



Green Initiative Products that Bring Energy Savings Possibilities to Your Facility

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Mike Fowler is the Commercial Marketing and Sales Manager for Pentair Water Commercial Pool and Aquatics. Mike has been with Pentair since 1992, starting his career in the technical services department at Purex Pool Products. He has filled many roles with the company including Marketing Manager, Accounts Manager, and product manager. Mike was born and raised in Southern California but has been based in Sanford, NC since 1995.

Aaron Grimes is the Commercial National Accounts Manager for Pentair Water Commercial Pool and Aquatics. He has been involved with the commercial pool industry for the past 17 years. Prior to his current position with Pentair, Aaron had extensive experience in commercial pool automation and efficiencies as a founder of Acu-Trol Chemical Controllers. Aaron is a native of California and currently resides in Sacramento, California.

Abstract

Through use of analysis of existing facilities, discussing opportunities for changing or modifying existing equipment rooms in aquatic facilities to bring green energy-efficient products in. With the use of these types of products, efficiencies improve in pool performance and budgets improve through saved energy costs and product replacement costs.



*Green Initiative Products that Bring
Energy Saving Possibilities to your Facility."*

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Aaron Grimes – National Account Manager

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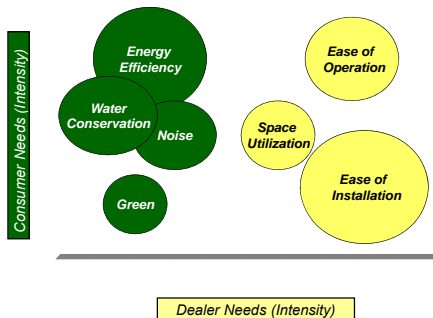
Opportunities for Green Product Platform

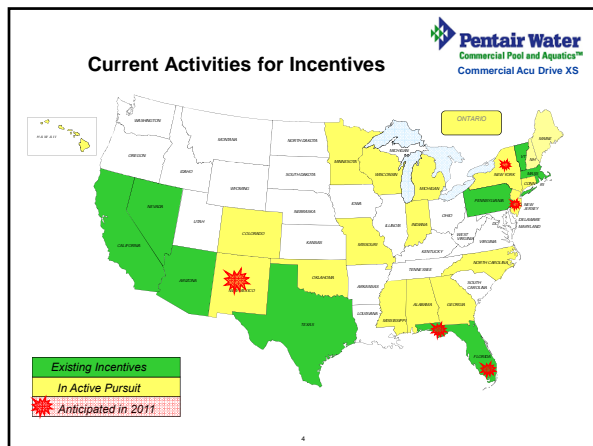


- Energy Efficiency
- Water Conservation
- Noise Reduction
- Increased Product Life

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Green Platform combines several needs





Utility Programs

Pentair Water
Commercial Pool and Aquatics™
Commercial Acu Drive XS

Programs Under Development / Consideration

Green Evokes Emotion

Pentair Water
Commercial Pool and Aquatics™
Commercial Acu Drive XS

Responsibility
Stewardship
Contribution
Obligation
Guilt
Pride
Proprietorship
Peer Pressure
Sense of Community
Legacy for our children

Demand (kW) Savings through new technology



Component	Traditional	Energy Saving Technology
Pool Pumps	2,200 W	300 W
Pool Lights	500 W	70 W
Heaters / Heat Pumps	673 BTU / 1¢	1408 BTU / 1¢

Commercial Rated Pumps




Variable Speed Pumps

THE GREEN FACTOR: Standard pool pumps can consume as much energy as all other home appliances combined—often costing more than \$1,000 per year! Variable Speed pumps can typically cut energy use by 30% to 90%, generally saving \$324 to \$1,356 in utility costs annually*—more where rates are higher than average. Additionally, their much quieter than standard pumps!


Energy Efficiency	⊗
Water Conservation	○
Noise Abatement	⊗








BEFORE




AFTER

	"Before" 5HP Pump	VFD type Pump
Energy Consumption in kW after fine tuning flow rate to required levels	12.19 kW	3.76 kW
Decibel (Noise) Level	70-80 dB	7-10 dB
Annual Energy Use (KWh)	106,784 KWh	32,937 KWh
Annual Energy Cost at \$0.10/kWh	US \$ 10,678	US \$ 3,298
Savings		\$ 7,380 Or 69%



Pump Affinity Law




Speed (rpm)	≈	Flow (gpm)
Speed (rpm)	≈	Pressure ² (ft. of Head)
Speed (rpm)	≈	Power ³ (kW)


Example: Reduce speed
 3450 rpm → 1725 rpm (50%)

$\frac{1}{2}$ Speed (rpm) ≈ $\frac{1}{2}$ gpm
 $\frac{1}{2}$ Speed (rpm) ≈ $(\frac{1}{2})^2 = \frac{1}{4} \times \frac{1}{2} = \frac{1}{4}$ Head
 $\frac{1}{2}$ Speed (rpm) ≈ $(\frac{1}{2})^3 = \frac{1}{8} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ kW

3450 rpm → 1150 rpm (33%)

$\frac{1}{3}$ Speed (rpm) ≈ $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27}$ kW





Using Hydraulics to reduce filtration costs

Reduce system TDH

TDH = Total Dynamic Head
 = System backpressure
 = Resistance to flow
 = Feet or PSI

- Install large cartridge filters
 - Increased Surface area
 - Eliminates backwash valve
- Replace above-ground plumbing 90's with long-radius sweep 90's
- Increase above-ground pipe diameter
- Install heater by-pass

\$ The Cost TDH \$

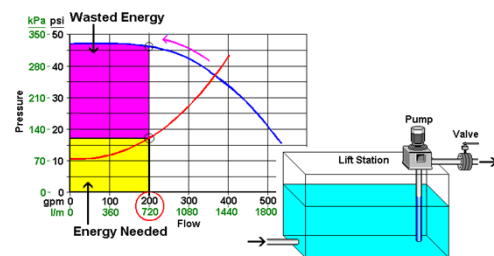


Every 1 psi increase in TDH adds an additional \$30 / year in electrical cost.

Standard Filtration Pump
Flow Rate: 100 GPM
Run Time: 6 hrs. / day
Elec. Cost: \$.20 / kWh

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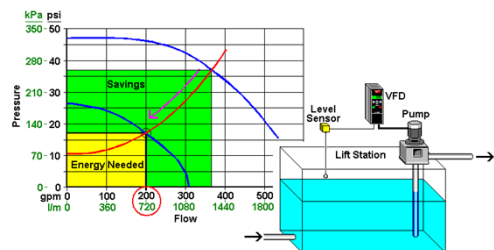
Throttling Flow



- Use a valve to throttle the flow back to 200gpm
- Pump rides up the pump curve – wasting energy

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Adjustable Speed



- Use a VFD to control the flow
- Pump rides down the system curve
- Saving energy

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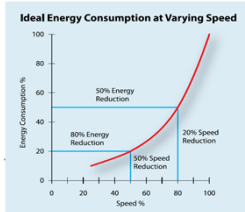
Using Variable Speed Drives To increase your efficiencies



- **Extreme Cost Savings** right out of the box!
- **Eliminates the need for heaters and starters.**
- **Reduce RPM 25%, see up to 50% Energy savings; Reduce 50% see up to 80% Energy savings.**
- **Single and three phase input**
- **Best efficiencies seen when teamed with Premium Efficient motors.**



Affinity Laws



**RPM and GPM are linear,
RPM and energy savings are not**

**20% reduction in speed is a
50% reduction in energy**

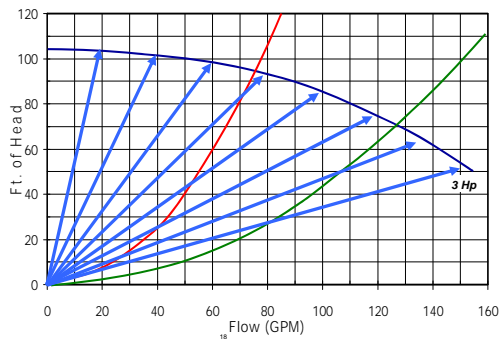
**50% reduction in speed is a
80% reduction in energy**

**Even a 10% Reduction in
Speed Saves over 25% of
Energy!!**

**If you get "doubters", this is
well know (Wikipedia,
Google)**

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Variable Speed Pump & System Curves



Why Control the Pressure/Flow?

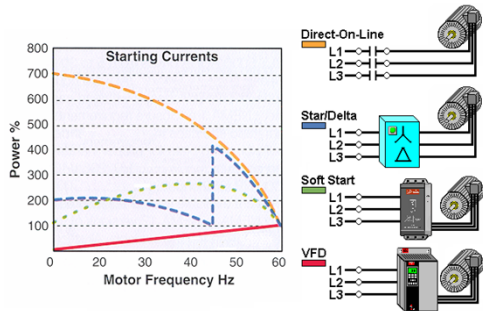


Water systems are designed for the “worst case” situations. Most of the time they have excess capacity. Controlling pressure & flow below its maximum

- Saves energy
- Improves system operation

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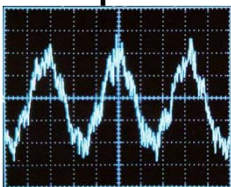
- Add two the three times to motor's life
- Preventative maintenance savings
- Decrease water hammer



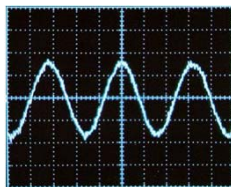
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Motor Current Comparison

5% energy savings from power clean-up




Conventional PWM Output

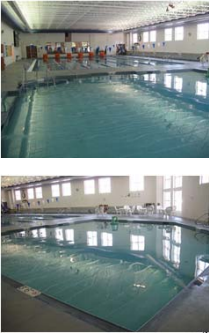


Drive Output to Pump Motor

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Commercial Acu Drive XS



- ▶ 5 Year old facility with 189,000 gallon competition pool and 40,000 gallon activity pool
- ▶ Sta-Rite 3-phase CSP pumps that run on 208 Volts
- ▶ Chlorine levels controlled by means of Acu-Trol AK600 controller with AKColor and Stenner pumps
- ▶ Pools heated by 4 Sta-Rite Max-E-Therm 400,000 BTU heaters

Benefits of using a VFD at your facility!!!!



Original State		Savings with change in turn-over rates		Savings without change in turn-over rates	
kW Reading	15.2	Average kW Reading During Operating Hours	11.0	Average kW Reading During Operating Hours	11.0
Hours/Day	24	Hours/Day	15	Hours/Day	24
Total Annual kW Used	1331.52	Total Annual kW Used	6022.5	Total Annual kW Used	96360
Electric cost per kWh	\$ 0.10	kW Reading During non-Operating Hours	3.3	kW Reading During non-Operating Hours	1.8
Annual Cost @ \$0.10/kW-Hr.	\$ 13,315.20	Hours/Day	9	Hours/Day	0
		Total Annual kW Used	10840.5	Total Annual kW Used	0
		Grand Total kW Used	71065.5	Grand Total kW Used	96360
		Electric cost per kWh	\$ 0.10	Electric cost per kWh	\$ 0.10
		Annual Cost @ \$0.10/kW-Hr.	\$ 7,106.55	Annual Cost @ \$0.10/kW-Hr.	\$ 9,636.00
		Projected Annual Savings	\$ 6,208.65	Projected Annual Savings	\$ 3,679.20

Field Analysis

Facility _____

Contact Information _____

Performance Criteria _____

Total Gallonage _____ GPM _____ GPM Required _____ Unrestricted GPM _____

Ft. of Hd. _____

Motor Specs _____ Power Factor _____

Energy Consumption _____ Facility Hours _____ Restrictor Valve _____

kWh cost _____ Pump Hours _____

Equipment Set _____ Backwash type _____ Pipe size _____

Pump Model _____ HP _____ Phase _____ RPM _____

Installation Type _____

Voltage _____ Amps _____ Est. Watts _____ Est. kWh _____

Estimated Energy Cost for running current Pump _____

Estimated Energy Savings with Pentair Acudrive _____

Notes: _____

Filters to fit any application.....



Pentair Water
Commercial Pool and Aquatics™
Commercial Acu Drive XS

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Cartridge Filters

THE GREEN FACTOR: Water flows very efficiently through the Cartridge filters, often allowing the use of smaller pumps or lower pump speeds to minimize energy use. And since consumers rinse cartridges rather than backwash, they significantly reduce water use, too.



Energy Efficiency	⊗
Water Conservation	⊗
Noise Abatement	○

Pentair Water
Commercial Pool and Aquatics™
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Heaters

Constant burning Pilot lights prohibited
Readily accessible On-Off switch
Resistance heating minimum restrictions
Gas Heater Efficiency minimum requirements 78%

- DOE currently rewriting efficiency standard – effective 2013

Heat Pump minimum efficiency of COP= 4.0

Pentair Water
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Higher Efficiency Heaters adding To Green experience

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Automatic System


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Chemical Controller Systems Increase ability To maintain chemicals efficiently and economically

Pentair Water
Commercial Pool and Aquatics™
Commercial Acu Drive XS


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BEFORE

➔



AFTER

	Before	After
Remote Monitoring	No	Yes
Real Time Monitoring		
PH	Yes	Yes
ORP	Yes	Yes
Pressure	No	Yes
Temp	No	Yes
Flow Rate	No	Yes
Data Recording	No	Yes

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LED Lights – Color and White

THE GREEN FACTOR: LED
(Light Emitting Diode) pool and spa lights are the most energy-efficient pool and spa lighting option available. Plus, they can last 30,000 hours or more, minimizing replacement cost and disposal.



Energy Efficiency ☒

Water Conservation ☐

Noise Abatement ☐



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LED Pool Lights increasing opportunity for better lighting and increased energy savings!!

Features:

- Equal to 500w, 400w, or 300 w Incandescent lights with max 70w rating
- Superior lens geometry and reflector design combine for wider beam and more uniform light distribution
- Stays illuminated, even if an individual LED is disabled





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White LED Pool Lights



500W Acu Drive

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NEW WHITE LED LIGHTS Camarillo, California YMCA



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LED Spa Lights



400 watt Incandescent



White LED Light (70W)

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***Thank you very much
for your time!!!!***

Questions???

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