Approaches to ensure the sustainability of an industry can come in many forms. This virtual-reality solution is a case in point. It's now helping the USDOE develop and train those clean-coal power-plant operators that we'll need in the future.

Designed for use in integrated gasification combined cycle (IGCC) power plants with carbon capture, Invensys Process Management's SimSci-Esscor EYESIM immersive training system has been deployed at the U.S. Department of Energy (DOE) National Energy Technology Laboratory's Advanced Virtual Energy Simulation Training and Research (AVESTAR) Center in Morgantown, WV.

Wearing stereoscopic headsets, IGCC field operators are immersed in a virtual environment and given the ability to move throughout the plant, coordinating their activities with control-room operators as if they were in the actual facility. Users can experience and interact with IGCC plant equipment in real-time, activate transparent views of equipment internals, display pop-up trends of key process variables and experience equipment sound effects, malfunctions and

visual training scenarios.

Trainees at the AVESTAR Center learn about advanced IGCC plants using real-time simulators, much like those used to train airline pilots.

Moving through state-of-the-art

The EYESIM solution is the centerpiece of a new state-of-the-art training center that will help bring online a new generation of zero-emission IGCC power plants. The formal EYESIM site acceptance test was completed on July 16, 2012, after a complete plant startup, culminating a long-term project that began in 2008, when Invensys was awarded a contract by the DOE to simulate the IGCC process using its DYNSIM process modeling software.

“Training IGCC operators require us to simulate the chemical process of coal-gasification with CO2 capture together with combined-cycle power generation,” says Stephen E. Zitney, Ph.D. and Director of NETL's AVESTAR Center. “No one has ever done that before, but now with help from Invensys, we can simulate almost any operating scenario, including disturbances, malfunctions and emergency shutdowns. We can even train operators on different coal and biomass feed stocks. The developments we’ve accomplished and the technology we’ve

installed at the AVESTAR Center show the growing viability of IGCC power plants and indicate the growing demand for a well-trained workforce. We look forward to working with Invensys as we train and enable the clean-coal operators of the future."

The U.S. Energy Information Administration estimates that the United States has enough coal to last more than 200 years, but plants that continue to use conventional fossil-fuel technologies will emit unacceptable levels of CO2 and other pollu-tants. IGCC with carbon capture offers an environmentally friendly alternative by capturing 90% of the CO2 produced in traditional fossil-fuel-burning processes while at the same time reducing sulfur, mercury and other NOx emissions. The IGCC process is more environmentally friendly than other coal-burning processes, but is also extremely complex and requires skillfully trained personnel to operate what is effectively both a chemical processing plant and a power plant.

The EYESIM solution is also fully integrated with plant operating models, using the DYNSIM modeling solution, so actions taken by a field operator affect the plant's process, and actions performed in the control room change the information visible to the field operator. Fully interactive animations respond and react to the actions of plant personnel, illustrating how various pieces of equipment will operate under almost any scenario and condition. As a result, field and control-room operators learn to collaborate and perform as a team.

A gas-leak training scenario displayed in the IGCC immersive training system at NETL's AVESTAR Center.

Benefits here, now and later

Combining high-fidelity, real-time IGCC dynamic simulation with a fully interactive 3D virtual plant environment allows both control room and field operators to coordinate their actions and collaborate as a team. Additional benefits include training for safety-critical tasks, rare occurrences and emergency shutdowns. Aside from training, education and research applications, the DOE and its partners will use these realistic, hands-on, dynamic simulator-based systems to showcase clean-coal technologies that support a clean energy future.

"Our EYESIM immersive training system makes the theoretical and conceptual side of training more realistic and tangible by allowing operators and trainees to become familiar with the layout of the physical plant and how it will operate under almost any condition," notes Tobias Scheele, Ph.D., Vice President, Advanced Applications, Invensys Operations Management. "The solution combines stereoscopic 360-degree views with collision effects, sounds, lighting and weather conditions to give the plant operator a realistic walkthrough environment and simulated hands-on experience with the plant's physical operation, helping plant personnel improve operations excellence."

A separate EYESIM virtual-reality training system will be installed and commissioned at West Virginia University in Morgantown for student education and simulator training as part of assigned course work. In addition to training and plant design functions, the NETL and its research and development partners, including Invensys, will use the simulator to showcase the feasibility of clean-coal technology as a means to support future electrical generation demand without emitting environmental pollutants or greenhouse gases.

By offering a comprehensive IGCC training program, the DOE aims to develop a workforce well prepared to operate, control and manage commercial-scale gasification-based power plants with CO2 capture. **MT**

To learn more about AVESTAR and the NETL, visit www.netl.doe.gov/avestar . For details on

other Invensys SimSci-Esscor simulation solutions, visit iom.invensys.com/EN/Pages/SimSci-Esscor.aspx.

More Real-World Simulator Training

Eni Refining and Marketing, Italy's largest international refiner, is using a novel training solution built on Invensys Operations Management simulation technology. Combining immersive 3D virtual-reality software with its own refining expertise, Eni has installed EYESIM training kiosks at several of its facilities around the globe, providing a unique approach to refinery process training.

Using proven Invensys simulation software, which has been integrated with a gaming console controller, trainees, operators and other personnel can walk through a virtual refinery, learning process operations and procedures. They can also score and improve their performance with unrestricted access to the kiosks, which offer a fully lifelike plant experience. The focus is on reducing risks, improving safety and increasing the productivity and efficiency of the refinery.

The EYESIM solution enables engineers and operators to see and safely interact with the refinery and the processes they control. Applying gaming and other skills familiar to a new generation of employees, the solution combines virtual-reality technologies with high-fidelity process and control simulation, computer-based maintenance and documentation management and other applications to provide a highly realistic and safe training environment for improving operating efficiency and skills.

For more info, enter 14 at www.MT-freeinfo.com