



Hybrid Boiler Systems

CEE Industry Partners Meeting
Chicago IL
Sept 16-17th, 2010

Best of Both Worlds

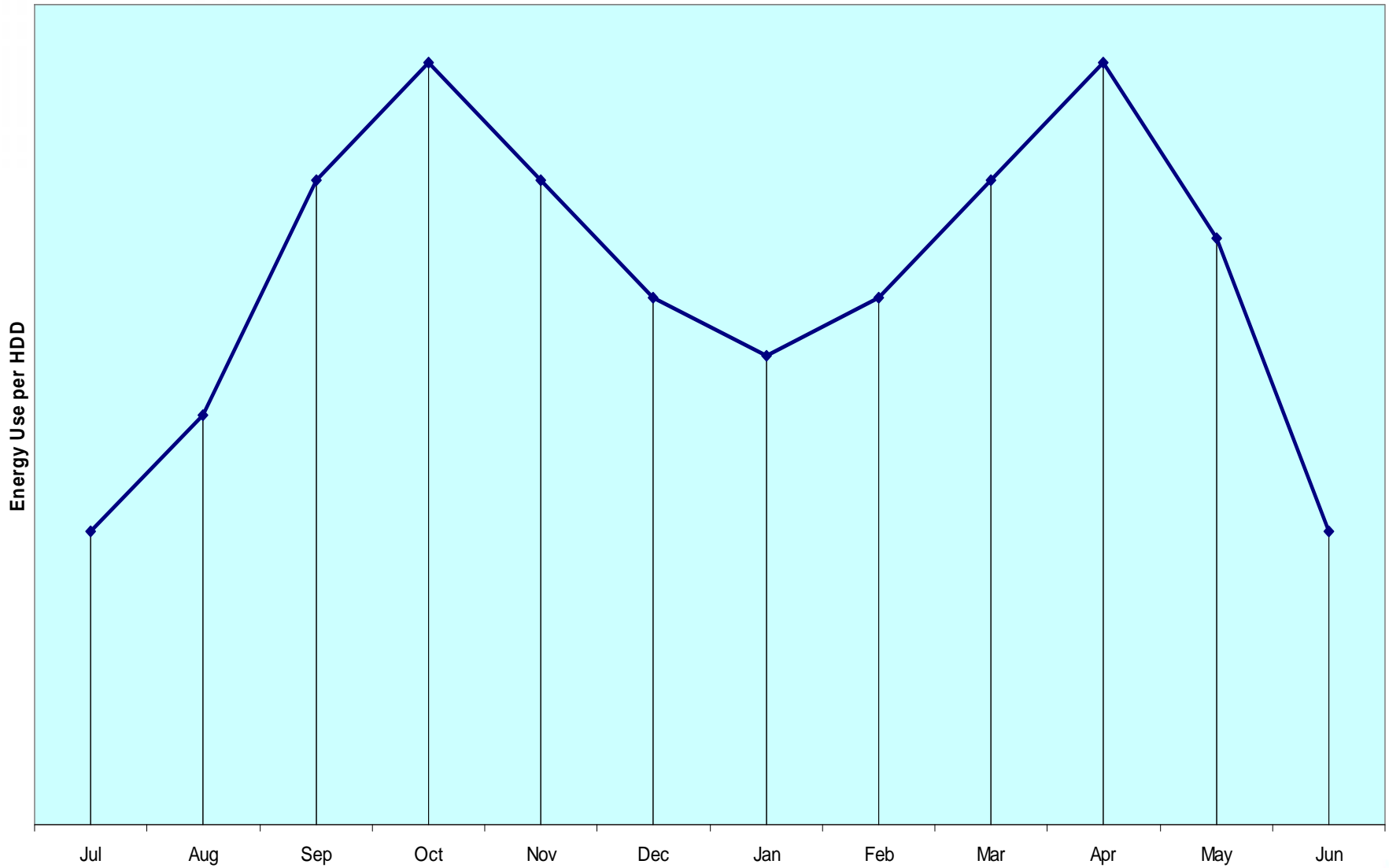


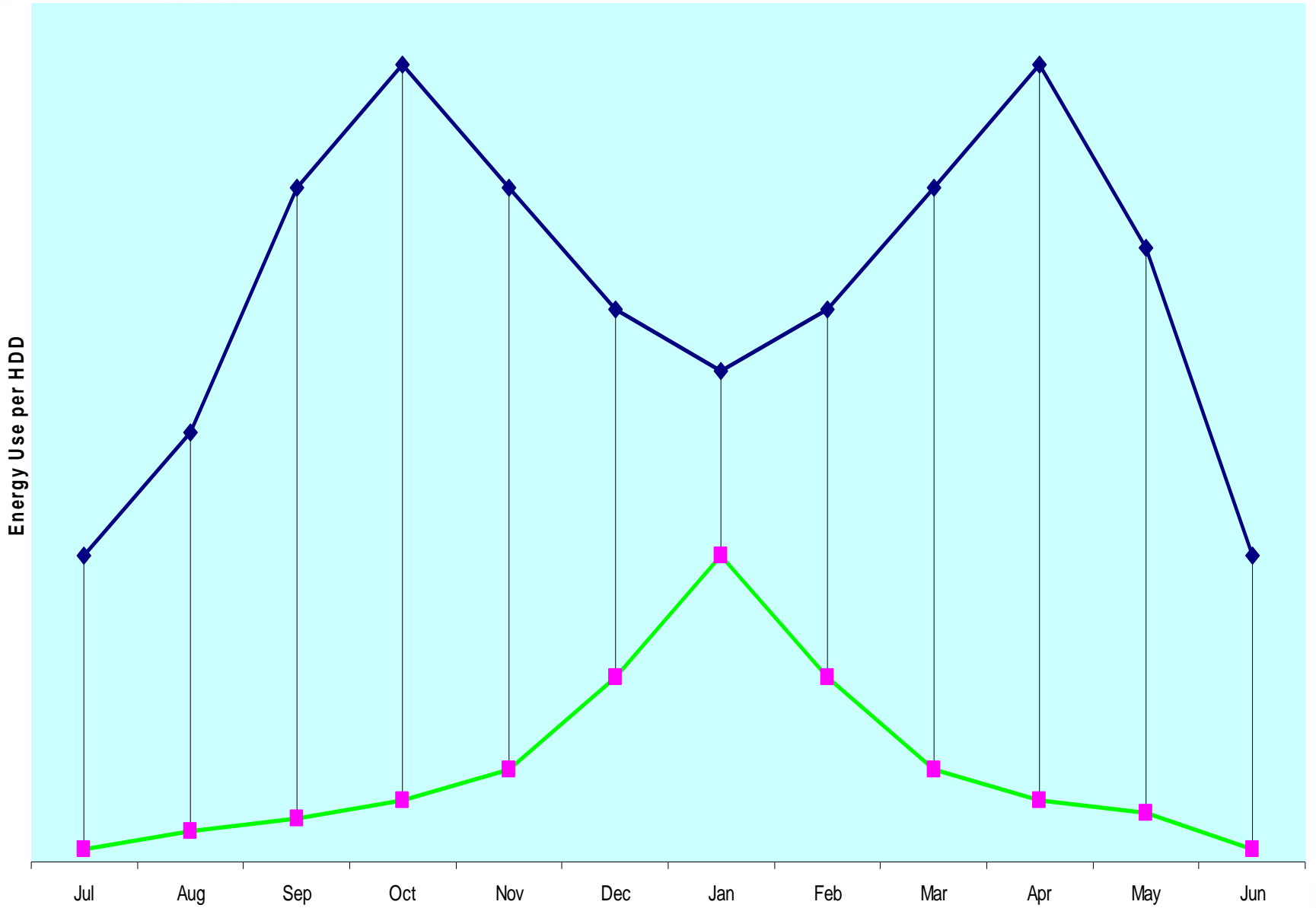
Why do we have the need?

- Many owners and engineers have been sold (on) the high efficiency boiler concept
- Some have concerns because they expect high efficiency all the time but need 180F
- Without redesigning the entire building for low temperature, there are options to reach these expectations

Definition

- We define Hybrid as Condensing and Non-Condensing boilers together in the same heating plant.
- This could be new or retrofit applications
 - In retrofit jobs, the older unit is typically replaced by new condensing modular unit(s).
 - Most fit in the existing footprint (or smaller).
 - Biggest opportunity lies in retrofit energy savings.
 - Lower capital outlay relative to complete replacement
 - Large rise in operating efficiencies
- Coupled with “Modular” concept, the savings potential can be substantial.
- KEY- Must be able to match the “minimum” load requirement of the building/system.





Columbus, OH

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	% Total	Cumm %
DB (F)	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs		
60-65	1012		3	38	150	157	100	105	120	156	120	43	20	16.4	16.4
55-60	711		16	39	128	119	53	25	43	79	111	72	26	11.5	28.0
50-55	610	15	15	79	110	87	33	3	8	58	110	64	28	9.9	37.9
45-50	578	61	29	94	101	39	4			21	90	114	25	9.4	47.2
40-45	497	39	37	78	63	16				22	82	89	71	8.1	55.3
35-40	776	137	86	138	70	9				22	94	103	117	12.6	67.9
30-35	760	145	142	123	19						24	93	214	12.3	80.2
25-30	566	108	128	95	2						8	91	134	9.2	89.4
20-25	231	75	64	26							2	34	30	3.7	93.2
15-20	233	108	64	24								3	34	3.8	96.9
10-15	91	18	30										43	1.5	98.4
5-10	64	31	31										2	1.0	99.4
0-5	29	7	22											0.5	99.9
-5-0	5		5											0.1	100.0
	6163														

Chicago, IL

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	% Total	Cum m %
DB (F)	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs		
60-65	1008	0	0	15	58	121	137	119	252	165	132	9	0	15.5	15.5
55-60	542	0	0	8	80	113	82	24	39	55	104	37	0	8.4	23.9
50-55	462	7	2	13	82	106	24	1	9	67	100	40	11	7.1	31.0
45-50	852	33	56	59	225	137	12	0	0	41	144	115	30	13.1	44.2
40-45	334	11	33	67	62	19	0	0	0	3	49	72	18	5.2	49.3
35-40	951	101	99	199	136	13	0	0	0	0	84	171	148	14.7	64.0
30-35	788	129	108	152	56	0	0	0	0	0	21	171	151	12.2	76.1
25-30	667	135	164	146	2	0	0	0	0	0	8	86	126	10.3	86.4
20-25	229	50	63	47	0	0	0	0	0	0	0	5	64	3.5	89.9
15-20	334	112	67	31	0	0	0	0	0	0	0	0	124	5.2	95.1
10-15	127	50	44	0	0	0	0	0	0	0	0	0	33	2.0	97.1
5-10	75	39	28	0	0	0	0	0	0	0	0	0	8	1.2	98.2
0-5	48	32	8	0	0	0	0	0	0	0	0	0	8	0.7	99.0
-5-0	68	45	0	0	0	0	0	0	0	0	0	0	23	1.0	100.0
	6485														

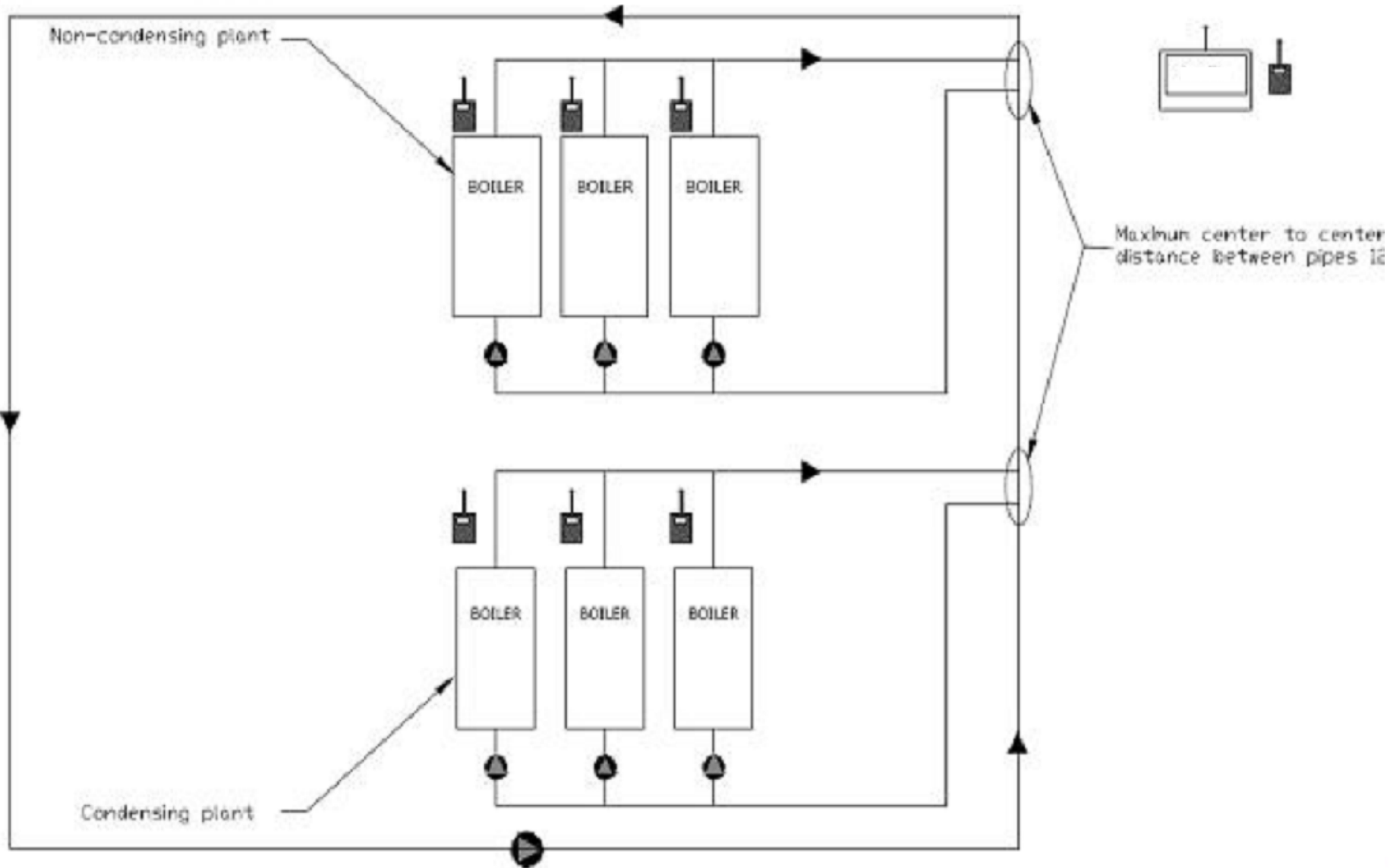


Duluth, MN

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	% Total	Cum m %
DB (F)	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs		
60-65	669	0	0	0	6	65	183	191	143	68	13	0	0	8.5	8.5
55-60	438	0	0	0	5	40	91	74	109	104	15	0	0	5.6	14.1
50-55	893	0	0	0	31	157	153	84	145	196	98	29	0	11.4	25.5
45-50	741	0	6	0	74	140	93	25	64	141	137	61	0	9.5	35.0
40-45	669	0	4	1	158	155	25	11	23	88	151	53	0	8.5	43.5
35-40	469	0	8	78	101	62	2	0	6	36	115	61	0	6.0	49.5
30-35	955	39	113	185	168	73	0	0	0	16	155	142	64	12.2	61.7
25-30	487	29	37	94	111	11	0	0	0	5	39	98	63	6.2	67.9
20-25	493	107	42	109	53	0	0	0	0	0	7	95	80	6.3	74.2
15-20	377	97	61	63	3	0	0	0	0	0	0	32	121	4.8	79.1
10-15	522	86	122	87	5	0	0	0	0	0	0	62	160	6.7	85.7
5-10	265	63	64	41	4	0	0	0	0	0	0	30	63	3.4	89.1
0-5	255	75	63	37	1	0	0	0	0	0	0	26	53	3.3	92.4
-5-0	160	64	32	14	0	0	0	0	0	0	0	17	33	2.0	94.4
-10 - -5	224	90	49	21	0	0	0	0	0	0	0	14	50	2.9	97.3
-15 - -10	114	52	28	9	0	0	0	0	0	0	0	0	25	1.5	98.7
-20 - -15	100	32	33	5	0	0	0	0	0	0	0	0	30	1.3	100.0
	7831														

*Sizing the Hybrid System – Size the Condensing boilers so they can handle approximately 1/3 of the design load.

*For most buildings you should find this outside air temperature will cover 60-80% of the heating season operating hours.



What are the effects of these breakthroughs?

- Significant reduced fuel usage!
- Elimination of short-cycling!
- Increased life-expectancy of equipment!
- Dramatically reduced stack emissions!