Faced with increasingly complex and highly integrated market and grid operation, energy companies are now tasked with operating and maintaining the most challenging electric power system in history.

To be successful in this context, not only do operators need to acquire more system operations experience, but they also need to do it as quickly and efficiently as possible.

Additionally, the more senior operators need an effective environment to transfer knowledge and skills to new operators in a more effective manner using a realistic simulation environment.

Thus, operator training has become a key focal point, an increasing mandatory priority and a cornerstone of any energy company’s business success.

**Continuous training and operators certification maintenance**

With e-terra simulator you can train your operators and maintain their certification with the most realistic, efficient and cost-effective simulation environment.

The only additional model that e-terra simulator needs in addition to the real-time system EMS models are for prime-movers and relay simulation purposes. All of these models are maintained in a single, centralized and federated modeling environment.

The instructor simply needs to retrieve a previously saved dataset or models-set to load the e-terra simulator with data. In addition, the instructor can load the simulator with a snapshot of the real-time system conditions using a single click to invoke the “one-step initialization from real-time system” feature.

Next the instructor can use the simulator “replay mode” for a practical teaching exercise by replaying:

- Previously recorded real-time system conditions or disturbances
- Previously recorded senior operator actions to mitigate challenging conditions in a simulation environment.

**Customer Benefits**

- Continuous operators training
- Improved situation awareness
- Quality assurance
- Low cost of ownership
e-terra simulator’s "replay mode" directly uses recorded EMS measurements and events to replay disturbance conditions. For instance, while replaying past events and reviewing all relevant data, an operator can understand a particular disturbance and the subsequent coordination of protection devices.

e-terra simulator’s record and replay features are ideal for efficient knowledge/skills capture and transfer to help address the retiring workforce challenges.

In e-terra simulator’s “simulation mode”, the instructor can retrieve existing events scenarios, or create them using the intuitive “quick scenario builder” to insert the events in the scenario. Alternatively, the instructor can use the “automatic scenario builder” which automatically creates an event scenario based on recorded real-time conditions or disturbances.

In this comprehensive simulation environment, the trainees work in the exact same environment and have access to the same user interfaces, applications and processes as the ones they use as operators in the real-time system in the control center.

Throughout the training session, trainee(s) and instructor actions can be recorded for trainee evaluation and compliance monitoring purposes.

Complex drills, such as mandatory Emergency Operation training (i.e. black-out or disturbance restoration) with coordinated neighbors can be implemented with e-terra simulator. One of several dispatcher consoles can be used for instruction, as well as for entering actions of power plant and neighboring utility operators. The latter capability allows a trainee to practice activities which require coordination with other energy companies.

In North-America e-terra simulator is the solution to maintain your system operator’s NERC certification. Your training scenarios, including Emergency Operations Training, can now be presented to NERC and recognized as Continuing Education Hour credits.

**Improved situation awareness and system predictive analysis**

With e-terra simulator you can analyze past, present and future system conditions with what-if scenarios, look-ahead simulation and planning studies for improved situation awareness.

Used in conjunction with the historical system, e-terra simulator can replay and re-simulate previously recorded real-time system conditions. Comprehensive after-the-fact analyses with different what-if scenarios provide valuable insights for operational planning as well as operating procedures improvements.

Used in conjunction with the real-time system, e-terra simulator increases situation awareness in the control center:

1. e-terra simulator is initialized from current real-time system conditions with a single click using the “one-step initialization from real-time system” feature.

2. With the “fast simulation” feature, e-terra simulator performs a look-ahead simulation based on scheduled and forecasted information (i.e. Load Forecast, Generation Schedules, Transaction Schedules, Outage Schedules etc.) for the next minutes, hours or days. It can also include complex events scenarios.

3. Based on the look-ahead simulation results, operators now can mitigate major disturbances ahead of time and adapt their current operational procedures.

**Quality Assurance for new procedures, software applications and models**

With e-terra simulator you can test and define more secure and efficient processes, practice on them, and build up associated confidence, knowledge and skills to be ready in the operational environment.

**Low cost of ownership**

For users of ALSTOM Grid EMS solution, e-terra platform, the common use of applications, databases and displays in e-terra simulator means that staffing resources trained to maintain and support the EMS can effectively support e-terra simulator without additional training for the lowest cost of ownership.
The Core Technology

e-terra simulator reuses the core technology of e-terraplatform, ALSTOM Grid’s EMS solution.

The Energy Management System component of e-terra simulator is re-using the same real-time applications as e-terra transmission, e-terrategeneration and e-terrascada ALSTOM Grid’s solution for network security analysis, automatic generation control and SCADA.

The Story

e-terra simulator is your environment to perform key tasks for the success of your control center operation.

e-terra simulator is made of three major components:

- The Power System Simulation component provides the power system dynamic simulation functions
- The Energy Management System component contains network and generation application typically used in real-time EMS, such as state estimator, automated generation control, SCADA, optimization algorithms, etc.
- The Instructor Control component is used for setting up and controlling the simulation scenarios, reviewing the operators’ performance, and teaching the operators

Training with e-terra simulator provides a complete environment for system operators to practice operating tasks and experience both emergency and normal operating situations including:

- Automatic generation control
- Economic dispatch
- Supervisory control
- Interchange scheduling
- Voltage control
- Corrective action for loss of generation or transmission
- System restoration from blackout

Training staff, analyzing situations, and testing new applications within your control center can all be achieved with e-terra simulator.
e-terrasimulator is extensively exercised and enhanced for complex utility simulation needs and not only for academic and research studies. In addition, e-terrasimulator is used on every ALSTOM Grid EMS project as an integration and testing tool.

This is why your best choice for real-world and production grade simulation within your control center is e-terrasimulator.

With more than 25 years of experience delivering e-terrasimulator and working alongside customers on enhancements, ALSTOM Grid is committed to long-term support, training, consulting, and helping you continuously improve your control center operation in our increasingly complex power system environment.

The e-terrasimulator has an active user base that meets annually at a Working Group Meeting to share experiences and participate in the product direction process. The benefits of this Working Group Meeting to the industry has been recognized throughout and praised this year as ALSTOM Grid was awarded the 2005 Energy Training Product Of The Year award by Frost & Sullivan.

**e-terrasimulator is offered in two configurations:**

1. Standalone Simulator, including all three components: Power System Simulation, Energy Management System and Instructor Control. This system is generally used as a complete standalone training environment. It is the ideal environment to maintain your staff trained and certified for control center operation.

2. Simulation Engine, including the power system simulation and instructor control components.

   This engine can interface with an EMS using standard protocols for data exchanges. In the case of a non-ALSTOM Grid EMS, users can benefit from accurate simulation engine for operator training purposes; one can add selected advanced applications from e-terrasimulator’s energy management system, such as the state estimator, component to take advantage of ALSTOM Grid superior network applications in an off-line mode.

   For an ALSTOM Grid EMS, the simulation engine provides an ideal configuration for Engineering Analysis and QA/Testing in addition to operator training.

**ALSTOM Grid experts are ready to:**

- Deliver and commission an e-terrasimulator system at your site.
- Maintain your models and scenarios in hosted environment so that you do not have to maintain it.
- Work with you and support you in elaborating training scenarios and courses for operator certification (Continuing Education Program) and application training.

Alstom Grid Worldwide Contact Centre
www.grid.alstom.com/contactcentre
Tel: +44 (0) 1785 250 070
www.grid.alstom.com