Case Studies

Williams Lake School

Williams Lake, BC

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Power Consumption Estimates – Constant Speed Pumps vs. WILO Stratos

New Project – "P1" Hp ratings from pump selection software (Blue Angel Load Profile)

Full Load 10%, Partial Load 15%, Low Load 44%, Setback 35%

				Hp	KW Hrs	Hp	KW Hrs	KW Hrs
Service	**GPM**	**Head**	**Control**	**P1 Stratos**	**Annual**	**Std**	**Annual**	**Difference**
Leaving Furnace Rm	200	29'	Delta PV & LON	2.04	3797	3.16	12990	9193
1966 Rad & Coil	200	43'	Delta PV & LON	2.13	4489	4.09	15870	11381
Lunch Room/Dorm	200	40'	Delta PV & LON	2.11	4342	3.89	15580	11238
Ind Arts	200	32'	Delta PV & LON	2.08	4006	3.27	12560	8554
Boiler Room	200	6'	Delta PV & LON	0.89	1387	1.15	4544	3157
Gym	182	19'	Delta PV & LON	1.39	2589	2.35	8981	6392
1995 Rad Addn	194	37'	Delta PV & LON	2.1	4348	3.21	15050	10702
1995 Coil Addn	33	15'	Delta PV & LON	0.2	302	0.38	1357	1055
Office	21	36'	Delta PV & LON	0.387	879	0.77	2755	1876
Ent Furnace Rm	200	15'	Delta PV & LON	1.45	2298	2.21	9186	6888
P10 (New)	12.2	12'	Delta PV & LON	0.07	169	0.23	644	475
P11 (New)	52	12'	Delta PV & LON	0.26	501	0.41	1466	965
P12 (New)	52	12'	Delta PV & LON	0.26	501	0.41	1466	965
			Tot Annual KW Usage		29608		102449	72841

Heating Days	240
Heating Hrs/Day	24
Annual Heating Hours	5760

Enter KWh Cost Here	0.1
Enter # of Years Here	10

Annual $ Saving	$7,284
Savings based on Years	$72,841

Frisco School

Maine, USA

Power Consumption Estimates – Constant Speed Pumps vs. WILO Stratos

New Project – P1 Hp ratings from pump selection software

- Customer supplied load profile -

Service	GPM	Head	Control	P1 Stratos	Annual	Std	Annual	Difference
boiler circ.	25	10' w.g	const. flow control	0.1762	3787	0.5794	12454	8667
load-side circ.	25	35 w.g	integral speed control	1.207	25944	1.7656	37951	12007
HX circ.	8	8' w.g	temp dependant speed control	0.07879	1694	0.1037	2229	535
entire circ.	8	8' w.g	integral variable speed controller	0.07879	1694	0.1037	2229	535
boiler circ.	20	10' w.g	temp based speed control	0.1742	3744	0.2314	4974	1229
high temp loop circ.	9	15' w.g	integral variable speed controller	0.1112	2390	0.1415	3041	651
radiant slab	45	30' w.g	integral variable speed controller	0.6035	12972	1.0007	21510	8538
boiler circ.	18	10' w.g	const. flow control	0.1112	2390	0.1992	4282	1892
boiler circ.	4.5	8' w.g	integral variable speed control	0.07879	1694	0.0806	1732	39
				Tot Annual KW Usage	56309		90402	34093

High Load	1448
Low Load	4848
Total	6296

$/Kwh	0.17
# Years	10

Annual # Saving	$5,796
Savings based on Years	$57,958

Maplegrove Co-operative Apartment

Moncton, NB

Maplegrove Co-operative Apartment

Moncton, NB

52 Unit, 6 story, multi-unit residential, conventional hot water heating system Heating Plant

- Original oil fired forced draft hot water
- New boilers installed – high efficient, condensing, natural gas type, balance of system not upgraded

Pumping Equipment

- Existing 5 Hp, three piece inline type, constant speed
- WILO Stratos installed, operating in parallel, constant pressure setting, setback enabled

Benefits

- No zone valve failures (no excessive pressure during low heat demand periods)
- No water hammer no pressure by-pass valve

Customer Comments

- “This pumping technology is amazing, now we can rent the apartment unit above the boiler room because it is so quiet. The old pumps would make an awful racket. The electrical savings will pay for the installation of these two pumps in less than two years.”

Recorded Amperage/Energy Savings (based on $0.08 per Kwh)

- Original pumps – average 10 Amps, 6 month heating season, 24 hrs/day, 230 volt power
- Annual operating cost - $810.00
- New pumps – average 0.9 Amps, 6 month heating season, 18 hrs/day (auto setback, priority DHW etc)
- Annual operating cost - $54.00
- Annual savings $756.00 ($7,560.00 over 10 years – not including service/repair and energy cost increases)
- Will power costs go up?
- System condenses and there is a MINIMUM of 20 deg F across the boilers!

WILO

An Example of Over Pumping… at Immanuel Lutheran School

Original Circulators replaced with Stratos 3 x 3-40

Example of Over Pumping… Immanuel Lutheran School

Original Circulator

- 7.5 H.P, 230 V, Single Speed Circulator
- Measured Power Consumption= 2327 W/hr
- Circulator ran 24/7 from October 1st to April 30th (5040 hours)
- 5040 hours x 2327 W/hr = 11,730,000 watts per season.
- 11,730,000/1000 = 11,730 kW-hr/a.
- 11,730 kW-hr x $0.22/kW-hr =$2580.60/yr

Stratos 3 x 3-40

- 1.75 H.P, 230 V, Variable Speed Circulator
- Circulator set to 25 feet of head.
- 360 W/hr.
- 360 x 5040 = 1,814,000 W/hr
- 1,814,000/1000 = 1,814 kW-hr/a.
- 1,814 x $0.22 = $399.08/yr

$2580.60- $399.08= **$2181.52** in annual savings for one circulator at $0.22/kW-hr!

Over Pumping Continues at Immanuel Lutheran School…

- Original pump specified to deliver 250 GPM @ 50’ head.
- Pump choice determined by middle third of performance curve.
- As zones closed, pump head increased.
- The zone valves could not stop the flow of water.
- Rooms over heated. Teachers left with no alternative but to open the “window valve”.
- Head of maintenance reported that the winter of 2007/8 was the first winter in his 20+ years at the school that NO windows were opened during the heating season.
- How much money was wasted dumping BTU’s through open windows?

School

December 13, 2010

South Windsor Schools

Pleasant Valley School:

(2) original B&G 1510, 2 HP, 160 gpm @ 30’; operating cost: $875. (second pump was back-up.)

(2) Stratos 3 x 3-40, projected cost prior to installation: $440 each

12/6/2010 Determination: Stratos functioned 3,306 hours, 110 gpm (98% of the time) @ 25’; actual operating cost was $145. (only one Stratos operated.)

School

Orchard Hill School:

(2) original B&G 1510, 2 HP, 160 gpm @ 30’; operating cost: $875.
(second pump was back-up.)

(2) Stratos 3 x 3-40, projected cost prior to installation: $478.

12/6/2010 Determination: Stratos functioned 3,460 hours, 62 gpm (98% of the time) @ 26’; actual operating cost: $95. (only one Stratos operated.)

(2) original B&G 1510, 1.5 HP, 95 gpm @ 35’; operating cost: $690.
(second pump was back-up.)

(2) Stratos 3 x 3-40, projected cost prior to installation: $394

12/6/2010 Determination: Stratos functioned 3,410 hours, 135 gpm (98% of the time) @ 20’; operating cost was $135. (only one Stratos operated.)

School

Phillip R. Smith School:

(2) original B&G 1510, 2 HP, 160 gpm @ 30’; operating cost: $875.
(second pump was back-up.)

(2) Stratos 3 x 3-40, projected cost prior to installation: $440 (only one Stratos operated.)

12/6/2010 Determination: Stratos functioned 2,696 hours, 60 gpm (97% of the time) @ 12’; actual operating cost was $40. (only one Stratos operated.)

School

Note that our original projected electrical expense for Wilo Stratos was based upon 5,600 hours of operation, and 11 cents per KW operational cost. Actual operating cost based on same electrical rate. The overall annual electrical cost to operate the original (8) eight B&G base mounted pumps was $3,315 and the during last year's heating season the eight Stratos cost $415. The operating cost was reduced by 85%.

Northeastland Hotel
Presque Isle, ME

Chiller Pump replacement

- The Original Pump
- End Suction Pump, 10HP 208/230 3phase
- The Approximate cost per year to run the Pump $12,000

- The New Replacement Pump
- Stratos 3x3-40
- Estimated Electrical operating cost per year $3,000

Audit form

Just write it down....

WILO PUMP AUDIT/SURVEY SHEET - Date:_____

Job Site: _____ Location: _____ Pump Type _____

Flow:_____ Head:_____ Impeller size:_____

Other Pump Descriptive Information: _____

HP:_____ Voltage: _____ Phase: _____ Amp:_____ Amp: _____ Amp: _____

Motor Manuf.: _____ Eff:_____ Rpm:_____ Enclosure Type, ODP/TEFC _____

Pipe Size-Suction: _____ Pipe Size-Discharge: _____

Type of System, Hot Water, Chilled Water, etc. _____ Hours ON:_____ KW/HR= _____

Additional Comments:

WILO Recommended Selection(s): _____

List Pricing: _____

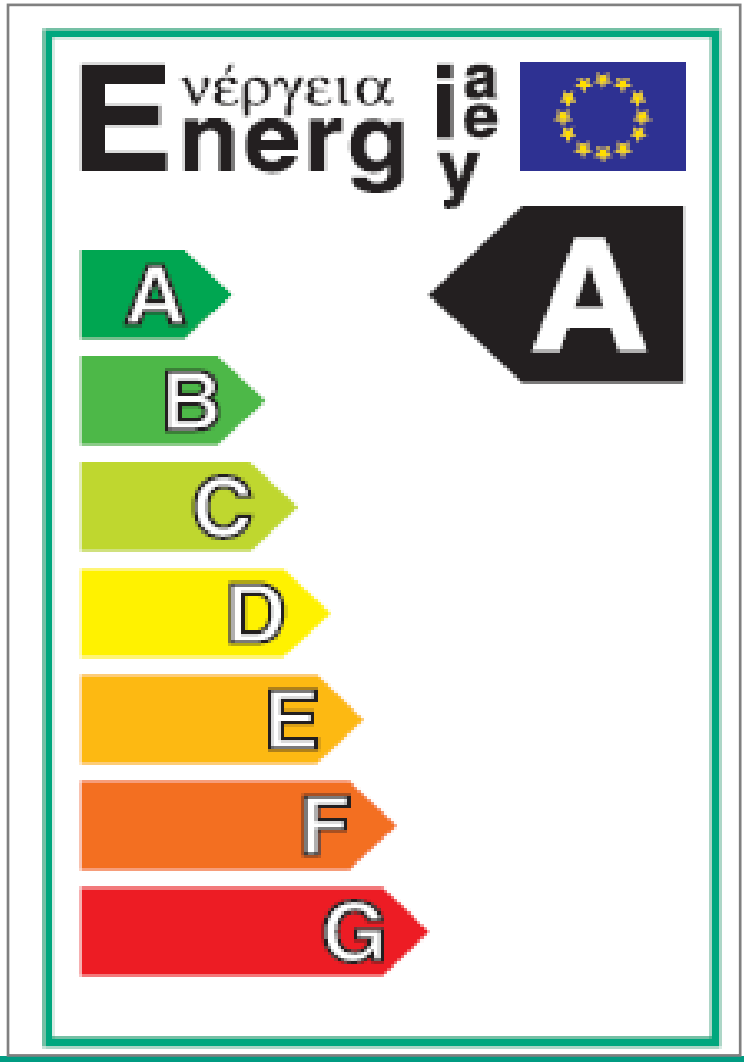
Delivery: _____

Cost of operation based on above hours on & kw/hr ¢/hr = _____

WILO Contact Person: _____

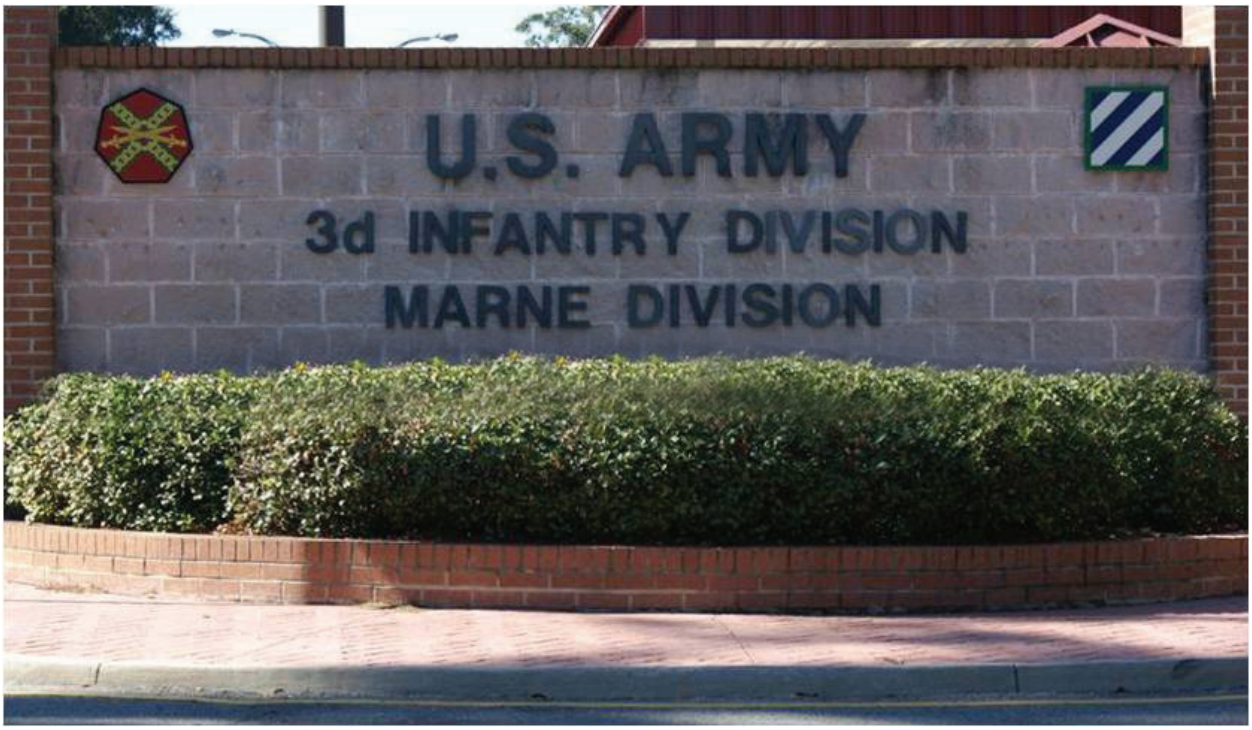
IEA (International Energy Agency - Facts and Figures)
"Factoids" on European Heating and Energy

- 78% of household energy costs is heating the home
- 90% if DHW (domestic hot water) is included
- 120 million heating pumps running in Europe
    - 60,000 giga watt hours annually!
- According to IEA, ECM technology has a potential of 70% savings
    - 42,000 giga watt hours annually
    - Equal to all washing machines and dishwashers in all Europe
- North America
    - Assume 3 million circs sold annually
    - Average circ life 10 years
    - Wattage per circ – 100 Watts
    - Totals 3 BILLION watts of power
    - Smart pump technology reduces power consumption by 2/3!
- Does not include systems savings
- Does not include all other larger pumps



US Military

Wilo Stratos Circulators demonstrate 88% energy savings.



US Military Facility, Southeast USA

Overview

In its pursuit of the newest technologies to reduce energy consumption, a US Military facility chose to investigate the benefits of high efficiency pumping technology that combines ECM motors and variable speed drive pumps for water circulation. The Wilo Stratos pump was chosen as an example of a pump utilizing ECM (electronically commutated motor) technology, which is able to realize up to 80% energy savings compared to conventional constant speed pumps. Wilo is the industry innovator and leading supplier of this technology, having premiered the technology at the ISH Exhibition in Frankfurt in 2001.

Strategy

Barracks 1506 and 1511, two residential buildings serving as a barracks, was identified as an ideal site. The two buildings have the same structure, orientation, mechanical systems, and occupancy, thereby presenting an opportunity to quantify energy savings. The cooling systems in both building consists of circulated chilled water (45°F) to air handler coils with 3 way zone valves controlling flow direction. Chilled water is operating from a central chilling tower plant. The outside high temperature average during the testing period was 83°F, and the average low was 59°F.

Barracks 1511 – 3HP Constant Speed End Suction Pump

Barracks 1506 – Wilo Stratos 3x3-40

Stratos pumps were installed in the cooling system in barracks 1506, while the 1511 building's cooling system remained unchanged. Power consumption for both the new and existing pumps were metered over a 35 day period to compare energy consumption. E-Mon electric meters were utilized for the analysis, measuring the kWh consuming during the period from September 16, 2010 through October 22, 2010.

US Military
Southeast, USA

Results

Power consumption of the standard pump was 1144 kWh, while the Wilo Stratos showed tremendous savings, consuming only 135 kWh. The 88% difference in energy consumption translates to a savings of 0.65 tons of CO_2 emissions* and 2,000 USGal of water**. Based on the measured and extrapolated data, the following results were observed:

Building	Pump	Delta-T (Target 10°-12°)	kWh During Test Period
1511	Existing	4°	1144
1506	Wilo Stratos	10°	135

Energy Savings – Over 35-day test period	**88.2%**
CO2 Savings – *Based on US National avg. 1.3 lbs/kWh	**0.66 Tons**
Water Savings – **Based on US National avg. 2.0 USGal to create 1 kWh	**2,000 US Gallons**

The Wilo Stratos demonstrated 88% energy savings when compared to the 3HP constant speed pump. These results are similar to experiments conducted in Europe since the Stratos was premiered by Wilo in 2001. As an added bonus, the base was able to turn off a 25HP pump in the main plant due to decreasing flow requirements from the oversized 3HP pump. The 25HP pump has not been turned back on since the test period ended - saving an additional 163,374 kWh & 106 tons of CO2 emissions* per year.

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WILO

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Harry Eklof & Associates, Inc.

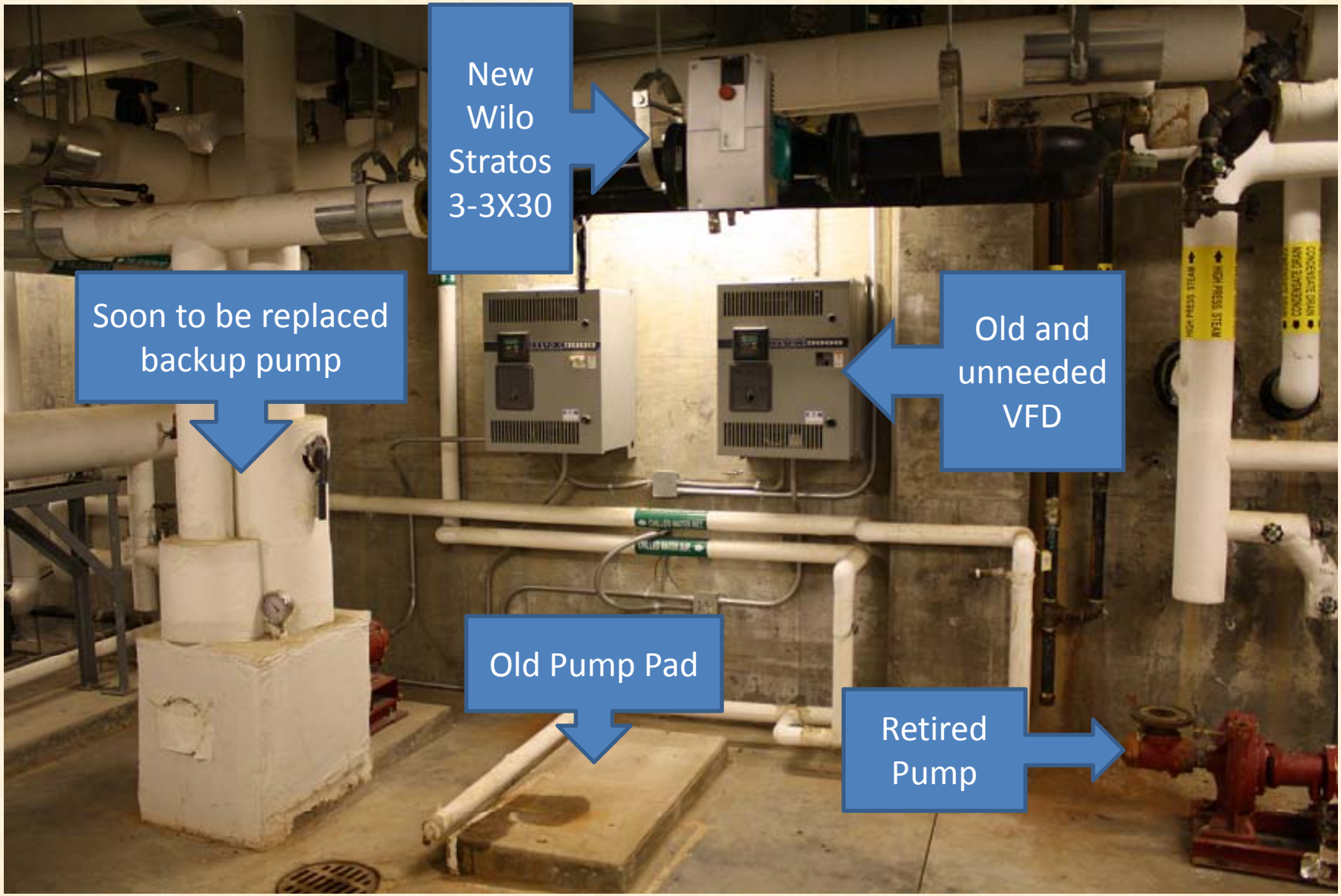
Pump Audit Performed at the University of Richmond

B&G 1510 vs. Wilo Stratos 3X3-30

- B&G 1510 was originally designed to maintain differential pressure out in the chilled water system.
- The Wilo replacement is running with the same control scheme.
- The original pump was logged for 2 weeks during May to obtain electrical usage.
- The replacement pump ran for one month during the month of July which saw temperatures in triple digits.

- The Wilo Stratos was able to save 93% of the energy consumption in comparison to the 1510.
- The temperature differential went from 5 degrees to 13 degrees.
- The differential pressure in the building is being maintained the same as it was before at 12- 14 psi.

This is a picture of the residence hall that houses 141 students. It is a 4 story structure completed in 2007. It was designed to later become a LEED certified building.


New Wilo Stratos 3-3X30
Soon to be replaced backup pump
Old and unneeded VFD
Old Pump Pad
Retired Pump

Results Summary

Building	Pump	Delta-T	Watts per hour
Lakeview	B&G 1510	5 deg.	3750 W
Lakeview	Wilo Stratos	13 deg.	266 W

Using 5760 operating hours (middle of March to the middle of October) The cost of operation of the old 5 hp pump is $1728.00 per year based on .08 cents per kWh.

The Stratos 3x3-30, operating the same number of hours will use $122.64 at .08 cents per kWh.

93% SAVINGS