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POOL SAFETY AND SAVINGS

MANAGING THE RISK BEHIND THE FUN

*OVERCOMING AQUATIC CHALLENGES
WITH SELF-FUNDING MODERNIZATIONS*

*GEOHERMAL SOLUTIONS:
THERE IS NO COMPETITION*

CLEAR PROTECTION

THE VALUE OF HIGH-IMPACT WINDOWS



June Contents

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Pembroke Pines Retirement Village

OVERCOMING AQUATIC CHALLENGES WITH SELF-FUNDING MODERNIZATIONS



BY ALVARO
MENDOZA

The Pembroke Pines organization is a well-established and successful retirement village with 7,700 homes built between 1980 and 1998. The extensive amenities feature a 135,000 square foot clubhouse highlighted by a magnificently designed 10,042 seat theatre; party room for more than 900; and a heated indoor pool, outdoor pool, and outdoor spa. The separate Club Health facility includes a unique wave-walking pool, and there are 23 additional pools located throughout the sprawling square mile facility.



Photos courtesy of
Commercial Energy Specialists



ALVARO MENDOZA, PRESIDENT, COMMERCIAL ENERGY SPECIALISTS (CES)

Alvaro Mendoza is President of Commercial Energy Specialists (CES). CES helps you take total control of your pool operation for affordable, crystal clear water with guaranteed results. Programs are custom-tailored to each site and to each water treatment application. The programs consist of a combination of chemical treatment and filtration hardware, software, training, service, supplies, and ongoing support. Every program includes 24 hour per day direct automatic control of water chemistry, and the establishment of a comprehensive CES water quality treatment program on your site. For more information, call (561) 744-557 or visit www.ceswaterquality.com.

Aquatic Challenges at the Pembroke Pines Retirement Village

- All 27 pools located in a large sprawling site are older
- High manpower requirements to achieve DOH compliance
- High chemical costs, with peaks and valleys of chemical levels
- High maintenance costs with replacement of motor pumps
- Accelerated deterioration of pool finishes, heaters, and accessories
- Substandard water level control and monitoring of water consumption
- High cost of water due to undetected leaks in aging pools
- Lack of comprehensive automated controls for pool amenities
- Need for additional educational and structured tech support
- High relative energy costs
- Older clientele with higher skin and eye burn sensitivities.

Plan of Action

After conferring with the board of directors, CES proposed a series of self-funding modernizations. Utilizing a three-year lease purchase program, the board evaluated the package and found that the estimated savings in labor, chemicals, energy, water, maintenance, and liability would substantially cover the monthly leasing costs, thus designating the equipment room upgrades as self-funding.

Phase 1 Modernization

Phase 1 was designed to establish a baseline for a high-quality aquatic operation backed with extensive, on-site training, service, and support. Components of Phase 1 included:

- Installation of reliable direct control of ORP, pH, temperature, and flow
- Installation of CES motor control center with integrated VFD (MCC-VFD)
- Installation of chlorine and UDA™ (ultra-dilute acid) feed systems
- Precise digital laser monitoring and control of water level
- Monitoring, log-keeping, and alert notification of water consumption
- Centralization of control of all 27 pools at the maintenance office
- Remote monitoring of all pools on roving iPads and smartphones
- Direct control of water temperature in all heated pools
- Monitoring, log-keeping, and alert notification of all chemical inventory tanks
- Monitoring, log-keeping, and alert notification of Vacuum DE filter soiling
- Centralization of control at CES regional monitoring center.

ENERGY MODERNIZATION PERFORMANCE RESULTS

Chemical Treatment Peaks and Valleys Resolved

Prior to the conversion, the manual control of chlorine and pH levels on 27 pools experiencing varying loads posed an insurmountable challenge to the staff. Even using adjustable rate chemical feeders and applying tremendous oversight labor, it was virtually impossible for the staff to mechanically control the peaks and valleys associated with manual feed. The BECSys5 package has provided pinpoint control of ORP and pH on a 24/7 basis regardless of bather loads and weather conditions. The ORP has been consistent and DOH compliant, and the pH levels have seldom varied since the installation date. The results have been tremendous savings in chemicals and the reduction of algae blooms, cloudy water conditions, pool closures, and DOH citations. Chemical savings have been more than 30 percent of previous consumption, and additional labor savings from not having to continually check and adjust chemical level output have been significant.

MCC-VFD Power Conditioning, Alert Notification Saves Pool Pumps

Prior to the conversion, the site had experienced an alarming number of motor failures, many times costing more than tens of thousands of dollars a year. The CES MCC-VFD package, using the integral phase protection, line reactor, and integral power conditioning of the VFD, directly impacted the situation. The MCC-VFD also sends a run command to the pumps so they do not need to be manually reset after power outages, a real labor saving feature. Upon installation, major incoming spikes on the 230V Delta Hi-Leg power were detected on several pool sites while others received normal power. Using the integral fault logging system, the power company was approached, and they eventually replaced non-compliant transformers that fed several multi-story buildings and pool areas. These areas had previously been plagued with recurring and expensive motor failures, and the CES MCC-VFD has resolved this issue.

Water Loss Prevention

Shortly after installation of the digital water-monitoring package, two pools were found to have significant leaks. The auto-fill system

worked diligently to keep the pool at the proper level, but detected excessive consumption of water. Upon receiving a digital alert and after conferring with the maintenance staff, CES remotely disengaged the auto-fill system overnight and monitored the water level. One pool dropped 13.3-inches in 12 hours and was immediately closed for repairs. This type of leak would have previously gone undetected until a future months' water bill, which could have ranged in the thousands of dollars, or could have undermined the pool deck. Since then, several other pools have been cited for slower but considerable leaks, which were quickly repaired. The pool staff reviews water consumption periodically, and the issue of undetected water losses has been fully resolved, along with the increased cost of heating and chemically treating the additional water.

Significant Swimming Pool Pump Energy Savings

In order to attain compliance, the DOH code requires



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a precise flow rate for each pool. Original pump sizing was mandated using worst case (50' TDH) that is normally calculated by DOH as time of permitting. Previously the pumping system would provide either too much or too little flow, thus either wasting energy or causing the pool to be non-compliant with DOH codes. The DOH required flow rate was programmed as a set point in the BECSys5, and the system now maintains precise flow 24/7, reducing the power input of the motor automatically and significantly. When the filters are clean, it is common for the pump to be operating at 29–39 percent of normal power with the new installation, and the system automatically ramps up the flow as the filters get soiled, but continuously minimizes power consumption based on site conditions.

Streamlined Chemical Handling and Inventory Management

Before the energy conversion, the site had to apply a considerable amount of labor to the monitoring, handling, and filling of the pH and chlorine chemical crocks. The site had to prepare extremely diluted mixtures that would require frequent refilling. The 54 vats around the property would empty at different intervals, and occasionally vats would empty unexpectedly, and the pool chemistry would fall outside of the compliant chemical level, even causing algae blooms or excessive chemical consumption. The conversion prescribed a full-strength bleach mixture, and a stronger acid

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Vacuum DE filters use a fine diatomaceous earth powder that is coated on a filter septum and is located on the suction side of the circulating pump. The cleaning and re-coating process can take several hours depending on the size of the system. Prior to the energy conversion, the DE filters on the 27 pools would soil at an accelerated rate, and there was no way to know when they would soil. If they were proactively cleaned on a schedule, while some still were relatively clean, it wasted many hundreds of man-hours of labor a year. If they waited too long to clean (greater than 15 in. Hg), the filter rate would quickly drop below the DOH compliance level, and the

mixture that lasts considerably longer than the previously, heavily-diluted mixture. The conversion's digital chemical inventory monitoring and alert notification feature allows the tech team to be alerted when a chemical vat is within one to two days of being empty providing them time to program their inventory regimen and save many hundreds of man-hours a year. Also, the alert notification helps prevent empty vats that in turn, ensures DOH compliance and averts algae blooms.

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lowered flow rate would contribute to cloudy water, algae proliferation, heater issues, and poor distribution of chemically treated water. Additionally, at vacuum levels greater than 18 in. Hg, the pool pumps would cavitate, causing premature destruction of impellers, seals, and eventually motors.

The 24/7 direct control of oxidation rates and pH has helped extend the filter runs significantly thus providing tremendous savings in labor and water. The BECSys5 e-mail and text alerts, that occur when the filters are nearing their optimum cleaning cycle, have allowed the staff to streamline and program their filter-cleaning schedule for additional savings.

Local Remote Monitoring and Control of the Pools Real Time

The operation of 27 pools spread out over many hundreds of acres was a daunting task, and the maintenance supervisor had little idea of the location and the progress of his crews. Pools that needed service could not be prioritized, and pools that were in perfect condition may have been inadvertently serviced first. The energy conversion included a centralized monitoring station located in the maintenance office. All major parameters for each pool are prominently displayed on the maintenance supervisors' flat screen TV, near the break room.

There, any out of range conditions are easily detected, and the alarm panel provides a concise listing of all current alarm conditions. This provides a quick to-do list for

the crews to dissect and handle. As the alarms are corrected whether the filters are cleaned, chemical vats are filled, or otherwise the alarm drops off the screen, and everyone can see the progress in real time. The iPad-based, mobile route management software allows fine-tuning of the daily schedules on the fly, in order to ensure DOH compliance.

IMPLEMENTATION, SAVINGS COMPILATION, AND CONCLUSION

Florida Power & Light (FPL) Evaluation and Incentive

As part of an ongoing, comprehensive energy project on the site, FPL was called on to help evaluate the CES Energy Conversion proposal,

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validate the potential savings, and provide additional information or direction. Under the FPL Business Customized Incentives Program, specific operational data was evaluated including an extensive evaluation of pump output across the property in relation to DOH requirements. Using FPL's sophisticated savings calculators, the modernization had a savings estimate of more than 52 kW peak load reduction. According to FPL, this would account for more than 459,000 kWh savings a year, or more than \$41,000 of electrical savings at today's electrical rates.

After the installation, the savings calculations were validated, and the program received final approval. Based on this peak load reduction, the CES pool modernization program provided the retirement village with an energy savings rebate from FPL in the amount of more than \$10,000. Subsequent analysis of pump operations shows that the actual savings in electricity greatly exceeded the FPL estimate as a recent, mid-day review showed all pools operating at an average of 42 percent of normal power.

Savings Recap

As discussed above, the energy modernization provides savings from five major categories: labor, chemicals, energy, water, and maintenance.

- **Labor Savings** come from streamlining chemical filling, filter cleaning, remote pump resets, and programmed service routes. Time spent at each pool is substantially reduced as water level, water chemistry, flow rate, and chemical tanks are controlled or easier to maintain. Also, troubleshooting is a snap with interactive monitoring and control, alert notification, CES cyber equipment support,

and roving, iPad mobile route management. The staff size has been reduced, providing dramatic labor savings while also providing better response time.

- **Chemical Savings:** Savings were estimated at 3040 percent of normal consumption and 75 percent of specialty chemicals including algaecides, shock treatments, clarifiers, etc. Dispensing straight bleach instead of mixing and operating a dilute muriatic feed system lowers consumption of balancing chemicals. The pools that installed Pulsar feeders are saving even more due to the all-in-one chemical formula and lower consumption of acid.
- **Energy Savings:** FPL estimate of \$41,000 a year



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might be conservative as the pumps are running at a lower than estimated percentage of power. The site is looking forward to compiling several years of data to show full results.

- **Water Savings:** The energy modernization has already identified quite a few leaking poolst hat normally would not have been discovered until thousands of dollars of water charges later. Water savings also lead to lower heating costs, less chemicals, and lower sewage costs due to water reduction and the individual metering.
- **Maintenance Savings:** The power conditioning has saved many thousands of dollars in replacement pumps and motors, while chemical feeder maintenance has been greatly reduced. There is less wear and tear on the pool fishes, which will extend the life and save many thousands of dollars in future renovation costs.

Conclusion

The Pembroke Pines Retirement Village energy modernization is a terrific example of a self-funding package that provided a much-needed, mechanical equipment upgrade, and let the project pay its own way out of savings, even at a low cost of \$.09 per kWh. Similar installations located in areas with higher energy costs, or in the Islands where energy costs can reach \$.51 per kWh, would provide incredibly more dramatic savings.

Centralization of control, programming and streamlining of labor, enhanced

code compliance and liability avoidance, and pinpoint control of all major pool parameters quickly vaults the facility into one of the most advanced in Florida. The modernization has given the facility additional intelligence for the entire operation, and the on-site technical support and cyber support programs have provided instantaneous expertise to the operations. The managers and supervisors are providing their patrons with the safest possible pools and spas.

With Phase 1 under control and paying its own way, the facility is looking at commencing additional savings programs including Pulsar chemical conversion, hi-rate sand filter conversion, and supplemental oxidation programs such as saline, ozone, or UV treatment packages. ■

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