000	264.000
2017/12	NON60530	Whelen 1	194.000	0.000	194.000
2017/10	NON60531	Whelen 2	0.000	0.000	0.000
2017/11	NON60531	Whelen 2	0.000	0.000	0.000
2017/12	NON60531	Whelen 2	0.000	0.000	0.000
2017/10	NON93900	Whelen 3	161.000	0.000	161.000
2017/11	NON93900	Whelen 3	211.000	0.000	211.000
2017/12	NON93900	Whelen 3	367.000	0.000	367.000
2017/10	NON95026	Froling PDC1	156.000	0.000	156.000
2017/11	NON95026	Froling PDC1	139.000	0.000	139.000
2017/12	NON95026	Froling PDC1	175.000	0.000	175.000



4000 Gallon ASME Buffer Tank
w/ Sensor Wells and 4" Perimeter Insulation

Mixed Heating Water Supply Z1 & Z2

BTU Meter
ClarkSonic (Clark Solutions) CSEMB20
with 440-00 Pyromation Temp Sensors

Zone 1 Pumps
2x(3x3x40 Wilo Stratos D)

Zone 2 Pump
2x (3x3x40 Wilo Stratos D)

Z1 3 Way Mixing Valve

Z2 3 Way Mixing Valve

Return Water Mixer

Boiler Pump

Heating Water Return

4x Froeling TX 150 Pellet/Chip Boilers
with 4 Boiler Staging Controller

Simplified Mechanical Schematic; Not shown are:
Venting, expansion equipment, pressure relief and
controls.
Piping Systems: Welded and Victaulic
Insulation: 1.5" FG on all pipes, 4" FG on tanks
PVC Jackets and fittings on all Piping and Fittings
Monitoring: DCM Logic, Web Based Boiler Browser
Installation: Froeling Energy
Design: Froeling Energy
Engineering Froeling Energy and OES

Drawn By M. O. Froeling