

- 7:00 **Registration, Breakfast, Tech Expo & Solution Center**
- 8:00 **Arc Flash Hazard Analysis**
Application Cases & Practices using etap ArcSafety™ Solution
Antony Parsons, Schneider Electric, USA **Albert Marroquin**, ETAP, USA
- IEEE 1584-2018 has been in place for more than a year. During this period the industry has been challenged to reach consensus on how to apply the new standard. The biggest application “pain” so far has been the identification of actual equipment data for input to the study, including bus gap and electrode configurations in the equipment. The case studies to be presented discuss how to select the electrode configuration(s) for different equipment types and voltage levels, and how to apply the arc current and enclosure size correction factors without significantly increasing data entry time and effort. One of the presenters is the chair of IEEE P1584.1 revision subgroup, which is modifying guidelines to be followed on how to apply IEEE 1584 for arc-flash hazard calculations, and the other presenter was model validation vice-chair and technical editor of IEEE 1584-2018.
- 8:50 **Grid Code Compliance & Verification**
Case Study of Renewable Energy Impact Analysis
Mengna Ding, ETAP, USA **Tanuj Khandelwal**, ETAP, USA
- Grid codes are designed to ensure that power systems are developed and operated reliably and efficiently in the evolving power industry. For compliance of applicable grid codes, planning studies should be performed to ensure the power systems are planned, designed, developed, and operated cooperatively, reliably, and efficiently. In this session, several aspects of planning studies shall be explored and demonstrated using ETAP including harmonics, reactive power requirements, Low Voltage Ride Through (LVRT) capabilities, and relay loadability studies.
- 9:30 **Break, Tech Expo & Solution Center**
- 10:30 **Geospatial Electrical Network System**
Data Quality, Modeling Tools & Applications
Cyprian Moore, BLPC, Barbados **Victor Andrade**, ETAP, USA
- Network connectivity model is the most crucial step towards renewable energy penetration studies and feeder hosting analysis. Improve safety, efficiency and quality of service by making GIS data work for you in the field. Learn about geospatial network modeling and its applications for utility distribution systems.
- 11:20 **Data Centers: Design to Operation to Optimal Planning**
Linking Data Center Design to Operational Requirements
Schneider Electric, USA **John Francis**, ETAP, USA
- Gain better understanding of the challenges and corresponding ETAP solutions offered to data centers for mission critical applications. Panel will cover the practical application and benefits of ETAP solutions used for design and operation of colocation to hyperscale data centers.
- 12:00 **Lunch, Tech Expo & Solution Center**

- 1:00 **The Case for Online Monitoring Using ETAP Real-Time™
in a Nuclear Power Plant**
Improving Nuclear Safety, Regulatory Operability & Operational Cost with a Digital Twin
Mark Bowman, TVA, USA Shervin Shokoh, ETAP, USA
- At a given nuclear electric power plant, the auxiliary power system supplies electric power to the equipment on which the generation of electricity is directly dependent, i.e. pumps, fans, valves, etc. The auxiliary power system typically consists of a MV and LV AC distribution system as well as a DC distribution system, powering thousands of individual loads and circuits. This presentation is intended to explore past practices as well as recent developments in online monitoring of such systems using a digital twin. This includes the reasons for utilizing online monitoring, advantages of using a digital twin versus simple data collection, and the multi-faceted benefits that can be realized from such a system (i.e. business case, safety case, operability case).
- 1:50 **To Shed or not to Shed?**
etap iLS™ Proactive Load Shedding System in Action
Empresas Públicas de Medellín, Colombia Hugo Castro, ETAP, USA
- Two main factors must be considered for an effective load shedding system, amount of load to shed and response time to an event. The amount of load to shed is dependent of the dynamic response of the available power sources. Their response is determined by environmental conditions, fuel type and availability, control settings, operational and technical constraints, reliability requirements and external grid factors. A comprehensive yet faster-than-real time solution is required to effectively maintain the stability of the system. In this presentation we will cover implementation of ETAP ILS in a Wastewater Treatment Plant with multi fuel source generation including biogas, from technical to monetary benefits. We will also explore the implementation in an electrical distribution network for on-demand load shedding with reliability considerations.
- 2:30 **Break, Tech Expo & Solution Center**
- 3:30 **Field-Proven eSCADA, DMS, OMS Solutions**
ADMS Deployment & Commissioning for Smart Grid
Deven Patel, Enzen, India Hossain Shaikh, ETAP, MENA
- ETAP and Enzen Global have successfully deployed ETAP's model-based Advance Distribution Management System (ADMS) based on CESC smart grid initiative – one of the largest smart grid projects in India. Learn about the features, capabilities and benefits of this integrated model driven ADMS that has transformed CESC network into an intelligent, adaptive, and sustainable grid that provides reliable and quality energy for their customers.
- 4:20 **Operator Training Simulator**
Benefits & Utilization of a Model-Driven OTS
Derek Dean, ETAP, USA
- The utilization of Operator Training Simulator has become a key factor in system design and operations, resulting in employee safety, improved operator productivity, maximizing system performance and minimizing risk. Learn about ETAP model-driven dynamic stability based OTS and its applications in one of the largest Oil & Gas facilities.
- 5:00 **Welcome Reception, Tech Expo & Solution Center**

7:00

Registration, Breakfast, Tech Expo & Solution Center

8:00



Design to Real-Time Operation to Optimal Planning

Opening Keynote

Farrokh Shokooh, ETAP CEO

Digital Twin technology can help improve performance across the power system lifecycle from capital project execution through ongoing operations. These lifecycle phases include Pre-FEED, FEED, Automation System Design, FAT, Operator Training. On the ongoing operations side, Digital Twin technology helps improve safety, training, knowledge transfer, environmental, regulatory compliance and optimization. Hear from the visionary and thought leader, Dr. Shokooh about the existing and upcoming model driven technology innovations that are poised to drive Operational Excellence.

8:30



The Next Wave of Energy Innovations

Guest Speaker

Michio Kaku, Renowned Theoretical Physicist

Dr. Michio Kaku is a theoretical physicist, bestselling author, acclaimed public speaker, renowned futurist, and popularizer of science. As co-founder of String Field Theory, he carries on Einstein's quest to unite the four fundamental forces of nature into a single grand unified theory of everything.

In his talk, Dr. Kaku will discuss how breakthrough technologies such as Super Batteries & Energy Storage Devices, Renewable Energy, Fusion Power, Quantum Computers, and Learning Machines will revolutionize the energy industry in the next two decades.

9:30

Break, Tech Expo & Solution Center

10:30

Model-Driven Intelligent Controls

Microgrid, Power Plant, & Load Shedding Controllers

Amman Minerals, Indonesia **Ashok Kumar Tickoo**, Dangote Oil Refinery, India **Hossain Shaikh**, ETAP, MENA

Learn from our panelists in this intriguing session about the role and evolution of controllers for power system edge control. Best practices in a systematic process for designing, testing and deploying a microgrid controller will be discussed as well as analytical insights for improved decision-making. Leverage distributed energy resources (DER) including solar, wind and energy storage systems for optimal system operation with ETAP μ Grid™.

11:15

Co-Simulation Technologies

Challenges & Benefits of Multi-Energy Systems & Transients

Echigoya Takuo, Toshiba Plant Services, Japan **Janet Parker**, AVEVA, USA

Fabian Uriarte, ETAP, USA **Tanuj Khandelwal**, ETAP, USA

Co-simulation is an emerging enabling technique, where global simulation of a coupled system can be achieved by composing the simulations of its parts. Due to its potential and interdisciplinary nature, co-simulation is being studied in different disciplines but with limited sharing of findings. Learn from our panelists the potentials of co-simulation technology, applications that have already been deployed and some of the challenges that have already been solved.

12:00

Lunch, Tech Expo & Solution Center

All sessions to offer CEUs/PDHs to satisfy Continuing Education requirements

- 1:00 **Applied Real-Time Predictive Simulation**
Model-Driven Power Management System Applications & Benefits
Geir Nordvik, Equinor, Norway **Mahmoud Ramadan**, PBF, USA
Bjørn Bungum, Unitech, Norway **Shervin Shokooh**, ETAP, USA
- This panel session is intended to explore past practices as well as recent developments in online monitoring and real-time predictive simulation of electrical power using a digital twin. We will examine how model-driven approach and process helps engineers and operators increase their understanding of systems in a cost-effective and repeatable environment by offering Situational Intelligent & Operational Awareness to predict system behavior in response to actions and events while proactively recommending and implementing decisions to improve design and operations.
- 2:00 **The Need for Centralized Relay Asset Management System**
Industry Challenges & Benefits of an Automated Protection Change Management
Mohammed Daod, PBF, USA **Derek Dean**, ETAP, USA
- As protection systems becomes more complex with multiple users maintaining devices from different vendors, it quickly becomes a daunting task to manage your relays and protection infrastructure. Discover how eProtect is a vital tool to manage your assets while synchronizing design and operation digital twins. From settings automatic device interrogation with real-time notifications to work order management and maintenance scheduling, eProtect is an extremely powerful tool for all users.
- 3:00 **Break, Tech Expo & Solution Center**
- 4:00 **Analysis of Railway Traction Power System with eTraX™**
AC & DC Modeling, Simulation, Protection, EMI
Bruce Rockwell, American Electrical Testing, USA **Javier Guerrero**, Ineco, Spain
Jacob Philip, ETAP, India **John Francis**, ETAP, USA
- Gain better understanding of the challenges and corresponding ETAP solutions offered to railways systems. Case studies will cover the practical application and benefits of eTraX™ Traction Power software for AC and DC railway systems.
- 5:00 **Welcome Reception, Tech Expo & Solution Center**
- 6:30 *etap*  *Ball*
Dinner & Entertainment

7:00

Registration, Breakfast, Tech Expo & Solution Center

8:00

Arc Flash

Auto Evaluation & "Ease-of-Use" Analyzer Features

Albert Marroquin, ETAP, USA

This presentation introduces to the industry the concept of constant I.E. area plots (C-area plots). C-area plots are highly beneficial and help to reduce many of the "pains" involved in AF analysis. These time-saving tools allow the consideration of multiple "worst-case" scenarios during the protective device coordination (PDC) stage. C-area plots also reduce the scope of an arc-flash analysis by referencing a target incident energy during PDC. A live demo on the automatic evaluation of C-area plots using the new STAR-Auto arc-flash interface is included. Also, the new features of the arc-flash result analyzer which significantly reduce the "challenges" involved with AF result analysis and the creation of deliverables will be presented.

8:50

Protection & Selectivity

Zone Selective Interlock Simulation and Application

Pirooz Barkhordar, ETAP, USA

Traditional Zone Selective Interlock (ZSI) scheme has potential to improve the overcurrent protection and reduce the arc flash hazard by minimizing the trip time. Advanced ZSI scheme can additionally enhance the selectivity between protective devices. ETAP supports efficient modeling and simulation of ZSI with easy to use smart tools, such as zone based ZSI wiring and Auto-Evaluation. In this tutorial, the application of ZSI for improvement of protection, selectivity, and arc flash hazard mitigation is demonstrated for practical system and powerful simulation capabilities will be demonstrated.

9:30

Break, Tech Expo & Solution Center

10:30

Dynamic Protection

Integrated Dynamics, Protection & Control Simulation

Mohammad Zadeh, ETAP, USA **Anirudh Malik**, Mangan, USA

Several protection functions such as out-of-step, generator loss of excitation, differential and wide-area protection schemes act based on system dynamics. Verifying and tuning relay settings during system transients are mandated by many grid codes. Fault characteristics of renewable resources also depend on their control logic and dynamic interaction with rest of the system. ETAP offers a unified protection and dynamic stability analysis module to properly design, simulate and study today's power systems.

11:20

Low Voltage Electrical System Design

Accelerate System Design with an Integrated Solution

Shervin Shokooh, ETAP, USA

ETAP provides a powerful set of calculation tools for design, sizing, and analysis of low voltage electrical installations. As an integrated LV and MV solution, the software utilizes an intelligent one-line diagram, rule-based design, and automatic equipment evaluation combined with the flexibility of a multi-dimensional database and smart interface with Revit® BIM to simplify and accelerated the electrical design process.

12:00

Lunch, Tech Expo & Solution Center

- 1:00 **DC Rail Traction Power**
Design & Analysis
Jagadish Subbaramaiah, Arcadis, India **Aparna Sinha**, ETAP, USA
- Learn how an existing etap model can be expanded to include unified AC & DC traction power analysis for power flow and fault analysis. Arc flash continues to be one of the potential hazards in electrical systems and hence needs a detailed investigation to mitigate the associated risks. Arcadis were engaged by Nexus Rail UK to carry out an evaluation of the hazards associated with “Arc Flash” for their Electrical system. One of the key challenges in the project was correct information of the existing plant was not readily available. In addition, creation of consolidated network from various sub elements was quite complex. Further operation and control functionalities were constrained by the existing electro-mechanical relay-based protection system. Learn how engineering experience & judgement combined with ETAP software enabled Arcadis to provide an acceptable solution to their Client and mitigating the inherent risk.
- 1:50 **Short Circuit Analysis**
Compliance with the Latest Standards & Applications
Jun Qiu, ETAP, USA **Giovanni Gambirasio**, SELECTY, Italy **Aleksei Korolev**, ETAP Systems, Russia
- Short-circuit contributions, both ac & dc components, from various sources change as function of time. This time-varying behavior is crucial for device evaluation and protection of DC and marine or offshore power systems. Detailed machine models are required to conduct calculations to accurately capture short-circuit decaying prenominal. ETAP provides the most comprehensive network analysis software to perform time domain short-circuit analysis for distribution, transmission, and traction networks. Learn about the latest enhancements in ETAP including device duty based on IEC 61660, IEC 61363 and GOST standards.
- 2:30 **Break, Tech Expo & Solution Center**
- 3:30 **Time Series Power Flow Analysis**
Quasi-Dynamic & Time Domain
Tanuj Khandelwal, ETAP, USA
- Quasi-Dynamic Time Series (QDTS) power flow is a pain to simulate dynamically changing load and generation over a day to years of high resolution data. QDTS is not just hundreds of independent power flow snapshots. ETAP QDTS captures low frequency dynamics of a distribution system. It memorizes previous state and then intelligently solves unbalanced steady state power flows with control actions quickly for annual DER/EV effects, load growth, losses and so on.
- 4:20 **Energy Storage**
Modeling, Simulation & Control
Ahmed Saber, ETAP, USA **Chen Xu**, ETAP, USA
- In recent days, Energy Storage (ES) is used for various purposes from large scale grid level up to small scale home level. Some applications are frequency regulation, unwanted tap changes for voltage fluctuation, PV-wind system energy smoothing, hosting capacity, energy arbitrage, maximum uses of renewable energy, transmission congestion, high ramp rate (duck curve), net zero energy-emission, uncertainty/dispatchability, 24/7 power supply, reliability/resiliency, and so on. However, ES modeling-simulation, necessary manufacturers data collection, intelligent ES parameter estimation are still challenging. Learn about ES modeling, simulation and control in the tutorial that covers Supercapacitor and Lithium Ion based Energy Storage for Microgrid, Power Plant, Railway and so on.
- 5:00 **End of Day 3 Tutorial Sessions**

- 7:00 **Registration, Breakfast, Tech Expo & Solution Center**
- 8:00 **Volt/Var Optimization & Control**
Distributed Energy Resource Management
Hugo Castro, ETAP, USA TNB, Malaysia
- Volt/VAR Optimization & Control is an advanced function that determines the best set of control actions for all voltage regulating devices and Var control devices to achieve a one or more specified operating objectives without violating any of the fundamental operating constraints (high/low voltage limits, load limits, etc.). Learn about how this technology is being used by utilities to save energy cost and provide improved quality of service to their customers.
- 8:50 **Microgrid Controller**
Model-Driven Design & Control
Fabian Uriarte, ETAP, USA
- Microgrid control strategy heavily depends on microgrid resources, operation conventions and reliability requirements. ETAP offers a model-driven microgrid controller that significantly simplifies the process of developing and testing microgrid control functions to meet customer requirements. In addition, a digital twin of the controller is always available to perform required studies. Economic dispatch, rule-based dispatch, load shedding, black start and renewable smoothing are main control functions of ETAP Microgrid Controller.
- 9:30 **Break, Tech Expo & Solution Center**
- 10:30 **Power Plant Controller**
WTG & PV, Edge & Plant Level Control
Mohammad Zadeh, ETAP, USA
- Power plant controllers are required to coordinately control renewable resources as well as to ensure local grid codes or standards are complied. ETAP offers a model-driven Power Plant Controller that can be easily configured to meet various local grid codes or standards. Active and reactive power control, power rate control, frequency support, support an external APIs to receive set points, manage plants with energy storage and STATCOM and renewable smoothing are main functions of this product. A digital twin of the controller is always available throughout the power system design and operations lifecycle.
- 11:20 **Feeder Hosting Capacity**
PV, Smart Inverter Location & Planning
John Francis, ETAP, USA
- Photovoltaic (PV) is the most suitable form of renewable generation in the present distribution system. However, in an existing feeder, the amount of PV accommodation is limited because of utility-established acceptable limits of higher voltage, voltage unbalance, harmonics, transformer rating, line thermal overloading, regulation equipment, protection coordination, feeder configuration, load profile and many more. It is important for feeder operation and planning to calculate the amount of PV that can be hosted inside an existing feeder subject to satisfy voltage limit, thermal limit, harmonics limit, and protection criteria – often referred to as feeder hosting capacity (FHC)

1:00

Voltage Stability

Concepts, Assessment & Indices

Haijun Liu, ETAP, USA Ling Jiang, ETAP, USA

Improve system planning & long-term interoperability by accurately identifying the system maximum load carrying capacity & reactive power compensation requirements. Voltage Stability Analysis provides assessment of weak, unstable or uncontrollable areas of the electrical network that may jeopardize future load growth due to unexpected voltage collapse. Conducting an effective Voltage Stability analysis is essential for system planning and long-term interoperability.

1:50

Advanced Fault Analysis System

Accurate Fault Identification & Location

Derek Dean, ETAP, USA

As systems become increasingly more complex it can be a major challenge to identify the source of an outage. With a robust and integrated Advanced Fault Analysis Software system can go from a major outage to a slight disruption. Leveraging our powerful analysis tools, the ETAP AFAS solution provides for a state of the suite for analysis, operations, protection / model validation, and post hoc analysis.

2:30

Break, Tech Expo & Solution Center

3:30

Available Transfer Capability

Generation Adequacy Analysis

Ahmed Saber, ETAP, USA Sifang Zhao, ETAP, USA

With the introduction of energy de-regulation, it is possible for customers to buy less expensive electrical energy from remote location. As a result, system operators face the pain to monitor and coordinate power transactions taking place over long distances in different areas. ETAP Available Transfer Capability (ATC) is a measure of the transfer capability remaining in the physical transmission network for further commercial activity over and above already committed uses allowing single and multiple contingencies. ETAP uses state-of-the-art intelligent optimization techniques with complete power flow to calculate more accurate ATC that transfers cheap and reliable power.

4:20

Asset Management – eProtect™

Centralized Relay Database Management

Derek Dean, ETAP, USA

Learn about eProtect: Enterprise Asset and Protective Relay Settings Management Solution that offers electrical power utilities and industrial customers a comprehensive power protection package. This includes Data, Setting and Testing Management and Life Cycle Management of Protective Relays integrated with ETAP Star and StarZ protective device coordination modules.

5:00

End of Day 3 Tutorial Sessions

Microgrid Controller for Energy Management

ETAP Training Center - 17 Goodyear, Irvine, California

ETAP 192

Microgrid Controller for Energy Management

Model-Driven Solution with Validation for Design & Operation Lifecycles

Day 4

Microgrid Fundamentals

- Role of Microgrids
- Requirements
- Challenges & Solutions

Network Modeling & Studies – Design Phase

- Renewable Energy Modeling including PV, Wind & Energy Storage
- Analyzing Dynamic & Steady-State Events & Disturbances
- Establishing Requirements for Microgrid Control to Support Business Objectives, Resilience & Clean Power

Control Logic Validation – Design Phase

- Defining objectives for controller logic
- User Defined Logic (UDL) software interface
- UDL parameterization
- UDL Validation for dynamic & steady-state operation

Microgrid Control Integration – Maximize performance

- ETAP Microgrid Controller Architecture
- Preparing ETAP Microgrid Model for System Integration
- Deploying UDL to controller hardware
- Utilizing Hardware-In-the-Loop (HIL) or Software-In-the-Loop (SIL) to validate controller hardware operation

Day 5

Microgrid Hardware & Communication Integration

- Device communications infrastructure
- Communication Protocol Configuration
- System redundancy deployment
- Communication to SCADA System

Data Acquisition & Microgrid HMI Deployment

- HMI Designer and template utilizations
- SCADA Server deployment
- Web Server deployment

Network Operating Center – SCADA Applications

- Alarms & Events
- Data Archiving & Historical Applications
- User Reports

Network Operating Center – Advanced Applications

- Prediction of controller response to various system changes
- What-If Analysis & Predictive Simulation
- Forensic Analysis
- Integration with ADMS System
- Energy Demand Monitoring

The purpose of this introductory 2-day hands-on workshop is to develop an understanding of ETAP Microgrid Controller and its journey from Power System Design, Validation to Deployment & System Integration.

This hands-on training will help you understand microgrids, best practices for their operation and control as well as energy management principles applied to the microgrids. This workshop is divided into three main microgrid topics, which will help engineers and scientists to gain the skills and required confidence to meet their organization's needs, define microgrid specifications and to position themselves for their job responsibilities.

Seating is limited – almost fully booked