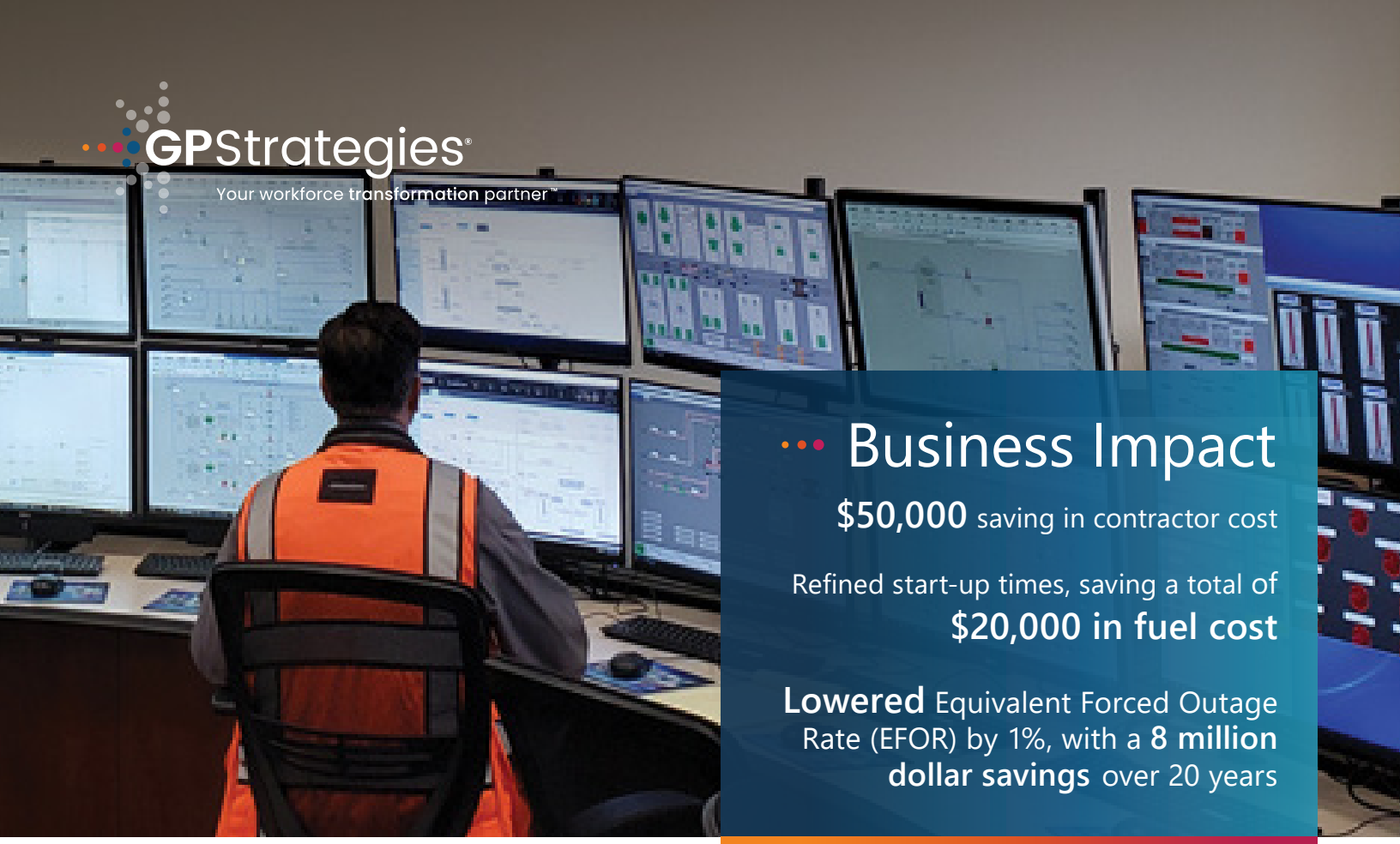
GPStrategies®
Your workforce transformation partner™



## Business Impact

**$50,000** saving in contractor cost

Refined start-up times, saving a total of **$20,000 in fuel cost**

**Lowered** Equivalent Forced Outage Rate (EFOR) by 1%, with a **8 million dollar savings** over 20 years

# CASE STUDY

## Technical Training to Power the AES Workforce

### Situation

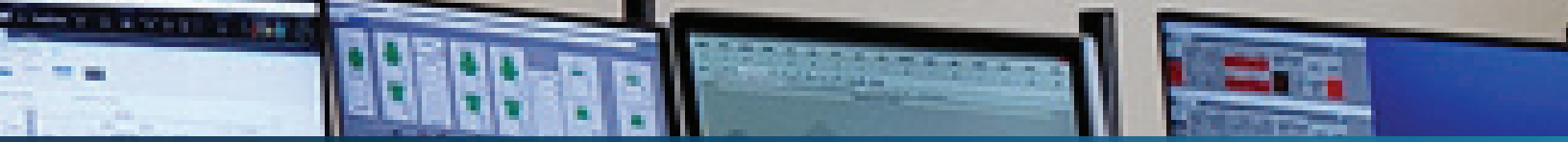
For AES, their mission is simple; to improve lives by accelerating a safer and greener energy future. From solar, wind, and natural gas, the power they generate lights millions of homes and businesses. With a company tag line of "We are the energy", they recognize that their people are the energy that makes it all happen; from achieving operational excellence to meeting the world's changing power needs. Therefore, ensuring that their staff were fully trained and competent in all aspects of their job was critical.

**Fully qualified personnel** in areas of environment compliance, safety, operability and maintainability of new CCGT plants.

### The Challenge | To Develop a Cross-Qualified Team to Operate State of the Art CCGT Plants

AES had three large generating assets in Huntington Beach California, Long Beach California, and Redondo Beach California. With the introduction to new regional laws, power plants were required to significantly reduce the use of ocean water for cooling. With this in mind, AES needed to repower their technology, and built two modern gas fired combined cycle power plants at their Alamitos and Huntington Beach sites.

The process, technology, and automation used in new Combined Cycle Gas Turbine (CCGT) plants were significantly different from the conventional gas fired steam generators. This ignited a range of challenges of AES, the most pressing being that their local talent had over 25+ years of experience with the older conventional gas fired units.





This created an urgent requirement to fill a significant technology gap in the AES local workforce to efficiently operate state of the art, highly automated CCGT plants. Another pressing challenge was that whilst the existing assets had a run profile of December 2020, part of the assets would retire at end of 2019, and so time was an integral motivator.

AES needed a program with training content to fill in the knowledge and skills gaps, and to provide a qualification process, thereby developing the team to be cross-qualified to support the overall business assumptions and goals in the business model.

The main goal was to design a training program that would be accessible to the plant operators. The program needed to train the workforce on the technical aspects and details of the new technology, whilst simultaneously giving them enough exposure to fully understand the complexity of the new units.

AES already had a well-established and great relationship with GP Strategies®. They recognized that GP Strategies had a broad based comprehensive library that was able to fill AES's potential needs, and knew that they had core fundamentals of power plant training in their library that was accessible to their technicians.

With this background, GP Strategies were selected to develop and deliver AES's training, along with TTP, Kiewit, and Western.

## The Solution | Utilizing GPiLEARN™ to Create a Center of Operational Excellence Through 3D Modeling and Simulator Training

Prior to designing the training, AES reviewed their business needs, researched the key players in the market place, and analyzed the knowledge base within the existing workers onsite. From this, they recognized that whilst some of their employees had limited experience with induction turbine technology, almost all of them had no experience in combustion turbine technology. This analysis informed them of those knowledge gaps and the action needed to address them.

AES worked with GP Strategies for 12 months prior to the program launch in January 2019. Together, they established 3 main factors:

- What their current state of AES was
- What their future state needed to look like
- What implementation measures had to be put in place so that they could train their workforce to take operational control

A comprehensive gap and requirements analysis was carried out to understand the various training modules required for Operations and Maintenance teams to successfully run the new CCGT power plants.

Once complete, GP Strategies worked to provide the overall e-learning platform for AES to upload and deliver all training material, develop qualification programs for the new technicians, and provide power plant fundamentals.

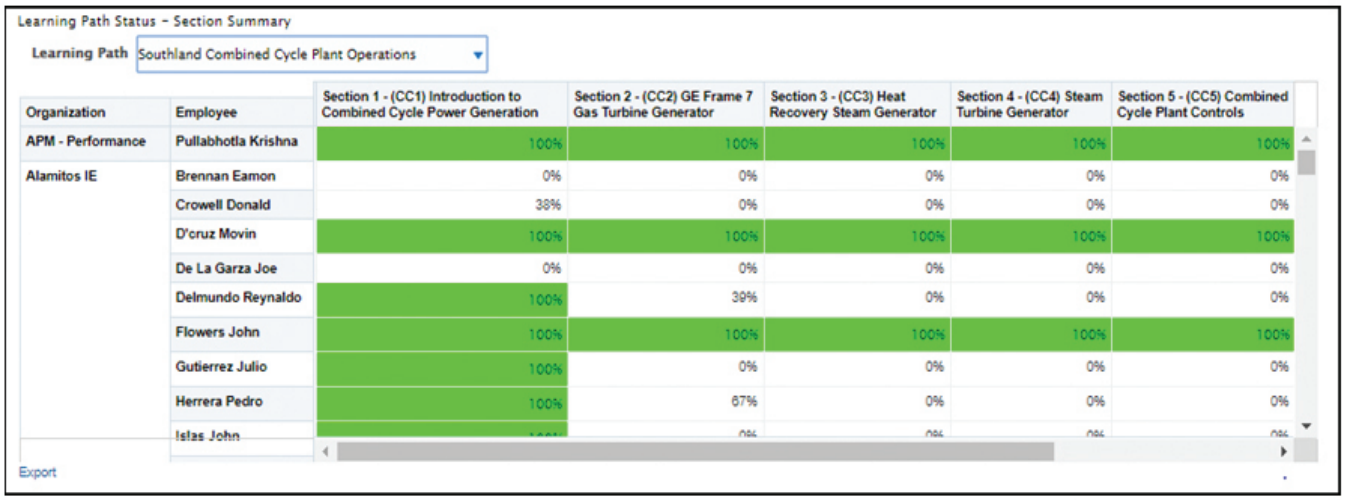
One of the key drivers for GP Strategies was turning unengaging training material such as PowerPoints into a more exciting, dynamic learning format. The 3D Modelling, LMS, Simulator Based Training and Qualification program was subsequently developed to create a center of operational excellence at AES.

## GPiLEARN

GP Strategies delivered AES' training through their GPiLEARN platform; GP Strategies' corporate training consultant program. Within this, AES had access to systems training, job performance measures, and fundamentals courses which all personnel had to go through. The training was delivered in two phases to two groups. Each of these groups were on separate sites, and were trained on different program elements.

**Overall Workforce Development**


**Reporting**



Learning Path Status – Section Summary

Learning Path: Southland Combined Cycle Plant Operations

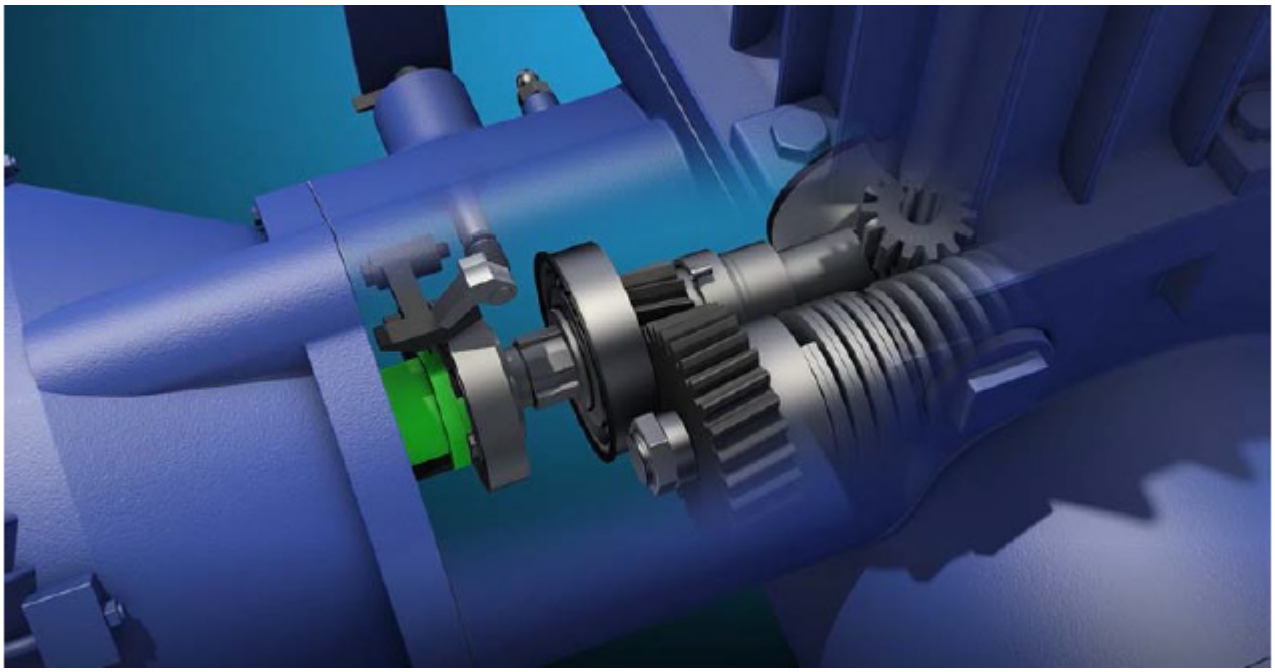
| Organization | Employee | Section 1 - (CC1) Introduction to Combined Cycle Power Generation | Section 2 - (CC2) GE Frame 7 Gas Turbine Generator | Section 3 - (CC3) Heat Recovery Steam Generator | Section 4 - (CC4) Steam Turbine Generator | Section 5 - (CC5) Combined Cycle Plant Controls |
|---|---|---|---|---|---|---|
| APM - Performance | Pullabhotla Krishna | 100% | 100% | 100% | 100% | 100% |
| Alamitos IE | Brennan Eamon | 0% | 0% | 0% | 0% | 0% |
| | Crowell Donald | 38% | 0% | 0% | 0% | 0% |
| | D'cruz Movin | 100% | 100% | 100% | 100% | 100% |
| | De La Garza Joe | 0% | 0% | 0% | 0% | 0% |
| | Delmundo Reynaldo | 100% | 39% | 0% | 0% | 0% |
| | Flowers John | 100% | 100% | 100% | 100% | 100% |
| | Gutierrez Julio | 100% | 0% | 0% | 0% | 0% |
| | Herrera Pedro | 100% | 67% | 0% | 0% | 0% |
| | Islas John | 100% | 0% | 0% | 0% | 0% |

Export

GPiLEARN combined GP Strategies' off-the-shelf technical and compliance content with a learner-centric LMS. GPiLEARN gave AES the ideal platform for offering three different training approaches; Instructor-led training (ILT), Online content, and on-the-job training. So, if a technician could not attend an instructor-led class, they could refer to the online content to fill in any knowledge gaps they may have missed.

## 3D Modelling and Simulators

Many of AES' technicians work directly in the field and could not physically attend one-to-one training sessions, so three dimensional (3D) training was developed for improved accessibility and to create a virtual world for them to explore. This included 3D model-based training, site-specific 3D videos, an online LMS for qualification tracking, and a high-fidelity simulator to prepare plant operators for start-ups and for operating the plant under a range of varying conditions.



3D modelling enhanced the training by replacing static 2D training material with a much more dynamic, visual approach. The e-learning system and approach to visually presenting technical information allowed the creation of content far superior to past programs in terms of depth and visualization. It also required 5x less training time, and thereby significantly reducing previous training costs.

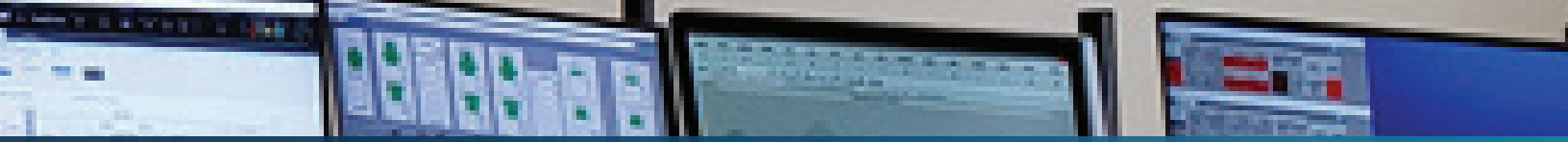
The 3D training modules provided a much more graphic and engaging approach to learning, covering complex topics including: Gas Turbine, Steam Turbine, Heat Recovery Steam Generator, Water Treatment, Air Cooled Condenser and multiple control systems. This enabled AES' workforce to move quickly and efficiently to becoming fully qualified operators and cross-functional technicians.

## Simulator

Much of the training was of a technical and complex nature. With that backdrop, and as part of the approach to creating more accessible and dynamic content, a high-fidelity simulator was developed.

The high and medium fidelity simulators created virtual plant scenarios where operators could learn normal, abnormal, and emergency response mechanisms in the operating plants. This allowed operators to develop the capabilities to run the power plants and understand the response mechanism during malfunctions, bypass, and abnormal scenarios that can exist during the power plant operation.

The simulator training increased the confidence of the operators by helping them to familiarize themselves with the new operations and procedures. They were able to practice those skills, and embed the knowledge in a safe environment, therefore preventing human errors that can result in plant trips during the power plant operation.





AES and GP Strategies were able to leverage their combined project knowledge to:

- Present classroom training
- Enhance Original Equipment Manufacturer (OEM) content
- Create detailed 3D maintenance procedures for Assembly, Dis-Assembly, Calibration
- Create operating procedures
- Enhance system descriptions with 3D graphics

The content delivered a much more accessible and engaging experience, providing deeper understanding and quicker learning than through conventional books and PowerPoints. The 3D model based training and visually stimulating presentation of complex technical content was a far more effective technique of training the workforce.

Through the 3D modelling and simulators, learners became skilled and competent in areas of environment compliance, safety, operability, and maintenance of new CCGT plants.

By utilizing GPiLEARN, the training could be accessed by AES businesses across the globe. It could also be replicated for any new power plant(s) that AES construct at present or in the future. The power plant can be gas fired, coal fired, wind based, solar or hydro-based power facility.

The LMS allowed AES to track and monitor the progress of the learners. Frequent reviews of proficiency exams were executed to identify any potential shortfalls in the training curriculum. After the knowledge-based assessments took place, they could then determine the level of proficiencies with each learner. For those who had knowledge gaps in specific areas after the initial training, refresher courses were available for them to relearn certain skills that they were lacking.

Site walk-downs were also carried out so that the knowledge of the technicians could be evaluated in real-time whilst on-site. Managers and supervisor would do these walk-downs with the teams to ensure they knew how to use the equipment and run the unit.

## Business Impact | A Blended Learning Approach That Delivered Cost Savings, Exceeded Operational Goals, and Enabled AES to Provide Reliable Energy to Their Customers

The training program was completed by April 2019, and AES saw a range of different benefits for both the technicians themselves and the company as a whole.

### For the technicians:

AES wanted a training program that would develop the skills and knowledge of their workforce. Since implementing this training:

- AES now have fully qualified personnel prior to first fire, and they have exceeded their operational goals.
- The workforce have become fully skilled and competent in areas of environment compliance, safety, operability and maintainability of new CCGT plants.
- The entire workforce can now carry out procedures with improved accuracy and less iteration/contractor time. This in turn has led to a $50,000 saving in contractor cost.

Operators and technicians were able to access the fully comprehensive, planned training program at their leisure and convenience. They also understood that AES values their experience, and that AES are committed to giving them all the tools to perform their jobs safely and reliably.



### For the company:

- The use of the simulator refined start-up times, which saved a total of $20,000 in fuel cost.
- The training program allowed AES to not only prepare their operators and technicians, but still operate their classic units as dispatched, and provide reliable energy to their customers.
- The use of the simulator in advance validated plant graphics, design, and logic prior to operations. A total of 110 items found, 7 items that would have tripped the plant on start-up. These can be tied directly to the early completion.
- As a result of the training program, AES have lowered their Equivalent Forced Outage Rate (EFOR) by 1%, with a 8 million dollar savings over 20 years.

### Learning design

Through implementing 3D modelling and simulators, AES simplified what was once complex technical information, into something that is engaging, dynamic, and valuable for the learners. Knowledge retention increased through the hands-on training, which in turn minimized the overall defects and reduced rework for plant operators.

AES have recognized that this type of virtual, e-learning training content is entirely cost-effective and that it simply does work. The benefits they have seen have now opened a door for them to use Virtual Reality Training Development in future projects and programs.

In conclusion, AES is now a center of operational excellence that ensures that their teams are prepared to operate plants safely and reliably for their operating business. The training was designed, developed, and delivered in a timely and efficient manner, and all timescales were abided by in order to meet the demands of specific run profiles. AES now have a workforce that understands how to perform their job, and more importantly, they recognize that they themselves are such an integral part of the company as a whole.

To learn more about how GP Strategies can help you LOWER COSTS while delivering both COMPLIANCE and SAFETY, visit **www.gpstrategies.com**.

### About GP Strategies

GP Strategies is a leading workforce transformation partner—one of the few truly dedicated global providers in the marketplace providing custom solutions. We believe our transformation focus, when paired with deep listening, a customer-centric approach, and innovative expertise, enables our clients to routinely achieve superior business and operational results from our evidence-driven and technology agnostic recommendations.

Whether your business success requires a change in employee performance and mindsets, learning technologies, or critical processes, GP Strategies is the transformation partner you can trust.

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