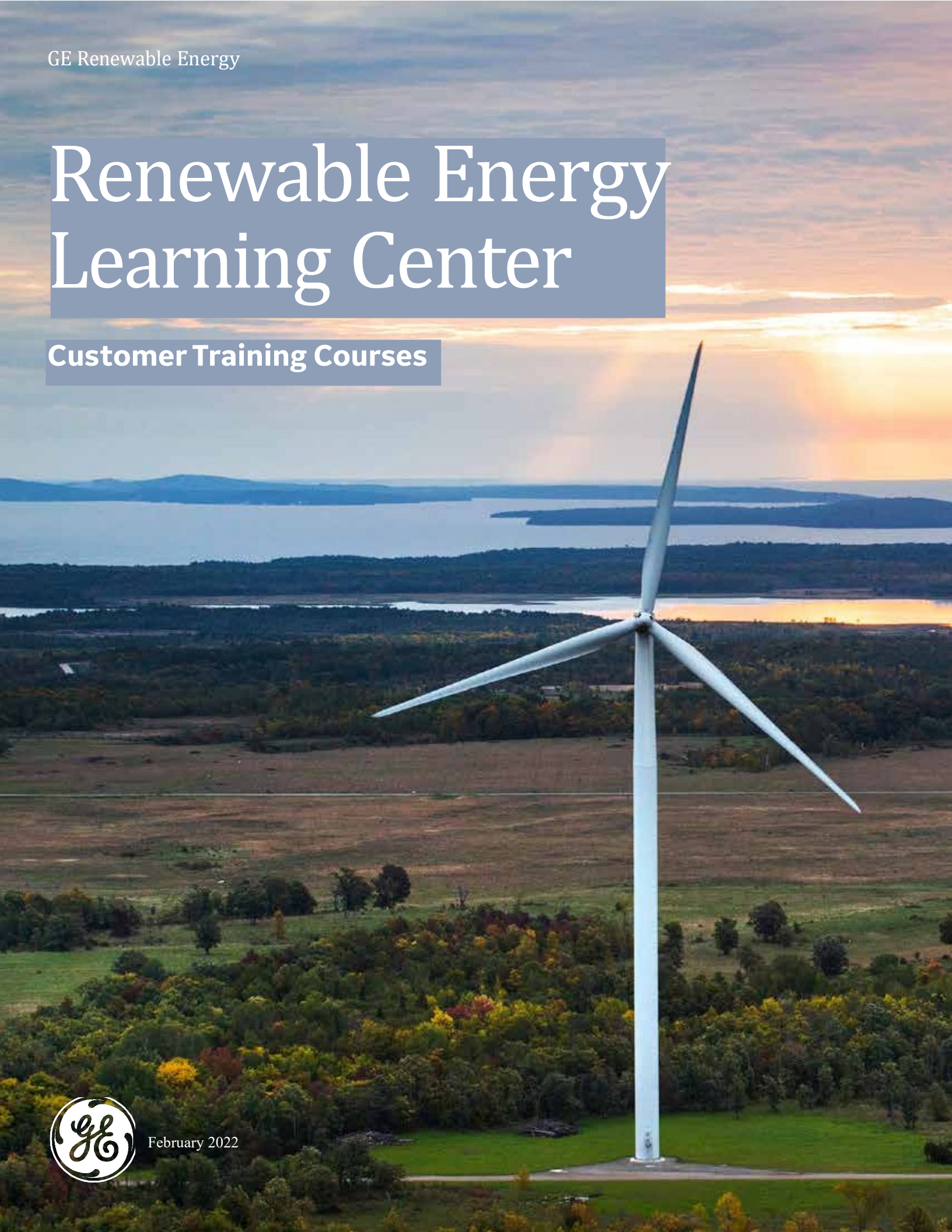
GE Renewable Energy

Renewable Energy Learning Center

Customer Training Courses



February 2022

Benefits of Training at the RELC

Leveraging the breadth and depth of GE knowledge and investment to support safe, efficient, and effective turbine operations.

The Renewable Energy Learning Center (RELC) in Niskayuna, NY offers a wide variety of courses that cater to our customer needs. Our extensive course offerings range from beginner to advanced level technicians, encompassing all GE turbine platforms. In addition to field technicians, managers and support staff can also benefit from our available training courses.

Key Elements of Training Success

- Facility investment
- Instructor knowledge and experience
- Breadth and depth of training
- Hands-on lab experience
- Exposure to the latest technology
- Global capacity

Inventory of Wind Equipment

Bachmann Turbine Setup

- MCC
- LVMD
- Converter
- Nacelle
- Pitch system
  - o 20 Nm GE pitch
  - o SSB Pitch

ESS Turbine Setup

- DTA
- Nacelle
- Pitch system
  - o 20 Nm GE pitch
  - o 30 Nm GE pitch
- Stand-alone equipment
  - o 2 DTA's
  - o Top Box
  - o 8 Turbine controller

2.0/2.3 Turbine Setup

- DTA
- Nacelle
- Pitch system
  - o 30 Nm GE pitch
- Stand-alone equipment
  - o DTA
  - o Top Box
  - o 30 Nm pitch system

2.X PMG Turbine Setup

- MCC
- Top Box
- Converter
- Pitch system
  - o 30 Nm GE pitch
- Gearbox
- Generator
- Hydraulic unit

3.X DFIG Turbine Setup

- MCC
- Top Box
- Converter
- Pitch system
  - o 30 Nm GE pitch
- Gearbox
- Generator
- Hydraulic unit

SCADA Setup

- Security ST SCADA rack
- Wind CONTROL Cabinet
- Virtual Servers for:
  - o WindSCADA 10.0
  - o WindSCADA 11.0
- Interfaces with ToolboxST
  - o 4.x and 5.x
- Switch hardware
  - o N-tron and Hirschmann

Why the Renewable Energy Learning Center?

4

Expert lead instruction and hands-on training

1

Controlled EHS environment and no lost revenue

We have Turbines.
Why should I send technicians to the RELC?

3

Equipment designed for learning and troubleshooting

2

Time on task (No cancellations due to weather)

Index

Prior to selecting training, please consult with an expert at the RELC to assist in proper course selection. A course schedule is available upon request.

Overview Training: Introduction to GE Wind Technology

Training Objective

The goal of this three-day session is to supply GE customers with the educational foundation that facilitates the development and growth of understanding the basic operations of the GE wind turbine fleet and introduction to the next generation machines. It is focused in the areas of wind technology designed to give site management a set of tools, guidelines and a well-rounded introduction to improve efficiency and effectiveness.

Content of Training

Training will cover the following topics at a high-level overview including Wind Turbine Components, Operating Fundamentals, Major Systems and Turbine Interface.

Duration of Training

Three days

Turbine Fundamentals Training: Wind Turbine Operations

Training Objective

This course provides the basic understanding of each specific wind turbine. The participant will gain the knowledge necessary for normal day-to-day operations of the turbine. Additionally, the participant will be introduced to basic troubleshooting and maintenance related to the turbine.

Content of Training

Introduction to Wind Turbines, Electrical Fundamentals, Electrical Components, Schematic Reading, Down Tower Assembly, Top Box, Yaw System, Hydraulic Brake, Safety Chain, Drive Train, Pitch System, Generator Theory, Turbine Operation, Turbine Safety, Pitch Control System, Turbine Control, Multi-meter Operation and Troubleshooting.

Turbine Platform Options

Bachmann Control System –SSB or GE pitch
ESS Control System –20 or 30 Nm GE pitch
2.0/2.3 MSS Turbine
2.X PMG Turbine
3.X DFIG Turbine

Duration of Training

Ten days

Intermediate Training: Turbine Controls and Converter

Training Objective

This course provides an understanding of GE frequency converter operation and theory including parts and component identification, start-up sequence, schematics, and commissioning procedures. It also gives a basic overview of the operation and connection protocols of GE Toolbox software.

Content of Training

Schematic Reading, Converter Components, Generator Theory, Converter Theory, Converter Maintenance and Safety, Converter Sequencing, Control Cards and Control Architecture, Converter Cooling System, Component Replacement, ToolboxST for the Converter and Software Downloads.

Turbine Platform Options

Bachmann Control System
ESS Control System
2.0/2.3 MSS Turbine
2.X PMG Turbine
3.X DFIG Turbine

Duration of Training

Four days

Advanced Training:
Advanced ToolboxST Operations

Training Objective

The purpose of this course is to introduce the student to the ControlST software suite features that are used within a GE Wind Site. At the completion of this course the student will understand the ToolboxST and WorkstationST features that are commonly used to operate, troubleshoot, and repair a GE Wind Site. This course will utilize a mix of Instructor led presentations and demonstrations as well as structured lab exercises that allow the students to apply the knowledge and skills presented during the course. Each student will be provided with an online virtual lab environment similar to what they would have on site to develop a deeper understanding of some of the more commonly used tools within the ToolboxST and WorkstationST applications.

Content of Training

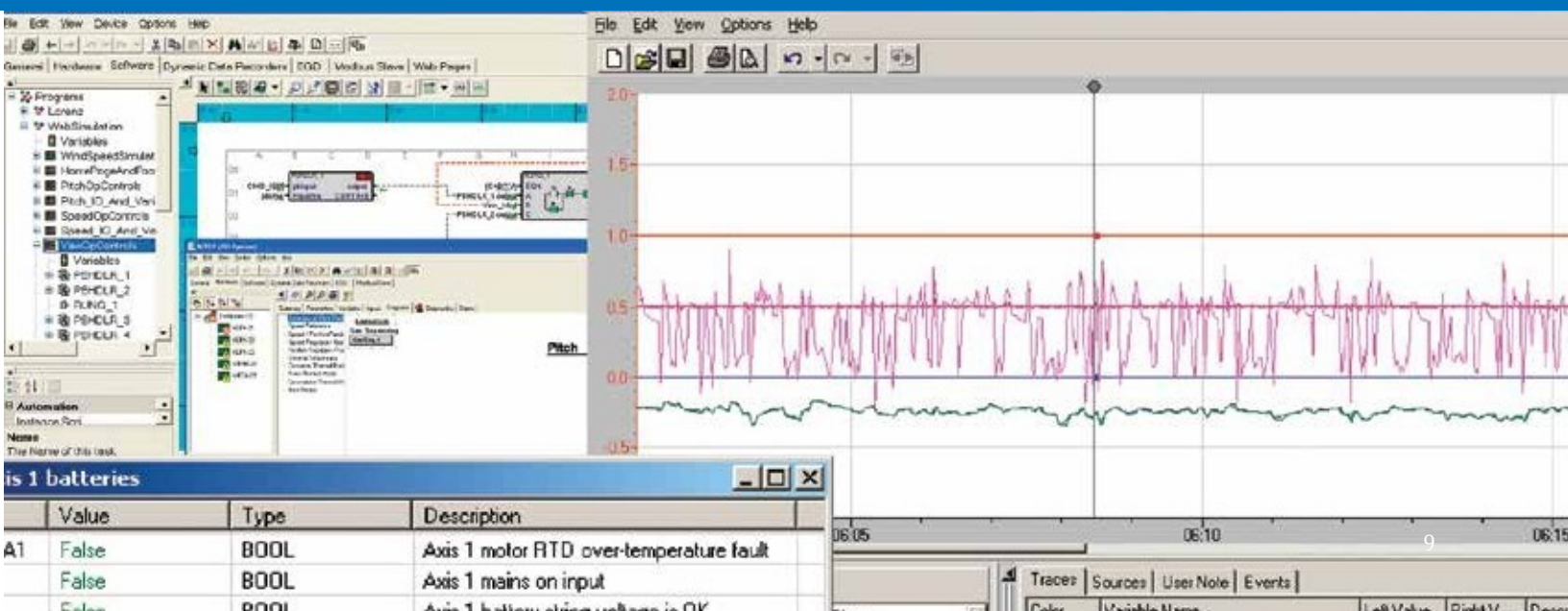
- Mark VIe Site Hardware & Architecture
- Mark VIe Component Replacement
- SCADA network configuration
- ToolboxST System & Component File Tools & Features
- Software Analysis & Alarm Tracing
- Watch Windows & Trenders
- Dynamic Data Recorders
- Trip Files
- Converter Diagrams & Use
- Converter Capture Buffers
- Workstation Alarm Viewer

Turbine Platform Options

All Wind Turbine platforms with Mark VIe Control Systems

Duration of Training

Three days



Advanced Training: WindSCADA

Training Objective

The purpose of this course is to introduce the student to the features included within the GE SCADA Web User Interface (UI). At the completion of this course the student will have an understanding of how to access the SCADA Web UI in order to operate, maintain and troubleshoot a GE Wind Turbine. The student will also gain an understanding of the SCADA analysis and reporting features within the SCADA UI that allow for more detailed turbine and site analysis.

This course will utilize a mix of Instructor led presentations and demonstrations to introduce the student to SCADA Web UI features and capabilities.

Content of Training

- SCADA Hardware & Architecture
- SCADA Web UI Access
- SCADA Web UI Features & Capabilities
- SCADA Web UI Analytics
- SCADA Web UI Reports
- Basic SCADA Web UI Troubleshooting

Turbine Platform Options

All Wind Turbine platforms with Mark VIe Control Systems

Duration of Training

One day

10

Custom Training:
Custom Dedicated Course offering

Training Objective

Custom courses are offered to all turbine owners to address their specific training needs. Customers can work directly with members of the training team to design the specific training course that meets the content and length criteria desired. All custom classes have a minimum number of six attendees and can be conducted on-site.

Content of Training

Content to be selected by the customer based on the specific training needs.

Turbine Platform Options

All types

Duration of Training

Duration is based on the time required to deliver the desired training

Flexible Service Offerings

Selecting the customized solution for your fleet. GE develops a tailored solution with you that supports your strategy.

GE is your partner in simplifying your fleet operations. With 10+ years of operating experience and technical knowledge, GE can manage your portfolio to your metrics.

- Park and Asset Management
- Planned and Unplanned Maintenance
- Technical Support

Enhancing your plant economics with:

- **Lifecycle Service Solutions**
  - o Customized for your fleet
- **More AEP and Greater Reliability**
  - o Increasing your revenue
- **Technology Investments**
  - o Managing operations efficiently

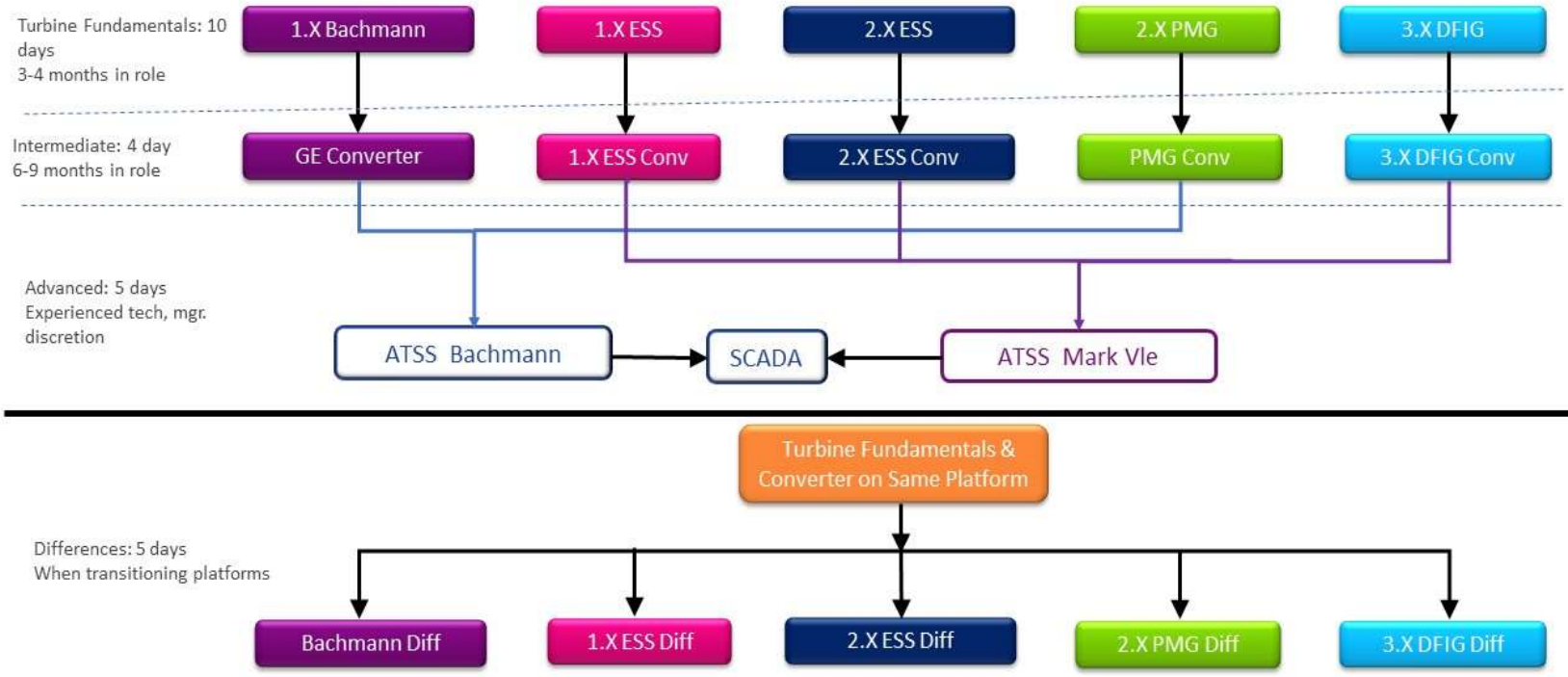
Advanced Service and Repairs:

- **Drive Train**
  - o Monitoring, inspection, and evaluation
  - o Remanufacturing and replacement
  - o Uptower repairs
- **Blades and Hubs**
  - o Monitoring, inspection, and evaluation
  - o Enhancements and exchanges
- **Converter and Controls**
  - o Advanced troubleshooting
  - o Custom upgrades

Attribute	Product Feature	Expanded Service ESA	Full Service FSA	Operational Service OSA
Enhanced Performance	Wind PowerUp* Services Platform	✕	Optional	Optional
Operations Solutions	Asset Management • Operating plan, NERC support	✕	Optional	Optional
	Park Management • Site operations, eBOP, BOP	✕	Optional	Optional
Unplanned Maintenance	Customizable unplanned coverage • Full scope • Major components • Minor components	✕	✕	
	Availability guarantee	✕	✕	✕
	Manual resets and troubleshooting	✕	✕	✕
Planned Maintenance	Parts management	✕	✕	✕
	Preventive maintenance	✕	✕	✕
	Routine maintenance	✕	✕	✕
Monitoring & Diagnostics	Remote monitoring and resets	✕	✕	✕
	PulsePOINT* Services	✕	✕	✕
	Data analytics and reporting	✕	✕	✕
	Technical advisory support	✕	✕	✕

Normal Course Sequence

Before attendees can participate in labs at the RELC , they need to have completed their employer's training on LOTO and Electrical Safety (not provided by GE).



Terms and Conditions

I. RELC Location

The location of the GE Renewable Energy Learning Center (RELC) is:

2690 Balltown Road Building #600

Niskayuna, NY 12309

II. Pricing

a. Onsite

Pricing is subject to change based upon location, number of attendees and the number of days of training. Travel expenses of the instructor will be added onto the price of training. The RELC will provide a quote upon request.

b. At RELC

Pricing is subject to change based upon equipment needed, number of attendees and the number of days of training. The RELC will provide a quote upon request.

c. Custom Curriculum Development Rate

For customized training requests, GE can develop a curriculum and price based upon an hourly rate and the level of expertise needed for the project. This is common for operations and maintenance training based on site specific procedures. The RELC will provide a quote upon request.

d. Cancelation Fee

If written notification of cancelation of attendance is received at least 2 weeks prior to the class start date, a cancelation fee will be charged in the amount of 50% of the total training cost. If cancelation of attendees is communicated less than 48 hours before start date, 100% of the training cost will be charged.

111. Scheduling

a. Class Hours

Classes are conducted Monday through Friday from 8am to 5pm; the RELC is closed on holidays. Please understand that our schedule may be full months in advanced.

b. Annual Calendar

We build our annual course offerings in the months prior to the beginning of each year, if you can give us your forecasted training demand for the year, we can schedule those courses. If you do not do this, then we ask for at least two months' notice before we may be able to add a new course into our schedule.

IV. Course Preparation

Every class can be customized to suit the wind turbine configuration in addition to the audience and learning objectives. The class rosters must be sent in advance. This customization might require curriculum development which could incur additional costs.

Terms and Conditions

V. Number of Participants

a. Minimum

Site based classes have a minimum number of 6 attendees required. Due to opportunity costs, RELC based classes also require a minimum of 6 attendees to create a dedicated in person class session. and 6 attendees for virtual sessions. The RELC may be able to mix attendees from different groups to make a large enough class with approval.

b. Maximum

The maximum number of attendees allowed in a class varies greatly but typically this is 10 participants. Depending on the classroom size and presentation setup, the attendee's base knowledge, attendee to teacher ratio, and time constraints. This will have to be determined prior to locking in the class on the schedule.

VI. Training Offerings

Training courses are only available to companies who own GE wind turbines or are partnered with GE as an approved service provider.

VII. Recommended training programs

a. For wind technicians

Level 1.

Custom Technical Essentials for LOTO (5 days)*

Custom Preventative Maintenance(5 days) Wind Turbine Fundamentals (10 days)**

Level 2. Converter (4 days)

Level 3. Advanced Troubleshooting (3 days)+ GE SCADA (2 days)

*Tech essentials for LOTO is based on the customer's LOTO procedures and this training will be created and conducted based on documentation provided by the customer. This will incur curriculum development costs.

**Preventative Maintenance is based on the customer's scheduled maintenance procedures and this training will be created and conducted based on documentation provided by the customer. This will incur curriculum development costs.

Before attendees can participate in labs, they need to have completed their employer's

training on LOTO, Electrical Safety and Confined Space (not provided by GE).

b. For wind farm managers or remote operations

Level 1. Intro to Wind (3 days)

Level 2. Advanced Troubleshooting (3 days) + GE SCADA (2 days)

VIII. Onsite classes

Due to the disruptive nature of using onsite wind turbine equipment for hands-on training and the lack of lab equipment, the only training courses that are offered onsite are: 10-day Turbine Fundamentals, 2-day GE SCADA.

a. Provided by site for GE training participants

i. Morning and afternoon refreshments and catered lunch

ii. Projector and speakers for presentations, lectures and video clip demonstrations. A white board with markers and eraser. Printer and paper. Note pads, pens, pencils, highlighters.

Terms and Conditions

IX. Materials

a. GE Provided to attendees

A certificate of completion if student passes the test and if this is requested. The course materials are provided in an online classroom environment, most of this content is read only. Access to the online course is given one week prior to class start and remains for one month after the end of the course.

b. Customer Provides to attendees

1. Computer with internet and email access

11. Install Acrobat Reader and make it the default PDF viewer

111. When class includes labs, attendees must provide:

1. Safety glasses

2. Work gloves

3. Appropriate dress for lab: long jeans or heavy cotton pants and long sleeve shirts or arc flash shirts and safe footwear (EH Rated and steel toe recommended).

X. Policies

a. Recording

There is no recording allowed during training sessions; this includes audio, video, screen captures and photography. The instructor will give plenty of time for attendees to write notes based on presentations, drawings, and quizzes.

b. Professional Expectations

Attendees will be evaluated on their professional demeanor in class. Attendees are expected to act in a professional manner by not using cellphones or computers during lectures, arriving to class on-time, meeting deadlines, solving problems, cooperating with classmates, and in general, contributing in a positive way to the class.

c. Prerequisites

Each class includes prerequisites or criteria to attend that must be met before scheduling training. Consult with the training coordinator to review these details.

d. COVID Test

We are following the CDC and the New York State recommended protocols. This may require participants to receive a test for COVID infection and share those test results with us prior to entering the training center.

GE Renewable Energy Learning Center Contact Information

2690 Balltown Road
Building #600
Niskayuna, NY 12309
Email: elcwind.usa@ge.com