

Pool and Spa Revisions

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Pump Horsepower

<i>Nameplate HP</i>	<i>Service Factor</i>	<i>Total HP</i>
$\frac{3}{4}$	1.67	1.25
1	1.65	1.65
1 $\frac{1}{2}$	1.47	2.2
2	1.3	2.6

IPSSA Issues

- Two-speed motors do not work with
 - Sand filters
 - Erosion chemical feeders
 - Solar heaters
- Two-speed 3/4 HP motors do not save energy
- Downsizing motors to 3/4 HP single-speed provides a significant savings opportunity

Agreed Upon Assumptions

- Average of **4.2** hrs/day single-speed filtration
- **2** hrs/day of high-speed operation
- Typical existing pool system curve goes through 66 gpm / 52 ft (half way between curves A & C)

Sand Filters

- Depth of sand utilized drops from ~6" to ~2" at low speeds
- But, more than 1/2 hour of high speed operation is sufficient to use full depth of sand bed



Erosion Chemical Feeders

- Require 20 gpm flow
- 3/4 HP pumps on low-speed provide 20+ gpm even with restrictive system (Curve B)
- Can be adjusted



Solar Heaters

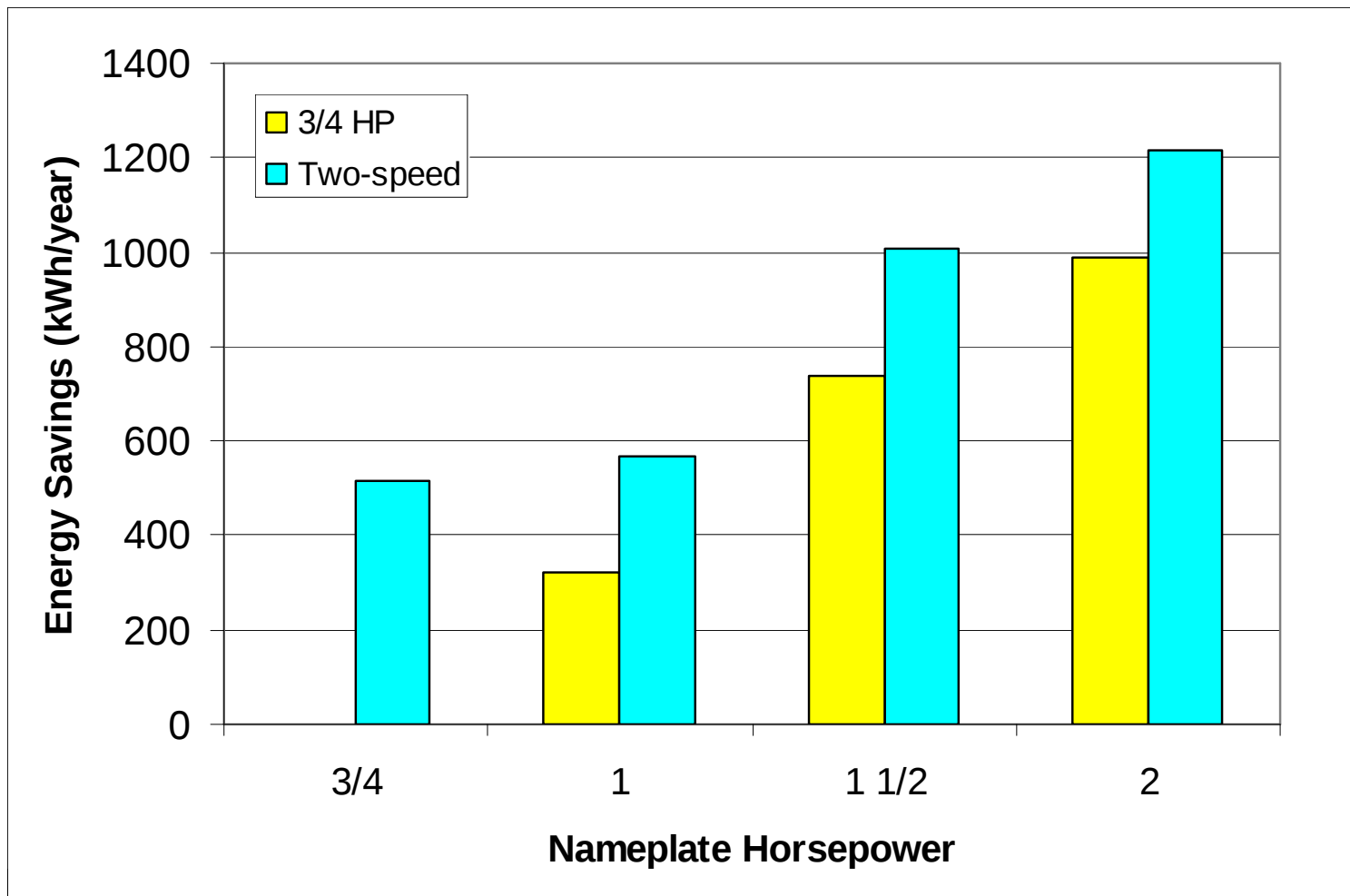
- Low-speed is often not sufficient to maintain circulation
- Assume 3% of pumps on high only. Based on:
 - 12% of CA pools have solar
 - 85% have single pump
 - 3 months operation



3/4 HP Pump Comparison

- IPSSA result of -62 kWh/yr based on
 - Single-speed operation of 3.75 hrs/day
 - $4.7\text{A} \times 115\text{V} = 540\text{W}$ on low-speed (no PF)
 - One pump (Pentair Whisperflow)
- Revised Calculations:
 - 4.2 hrs single-speed, 2 hrs high-speed, 342W on low, 3% high only, average of 7 pumps
- Results:
 - 516 kWh/yr, 1.0 BCR

Downsizing to 3/4 HP



Summary

- 3/4 HP two-speed motors save significant energy at marginal economics, but
 - 3/4 HP two-speed pumps currently expensive
 - Efficient low-speed operation is coming
- Lost savings from 3/4 HP single-speed:

Fraction Two-Speed	Energy (GWh)		Demand (MW)	
	First Year	10 years	First Year	10 years
100%	40.2	402	15.2	152
50%	30.9	309	10.9	109
Lost savings	9.3	93	4.4	44

Recommendations

- Retain current 45 day language of 1 Total HP for replacement motors
 - Consistency with pump/motor combinations
 - Prevent loss of savings for higher HP
- Change the following
 - Use only “Total Horsepower” definition
 - Add explicit language for effective dates
 - Require that multi-speed pumps be tested at two speeds

Spa Test Clarifications

- APSP and PG&E are in agreement on almost all suggested changes:
 - Spa volume definition
 - Operation of ancillary equipment
 - Normalization of standby power using a delta-T of 37 degrees
- Final comments are being drafted and will be submitted by October 13th