

Relative efficiency of different types of combination systems

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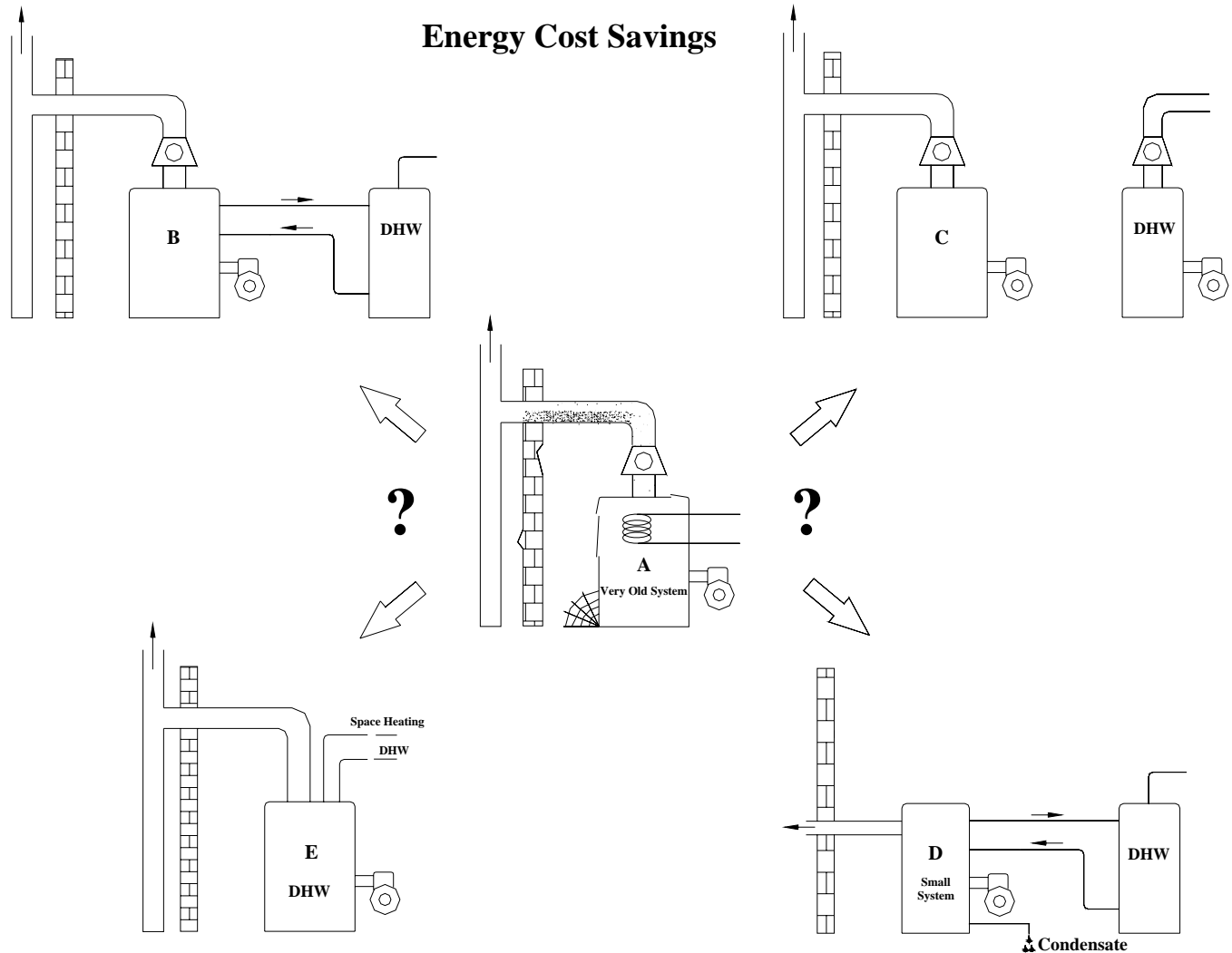
Brookhaven National Laboratory

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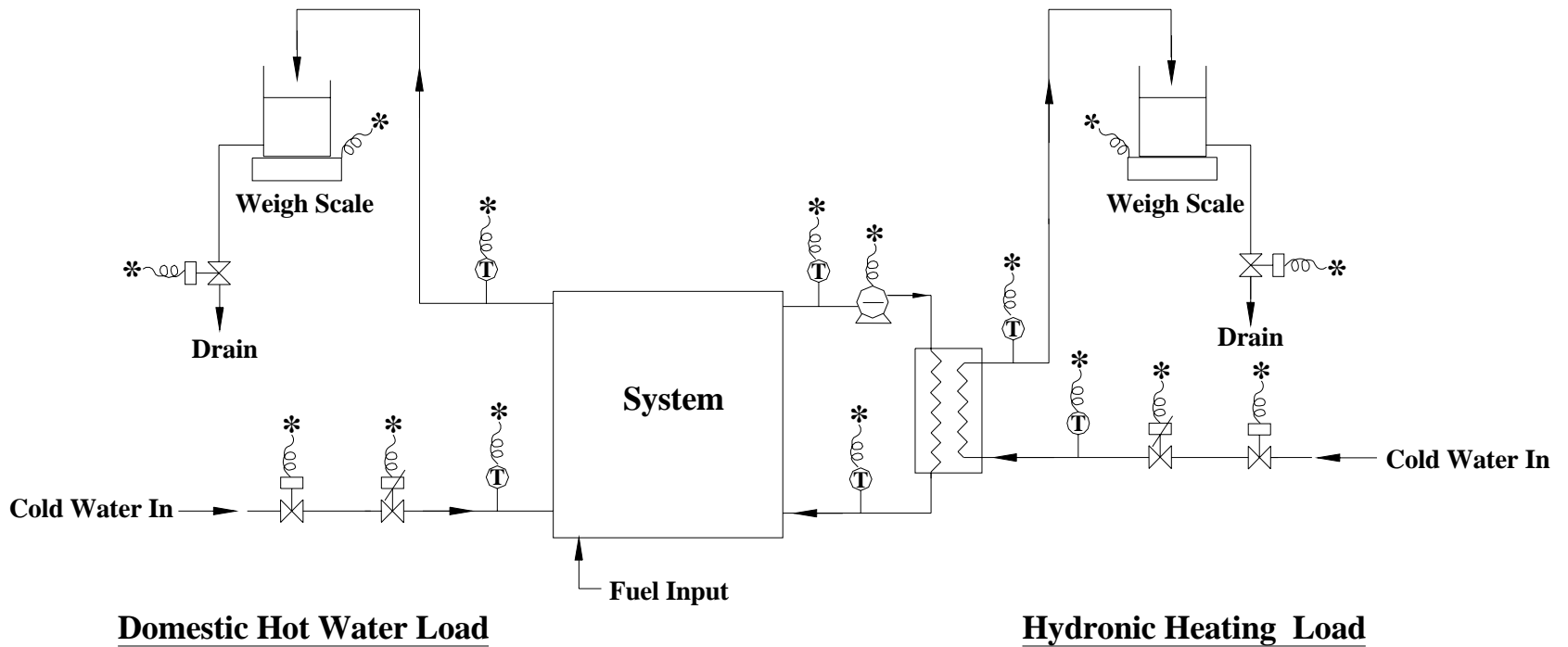
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Goal of the BNL Measurement Project

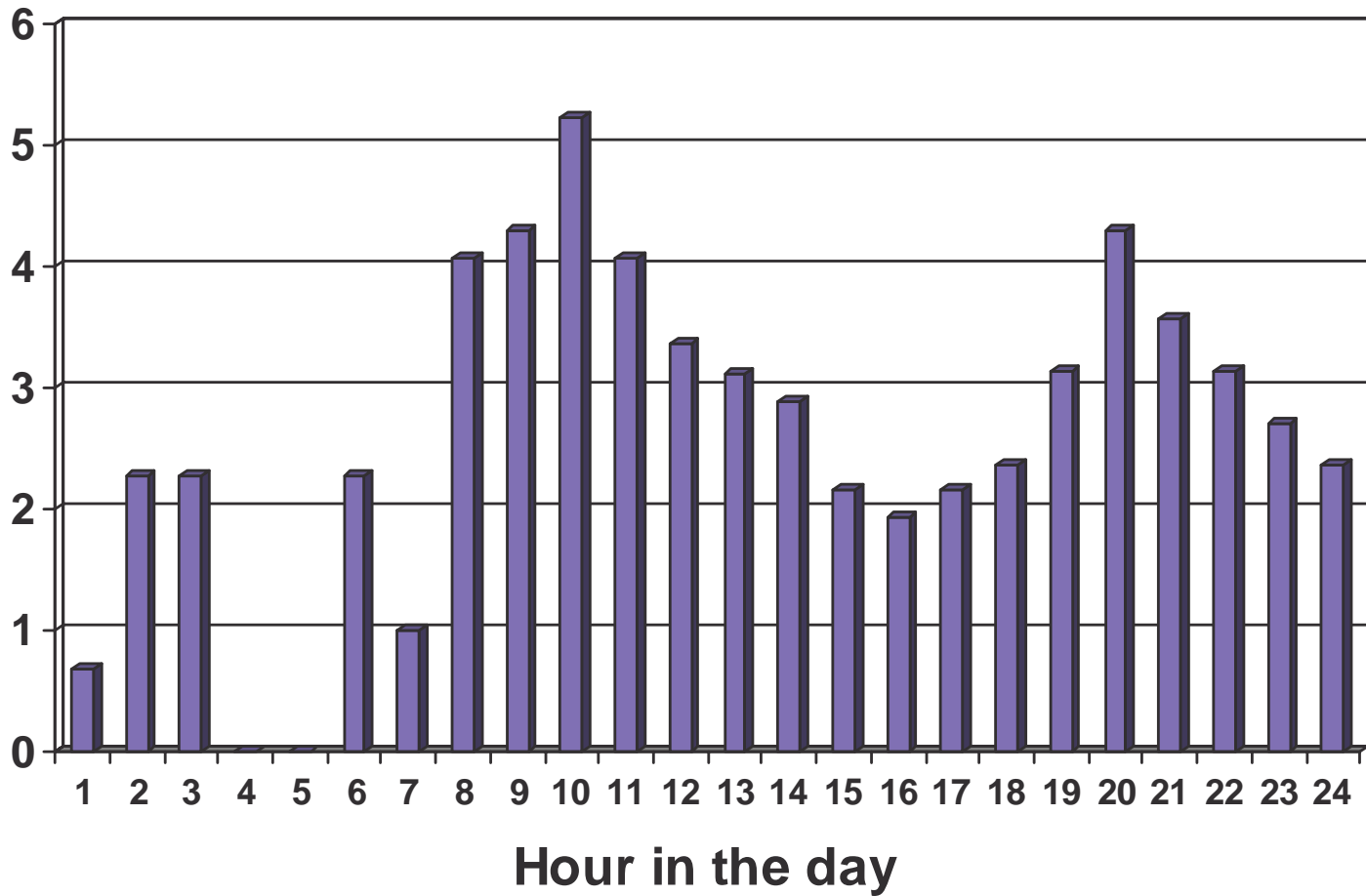


Test Method

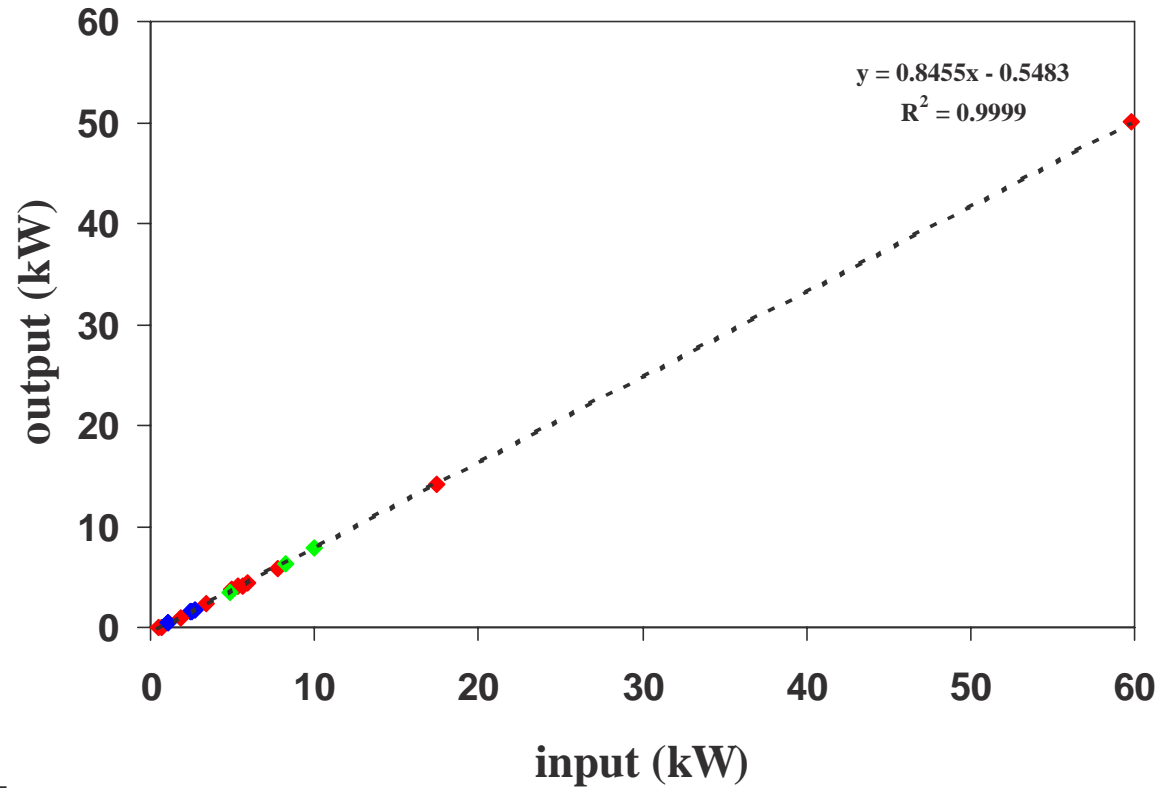


* To Data Acquisition / Control System

Daily distribution of hot water use (Gallons/hour)



Output results



Key Results:

idle loss

steady state thermal efficiency

Summary of Basic Results (1/2)

Summary of all basic test results. Part 1

Unit	Description	Steady State Thermal Efficiency (%)	Combustion Efficiency (%)	Idle Loss (%)	Summer domestic hot water efficiency (%)
1	Oil, cast iron boiler with tankless	83.7	85.5	1.2	40.6
2	Oil, cast iron boiler with indirect	78.4	84.6	2.1	38.3
3	Oil, steel boiler with purge control	86.5	88.1	.15	74.9
4	Oil condensing boiler	92.0	95	1.5	55.4
5	Oil, well insulated boiler	87.5	88.3	0.60	68.3
6	Oil, water heater used also for heating	81.5	83.9	1.2	57.1

Summary of Basic Results (2/2)

Summary of all basic test results Part 2

Unit	Description	Steady State Thermal Efficiency (%)	Combustion Efficiency (%)	Idle Loss (%)	Summer domestic hot water efficiency (%)
7	Oil, combi System	79.5	82.6	0.8	47.9
8	Gas atmospheric with tankless	72.5	77.6 ³	1.7	37.2
9	Gas atmospheric water heater	74.5	77.0	0.65	57.5
8+9	Gas boiler + separate gas water heater				57.5
10	Old cast iron boiler	72.8	79.7	2.1	31.0
11	Gas cond. modulating	88.5	93.6	0.60	58.7
12a	tankless mode	78	82.5	4.87	24.7
12b	indirect mode	78	82.5	1.16	51.4

Upgrade Case (1/2)

Comparison of Annual Energy Savings
Associated with Replacing System 10 with
Other Systems

Unit	Description	Annual Reduction in Fuel Use Relative to the Baseline
1	Oil, cast iron boiler with tankless	17.3
2	Oil, cast iron boiler with indirect	0.7
3	Oil, steel boiler with purge control	24.8
4	Oil condensing boiler	23.5
5	Oil, well insulated boiler	23.7
6	Oil, water heater used also for heating	15.1

Upgrade Case (2/2)

Comparison of Annual Energy Savings
Associated with Replacing System 10 with
Other Systems

Unit	Description	Annual Reduction in Fuel Use Relative to the Baseline
7	Oil, combi System	14.9
8	Gas atmospheric with tankless	1.8
9	Gas atmospheric water heater	-
8+9	Gas boiler + separate gas water heater	0.4
10	Old cast iron boiler	0.0
11	Gas cond. modulating	24.5
12a	tankless mode	-7.4
12b	indirect mode	11.5

OTHER ACTIVITIES

- Field verification of savings
- Performance mapping – instantaneous water heaters
- Water heater infiltration air flows
 - Draft hood and flue- flow / draft relations
 - Field studies – Energy Center of Wisconsin / STAC
- Lab testing to support MCEE field studies