

CAPACITY-BUILDING ACTIVITY

ORGANIZED BY



Operation and Maintenance of Electric Buses

AGENDA

September 23-25, 2019 | Lima, Peru

The Global Sustainable Electricity Partnership (GSEP) is in the process of implementing a pilot project that will bring the first electric bus to be integrated into the transport system in Lima, Peru. As part of this project, the bus manufacturer and GSEP experts will provide operation and maintenance training to the operators of the e-buses. Lima currently has approximately 300 transport companies that operate various routes. This technical workshop aims at providing operation and maintenance training to a larger number of operators. The three-day workshop will cover: electric transportation technology and its advantages, electric transportation operation and maintenance, and hands-on maintenance of the electric bus that has been provided by the GSEP.

For those who are interested in attending, kindly register by contacting Mr. Luis Calzado, GSEP Senior Project Advisor at calzado.luis@globalelectricity.org

SEPTEMBER 23, 2019

09:00 – 09:30

ARRIVAL AND REGISTRATION

09:30 – 10:00

WELCOME AND OPENING REMARKS

- Daniella Rough, Ministry of Energy and Mines of Peru
- Luis Calzado, Senior Project Advisor, Global Sustainable Electricity Partnership
- Alejandro Barragan, Manager, Enel X Peru
- Vincent-Michel Duval, Senior Advisor, Integration of New Technologies, Hydro-Quebec

10:00 – 10:30

COFFEE BREAK

10:30 – 12:30

Session 1**INTRODUCTION TO ELECTRIC BUSES**

This session is intended to gauge participants' existing body of knowledge related to electric buses as well as to get them thinking about the issues they may encounter when working with electric buses. This includes background on the technology and an introduction to the different parts and components of an electric bus compared to a diesel bus. During this session, participants will also learn about other jurisdictions around the world where electric buses are being used, and about the perceived benefits and concerns regarding electric buses.

PRESENTERS:

- Vincent-Michel Duval, Senior Advisor, Integration of New Technologies, Hydro-Quebec
- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP

12:30 – 13:30

LUNCH BREAK

13:30 – 15:00

Session 2**LIMA E-BUS PROJECT – LIMA PRE-FEASIBILITY, FEASIBILITY STUDY AND IMPLEMENTATION**

This session will present in detail the studies (pre-feasibility and feasibility) developed as part of the Lima E-bus project. The experts will present the elements that were taken into consideration for the selection of the route. A detailed explanation of the simulation of the routes will also be presented. The session will also provide information on the design and inspection of the electric bus.

PRESENTERS:

- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP
- Vincent-Michel Duval, Senior Advisor, Integration of New Technologies, Hydro-Quebec

15:00 – 15:30

COFFEE BREAK

15:30-17:00

Session 3**IMPACT ON OPERATIONS**

This session explores the main differences between electric and traditional diesel or compressed natural gas (CNG) bus operations. This includes studying the initial operational needs to successfully introduce electric buses and the flow of a depot according to energy supply, usage, and scheduling. Lessons learned from the operation of electric buses across South America and other exemplary cases from around the world will showcase international best practices.

PRESENTERS:

- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP
- Jean Paul Zalaquett, Head of E-mobility, South America, Enel X

September 24, 2019

09:00 – 10:00

**Session 4
DATA LOGGING**

This session introduces the ViriCiti platform for collecting data on the electric bus's performance and explains why data tracking is an important component of the pilot program. The electric bus is equipped with ViriCiti's DataHub hardware which collects, filters, and sends data to the ViriCiti cloud server, to be accessed by individuals analyzing the electric bus's performance. These performance measures will help advise drivers and maintenance staff on vehicle functioning and diagnostics.

PRESENTER:

- Joel Torr, Managing Director, ViriCiti

10:00 – 10:30

COFFE BREAK

10:30 – 12:30

**Session 5
BATTERIES AND AUXILIARIES**

This session will provide an overview of the battery model and connections used in the 12 metre conventional e-bus. This includes background on battery capacity, design, salvage, and a brief overview of the technical evolution of electric bus batteries.

PRESENTER:

- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP

12:30 – 13:30

LUNCH BREAK

13:30 – 15:00

**Session 6
CHARGING INFRASTRUCTURE AND METHODS**

This session looks into the installation and operation of the charging infrastructure and the standardization of the charger connections. Reviewing the different types of electric bus charging will introduce participants to charging techniques and electrical systems. This will provide familiarity for connector handling and establish understanding of charging time requirements, power transfer rates, and peak and off-peak period electricity usage.

PRESENTERS:

- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP
- Paloma Sarria, Focal Point, E-mobility, Enel X Peru

15:00 – 15:30

COFFE BREAK

15:30-17:00

Session 7
SAFETY

This session will provide an overview of the critical safety aspects of maintaining and servicing electric buses. This will include the different types of protective equipment needed to work on high voltage systems. Protocols for emergency response in the event of fire or other incidents will be outlined. Proper battery lifting techniques and battery handling will also be discussed.

PRESENTERS:

- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP
- Will Dulanto, BYD Peru
- Paloma Sarria, Focal Point, E-mobility, Enel X Peru

SEPTEMBER 25, 2019

09:00 – 10:00

**Session 8
MAINTENANCE SERVICING AND TOOLS**

This session will explore the differences in maintenance practices and procedures between an e-bus and a conventional diesel bus. Different methods of servicing the e-bus will be outlined in the discussion. The session will also discuss different types of tools and equipment required to work on electric vehicles and how they differ from conventional tools. Common Key Performance Indicators (KPIs) used in the industry to track performance of electric buses will be examined.

PRESENTERS:

- Will Dulanto, BYD Peru
- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP

10:00 – 10:30

COFFEE BREAK

10:30 – 11:30

**Session 9
DRIVING BEST PRACTICES**

This session explores preferred driving habits for electric buses and differences in the feeling of driving an electric bus compared to a traditional diesel or CNG bus. Understanding electric bus driving behavior as it relates to regenerative braking and acceleration will support proper electric bus operation and desired performance. Familiarity with signals, displays, and interfaces of the electric bus will help drivers become more comfortable with the new technology.

PRESENTERS:

- Will Dulanto, BYD Peru
- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP

11:30 – 12:30

**Session 10
ELECTRIC BUS DEMONSTRATION**

Participants will leave the classroom and attend a demonstration of charging and running an electric bus. Participants will have the opportunity to explore the bus inside and out and ask questions of the bus manufacturer. The bus will be driven along the pilot route and staff will be invited to attend the ride-along. This will showcase an electric bus in operation and the quiet nature of the bus.

PRESENTERS:

- Will Dulanto, BYD Peru
- Naeem Farooqi, Principal Consultant and Global E-mobility Lead, WSP

12:30 – 13:30

LUNCH AND END OF EVENT