Pool and Spa Revisions

Presented to:

California Energy Commission

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Pump Horsepower

Nameplate HP	*Service Factor*	*Total HP*
¾	1.67	1.25
1	1.65	1.65
1 ½	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

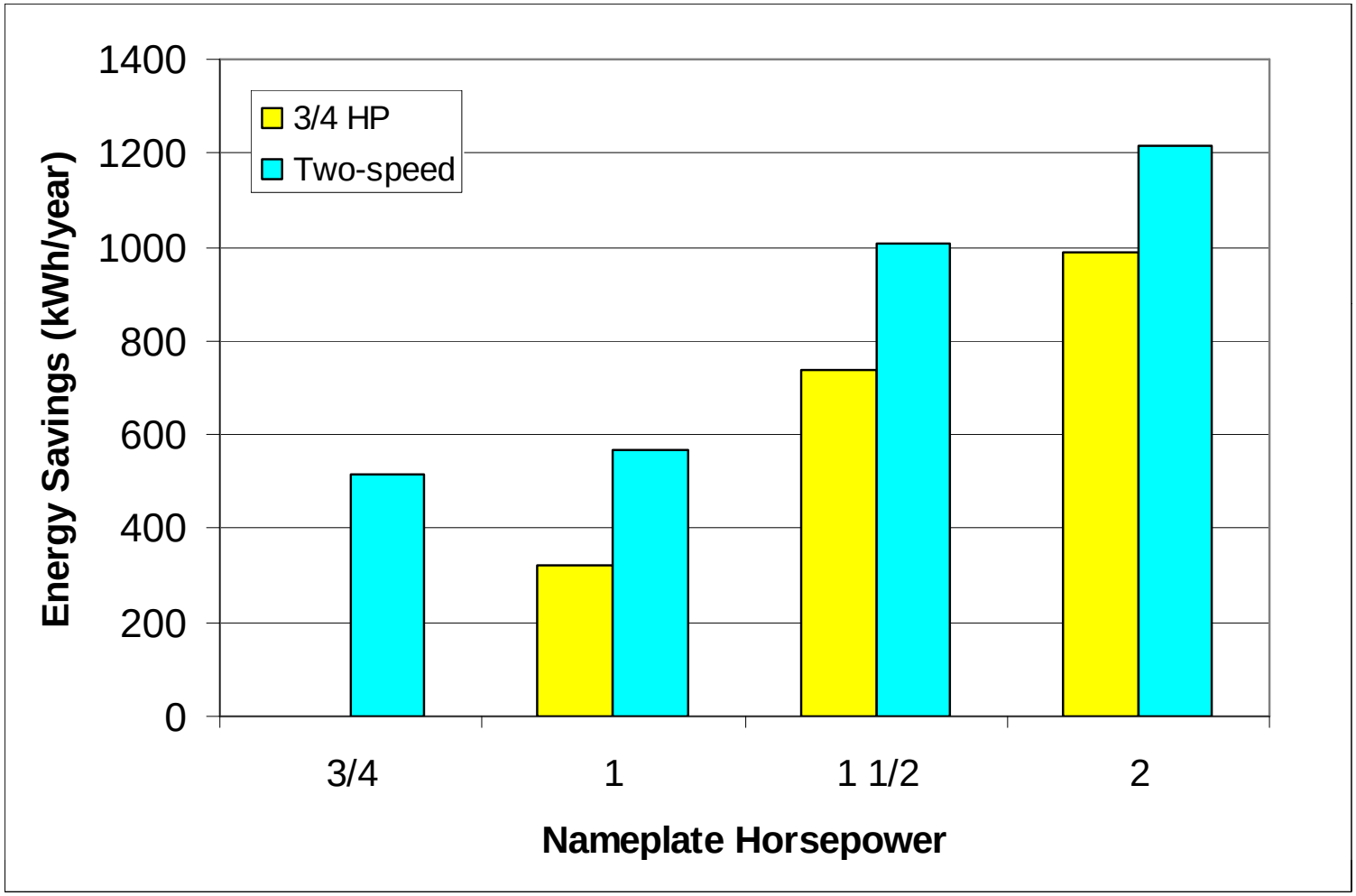
Solar Heaters

- 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
  - 4.7A x 115V = 540W 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/hr, 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) First Year	Energy (GWh) 10 years	Demand (MW) First Year	Demand (MW) 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
  - Consistancy 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