

THIRD RUN IN ASIA!

# MASTERCLASS IN UTILITY & COMMUNITY SCALE ENERGY STORAGE SYSTEMS

Reviewing a Nascent Industry



08 – 10 MAY 2018, SINGAPORE

## LEARN FROM THE BEST

IREC Certified Clean Energy Instructor/Master  
Trainer of the Year 2016  
Christopher LaForge, CEO Great Northern Solar

## Testimonials from CHRISTOPHER'S other courses

*"Well thought out courses that enables the participants to know what to look for in the design & implement process of the U & CES and the right questions to ask to vendors" - Executive & Load Forecasting, Tenaga Nasional Berhad*

*"PowerEdge never disappoint when it comes to providing training in Power & Energy Industry. TQ!" - Executive Engineer, Single Buyer*

*"Interesting speaker for an interesting topic. Enjoyed the whole 3-days course, and gained better understanding on the subject matter." - Tenaga Nasional Berhad*

*"Christopher is very experienced and knowledgeable in the nascent technology of energy storage systems. The course was excellently presented and very timely eye-opener for my utility company to consider a phased approach in identifying the detail needs of services by the system operator and for specifying requirements of criteria's for project implementation." - Single Buyer, Tenaga Nasional Berhad*

## Expert Course Faculty Leader



## Christopher LaForge

IREC Certified Master Trainer  
- Photovoltaic Technologies



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## About This Training Course

This course will provide a detailed analysis of Utility and Community Scale Energy Storage (U&CES) Systems. Beginning with an overview of the current available technologies the course will present the elements of U&CES with a focus on the benefits to Utilities as well as the advantages of energy storage for Commercial and Industrial energy users.

Issues to be covered include: Storage system design, battery applications, component specification and installation, integration of storage with Renewable Energy (RE) systems, multiple presentations of specific manufacturers of storage systems, O&M issues, available industry resources for ongoing education and the development of individual projects.

## Key Learnings

This course will allow participants to gain practical and theoretical knowledge about U&CES systems with a focus on real-world applications and current working examples of the various technologies.

Participants in this course will upon completion of this course, be able to:

- Define & explain how Utility and Community Scale Energy Storage (U&CES) operates and the benefits of these systems.
- Describe and identify components and specifications of a U&CES system
- Identify the best application and limitations of each system type
- Calculate U&CES system costs
- Describe financial benefits of U&CES systems
- Correctly size a U&CES system
- Recommend a U&CES system type to meet a Utility administrator's or business owner's goals
- Identify and describe different U&CES system types, their storage capabilities and the systems
- Explain data analysis, connection scheme, control algorithm and power system study for U&CES
- Explain and safety issues with U&CES system
- Define commissioning, operation and maintenance procedures for U&CES systems
- Demonstrate proper safety procedures when installing a U&CES systems
- Explain various policy, methodologies and utility-sided business model for implementation of U&CES systems

## Who Will Benefit

- Project developers and administrators
- Investors
- EPCs
- Project managers
- Installers
- Designers
- Government policy makers

**This training course has a limited attendance for up to 20 participants only.**

Sessions commence at 9am on all days, with short intervals at 10.30am and 3.30pm respectively.

Refreshments will be provided in the short intervals.

Lunch will be provided at 12:30pm for 1 hour. Sessions will end at 5pm on all days.

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## Course Outline

### DAY 1

#### Introductions

Background and History of Utility and Community Scale Energy Storage

#### Section I

- Define & explain how Utility and Community Scale Energy Storage (U&CES) operates and the benefits of these systems.
- Defining Storage types:
  - Flywheel
  - Compressed Air
  - Batteries:
    - Lead-Acid, Lithium-Ion
    - Flow batteries
      - Vanadium Redox Vs: Zink Bromide
    - Sodium-sulfur batteries
    - Ni-Cd
  - Capacitors
  - Superconducting Magnetic Energy Storage (SMES)

#### Section II

- Describe and identify components and specifications of a Battery based U&CES system:
  - Batteries by type
  - Inverters
  - Transformers/Phase converters
  - Points of interconnection
    - Client
    - Utility

#### Section III

- Identify the best application and limitations of each system type
- U&CES range of applications:
- Energy time shift
  - Load following
  - Frequency regulation
  - Renewable capacity continuity
  - Transmission congestions relief
  - Energy tariff cost management
- Application services and blending

#### Section IV

- Calculate U&CES system costs
  - Beginning analysis of determining cost in general
  - Equipment Cost parameters
  - Site preparation cost
  - Logistic costs

#### Section IV

- Describe financial benefits of U&CES systems – introduction
- System services – defining and stacking for optimal benefits

### DAY 2

#### Review of Sections I – IV w/ Q&A

Continue financial benefits of U&CES systems  
Optimizing and Stacking system services

#### Section V

- Correctly size a U&CES system
  - Defining client goals
  - Analyzing loads
  - Choosing capacity
  - Inverter capacity
  - Battery Capacity

#### Section VI

- Recommend a U&CES system type to meet a Utility administrator's or business owner's goals

#### Section VII

- Identify and describe different U&CES system types and Manufacturers, their storage capabilities and the systems

#### Section VII continued –

How to review Manufacturer's Presentations  
Manufacturers' battery presentations

#### Section VIII

- Data collection and analysis, connection scheme, control algorithm and power system study for U&CES
  - Data monitoring systems
  - Connection issues
  - Supervisory control and data acquisition (SCADA) interfacing
  - Controlling, managing and maintaining U&CES systems
  - Security

#### Section IX

- Safety issues with U&CES systems
  - Installation safety issues
  - O&M safety issues
  - Security of operations and interfaces

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## DAY 3

### Review of Sections V-VIII w/ Q&A

#### Continue Section IX

- Safety issues with U&CES systems  
Complete the discussion of Section IX with Q&A

#### Section X

- Define commissioning, operation and maintenance procedures for U&CES systems
  - Commissioning protocols
  - O&M options and Planning

#### Section XI

- Define and Demonstrate proper safety procedures when installing U&CES systems  
Safety issues –
  - Site Preparation
  - Equipment deployment
  - Integrating and Wiring
  - Commissioning
  - O&M safety issues

#### Section XII

- Explain various policy, methodologies and utility-sided business model for implementation of U&CES systems
  - Governmental Policy issues
  - Utility policy issues
  - For utility owned systems
  - For privately owned systems
  - Modeling implementation

### Final Review, Q&A and Open discussion

## Your Expert Course Faculty

### CHRISTOPHER LAFORGE

Christopher LaForge is the CEO of Great Northern Solar and is a NABCEP certified Photovoltaic Installation Professional. He has been an instructor with the Midwest Renewable Energy Institute since 1993 Teaching advanced Photovoltaic (PV) design and installation and is an IREC Certified Master Trainer (TM) in Photovoltaic Technologies. Christopher was the primary curriculum developer for the MREI Photovoltaic courses at the Institutes inception.

A strong advocate for clean energy production Christopher volunteers with the Midwest Renewable Energy Association, the North American Board of Certified Energy Practitioners (board of directors member 2004-2014, Chair of the Nominations Committee-current) and with the Northern Futures Foundation.

Christopher LaForge has been designing, specifying, installing and operating Battery based Solar Electric systems (PV) for over 30 years. LaForge has lived “off-Grid” for over 26 years where he runs his business Great Northern Solar.

LaForge has been training contractors, administrators and officials in the operation of PV systems including those employing storage for over 26 years. In the last 5 years LaForge has been investigating and developing trainings for the application of energy storage in commercial and other large applications.

With the development of Lithium Ion and other advanced battery technologies LaForge has begun to consult and present trainings in battery design and deployment for the commercial market.

In 2016 LaForge developed a hands-on seminar for retrofitting a LiOn storage and energy arbitrage system for a commercial building in Duluth Minnesota. The Hartley Solar Storage Retrofit Seminar walked participants through the design and implementation of the advanced storage system to provide for building resiliency and peak demand load shaving as well and potential other ancillary services for the Hartley Nature Center and Minnesota Power – the site Utility.

This small prototype is beta-testing Energy Arbitrage software that allows the client to choose several operational modes for cost reduction and resiliency.

Most recently LaForge presented “Energy Storage into Renewable Energy Systems” for the North Central Electrical League in the Minneapolis/Saint Paul area of Minnesota.

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	PER PARTICIPANT	2 PARTICIPANTS OR MORE	IN-HOUSE TRAINING
3 Day Programme	SGD 3,580 Per Participant (*GST Exclusive)	SGD 3,380 Per Participant (*GST Exclusive)	Guaranteed Minimum 40% Off Normal Price
	SGD 3,830.60 Per Participant (*GST Inclusive)	SGD 3,616.60 Per Participant (*GST Inclusive)	

\*GST FOR SINGAPORE REGISTERED COMPANIES

## ATTENDEE DETAILS

Name ..... Job title .....

Tel ..... Department ..... Email .....

Name ..... Job title .....

Tel ..... Department ..... Email .....

Name ..... Job title .....

Tel ..... Department ..... Email .....

Name ..... Job title .....

Tel ..... Department ..... Email .....

Name ..... Job title .....

Tel ..... Department ..... Email .....

## COMPANY DETAILS

Organisation name ..... Industry.....

Address .....

Postcode..... Country.....

Tel ..... Fax.....

## PAYMENT METHODS

By Cheque/ Bank Draft: Make Payable to PowerEdge Pte Ltd.

By Telegraphic Transfer: Please quote AE1 with the remittance advise

Account Name: PowerEdge Pte. Ltd.

Bank Code: 7339 Branch code: 686 Account Number: 686-253386-001 Swift Code: OCBGSGG

Bank Address: 65 Chulia Street OCBC Centre, Singapore 049513

All bank charges to be borne by payer. Please ensure that PowerEdge Pte Ltd receive the full invoiced amount.

## PAYMENT POLICY

Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to PowerEdge Pte Ltd. payment terms

\* GST- Exclusive price is only applicable for overseas corporate customers subject to qualifying conditions.

## CANCELLATIONS & SUBSTITUTIONS

You may substitute delegates at any time. POWEREDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another POWEREDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that POWEREDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future POWEREDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that POWEREDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit

## 4 ways to Register

- 📧 Online Web Registration
- ✉ info@poweredgeasia.com
- ☎ (65) 6741 9927
- 📞 (65) 67478737

## RELATED TRAINING

- ✓ [Power Purchase Agreements](#)
- ✓ [Competency Management System for the Power Industry](#)
- ✓ [EPC Contract Management for Power & Utilities](#)

## ON SITE TRAINING

Can't make it for the Course?  
We'll make the course come to you!!

Simply let us know your preferred time and dates and we will meet you at your schedule and venue.

With a host of highly trained experts, we will be happy to customize your programme with your needs 100% fulfilled.

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- ☎ (65) 6741 9927

