

## Virtual Classroom on Electric Bus Operation & Maintenance

### 电动公交车运维网课

30 Mar – 7 Apr 2021, 2 weeks span

2021年3月30日至4月7日，跨两周时间

UITP Academy is launching an online course on Electric Bus Operation & Maintenance, starting on 30 March and ending 7 April with Shenzhen Bus Group which has achieved full electrification. This course features 9 interactive online sessions.

国际公共交通联合会（UITP）学院将联合全球最大的纯电动公交运营商深圳巴士集团推出电动公交车运维系列在线课程。本次课程从3月30日开始，至4月7日结束，共有9次在线互动课堂。

With most metropolitan areas targeting zero-emission environments, an increasing number of cities and transport companies are considering a fully electric solution for their urban bus network. In this context, the UITP Academy & Shenzhen Bus Group designed this training programme on Operations of Electric Buses offering a comprehensive overview on operation, maintenance and asset management of electric buses. This training will give an insight of urban bus networks, importance of building a sustainable infrastructure, recent technologies, using the data for the operation & maintenance and implementation efficient timetable and scheduling on your routes.

随着大多数大都会地区以零排放环境为目标，越来越多的城市和运输公司正在考虑为其城市公交网络提供全面电动解决方案。在这一背景之下，UITP 学院和深圳巴士集团设计了本电动公交车运维培训课程，全面介绍电动公交车的运营、维护和资产管理。本次培训将有助于深入了解城市公交网络、建设可持续基础设施的重要性、最新技术、将数据运用于运营和维护以及实施高效的线路时间表和调度。

Shenzhen Bus Group is the largest and oldest public transportation operator in Shenzhen, China. After achieving full electrification (operating 6,053 e buses) in 2018, SZBG has become the largest new energy public transportation operator in the world. SZBG also have started trialing our electric self-driving buses on open and mix-trafficked roads since 2017 with zero accidents to date.

深圳巴士集团是中国深圳最大、历史最悠久的公交运营商。2018 年实现全面电动化（运营 6053 辆电动公交车）后，深圳巴士集团已成为全球最大的新能源公共交通运营商。自 2017 年起，深圳巴士集团已开始开放和混合交通道路上试运行电动自驾公交车，迄今为止事故为零。

The training and all training materials will be provided in English, and **Simultaneous Interpretation (SI) from English to Chinese** will be provided in this online training.

培训和所有培训材料将以英语提供，本在线课程将以**英文讲演配中文同声传译**。

#### Reach your objectives | 学习本课程将有利于:

- Adapt your operations for sustainable city  
调整您的运营，实现可持续城市
- Introduce the electric solution, the different types of technologies and compare their benefits and drawbacks  
介绍电动化方案、不同类型的技术，比较其优缺点
- Understand the different type of vehicles and required infrastructure to operate and maintain  
理解要运营与维护的不同类型车辆与所需的基础设施

- Discover the products on offer and the mainstream technology options available, competition and maturity level of the suppliers  
挖掘在售产品和供应商提供的主流技术选项、竞争度与成熟度
- Understand how to develop an operational and charging strategy  
了解如何开发运营与充电策略
- Learn from experience on how to plan, implement and run electric bus lines successfully  
汲取规划、实施与运行电动公交线路的成功经验
- Understand how technology and data management can help optimising your operations and charging  
了解技术与数据管理如何能够优化您的运营与充电
- Learn from successful major electric bus project operation & maintenance  
学习成功的主要电动公交车项目运维
- Listen the best practices from **Asia, Africa and Europe**  
听取**亚洲、非洲、欧洲**的最佳实践

### Why choose an online course | 为什么要选择在线课程?

- Interact with public transport professionals from across the world  
能够与全世界的公共交通专业人士互动
- Be time efficient, with 7 sessions over a 2-week timespan  
拥有高效的学习时间，2周时间内上7次课
- Flexibility to join the sessions from any location in the world, at work or at home  
无论是在办公室还是家里，任何地点都可以灵活地参与课程

### A top-level methodology | 顶级方法

- Participate in interactive online sessions which includes an introduction by course leaders and open discussions with participants  
参与在线互动课，其中包括课程负责人的介绍以及与参与者的开放讨论
- Apply your concepts during the online workshop  
在线研讨会期间，运用您的概念
- Exchange your current practices and experience with your peers  
与同行交流您的当前实践与经验
- Each theme will be approached as followed:  
各主题包含如下内容：
  - o Basic principles and conceptual approach  
基本原则与概念方法
  - o State of the art development and innovations  
最新发展与创新
  - o Good practices examples  
优秀实践示例
  - o Interactive exchange between participants and experts  
参与者与专家之间的互动交流

### Who is it for | 课程对象?

- Project managers, engineers and other professionals eager to learn more about the technology, the implementation and the running of electric buses  
项目经理、工程师以及渴望学习更多关于电动公交车技术、实施与运作的其他专业人士
- Staff from public transport operators who works in operation and maintenance  
公共交通运营商内从事运维工作的人员
- Staff from the bus industry worldwide involved in the market uptake of electric buses  
全球公交车产业参与电动公交车市场发展的人员



Professionals interested in obtaining a wider and international perspective on electric buses and eager to learn more from international best practice  
希望在电动公交车方面拓展国际视野并渴望更多地学习国际最佳实践的专业人士

A good level of English is a compulsory requirement to attend the training

参与培训的人必须具备良好的英文水平

### Inspiring trainers | 激励人心的培训师

Our skillful trainers are composed of international experts and professionals with extensive experience and knowledge in the strategic, operational and technological areas of electric buses.

我们的培训师精通相关专业，包括国际专家和专业人士。他们在电动公交车的战略、运营和技术领域拥有丰富的经验和知识。

**All sessions will take place at 08:00 am CET time, (UTC+1) equivalent to 3:00 pm China time (UTC+8).**

**所有课程的开始时间为 CET 上午 8 点 (UTC+1) 相当于中国时间下午 3 点 (UTC+8)。**

Day 1, Tuesday 30th March 2021 | 第 1 天, 2021 年 3 月 30 日, 周二

#### 08:00 Welcome & Introduction to the course | 课程欢迎辞与介绍

Sue CHAN, Head of Asia Pacific, UITP | UITP 亚太执行总监曾淑仪

Joe MA, Deputy General Manager, Shenzhen Bus Group, China | 深圳巴士集团副总经理马正源

#### Expectation Analysis | 预期分析

Sue CHAN, Head of Asia Pacific, UITP | UITP 亚太执行总监曾淑仪

#### 08:45 Session 1: An electric solution for urban bus networks

##### 第 1 节：城市公交网络电动解决方案

James WANG, Chief Scientist Communications in China Transit Science, China | 中国公共交通学科首席科学传播专家王健

- The policy context and city strategies for the introduction of electric buses  
电动公交车引进的政策背景与城市战略
- Legislation/policy aspect: how to incentivize e-buses deployment with a focus on the EU Clean Vehicles Directive mandatory country targets and other international examples  
立法/政策方面：如何激励电动公交车的部署，主要聚焦欧盟清洁汽车指令强制性国家目标和其他国际示例
- Current state of the global electric bus market, the products on offer  
全球电动公交车市场的现状和在售产品
- Main challenges for deployment: upfront costs, operational requirements, procurement, interoperability, cooperation with energy sector  
部署的主要挑战：预付成本、运营要求、采购、互通性、与能源领域的合作

- Planification of charging infrastructure, a quite critical part when planning to deploy e-buses  
充电基础设施的计划性—此为电动公交车部署中非常关键的部分
- The system approach and steps of an implementation and deployment process  
实施与部署过程的系统方法与步骤

10:30 End of Day 1 | 第 1 天结束

Day 2, Wednesday 31st March 2021 | 第 2 天, 2021 年 3 月 31 日, 周三

**08:00 Session 2: Vehicles, infrastructure, auxiliaries, state of the market**

**第 2 节：车辆、基础设施、配套设施与市场状态**

**Hans BEKKERS, Business Development Manager Public Transport, VDL Bus & Coach BV, The Netherlands**

This session will look into new technologies and auxiliaries used to run electric buses, whether it be the installation and running of charging infrastructure, the impact on information technology systems, driver assistance and standardisation of the connection or the technical evolution of the battery.

本节主要探索运行电动公交车所采用的新技术与配套设施，包括充电基础设施的安装与运行、对信息技术系统的影响、驾驶员辅助、连接标准、电池的技术演进等。

This session includes | 本节包括：

- An insight into vehicles (battery, plus-in hybrid, trolley, fuel cell) and infrastructure (overnight and opportunity charging, types of pantographs, in-motion charging) | 深入了解车辆（电池、插电式混合动力、无轨电车、燃料电池）以及基础设施（夜间和临时充电、受电弓类型、移动充电）
- State of the market from industry perspective | 从产业角度看市场状态
- Updated electric bus product overview: latest models and trends | 最新电动公交车产品概况：最新的公交车型号与趋势
- Figures and market numbers | 数字与市场数据
- Driveline – Batteries – auxiliary components & HVAC – technology & maintenance – infrastructure costs | 传动系统——电池——配套组件和 HVAC——技术与维护——基础设施成本

09:15 Break (tea-break) | 休息（茶歇）

**09:30 Session 3A: Timetable and scheduling of E-bus routes**

**第 3A 节：时间表与电动公交车线路调度**

10:30 **Session 3B: Case Study: Implementing and optimizing large e-bus fleet operations**

第 3B 节：案例研究：实施和优化大型电动公交车车队运营

**Barf KRAAIJVANGER, Manager Zero Emissie Programma, Connexxion, The Netherlands**

- The AML and ZOB cases of Europe, NL | 欧洲荷兰的 AML 和 ZOB 案例分析

11:30 End of Day 2 | 第 2 天结束

Day 3, Thursday 1st April 2021 | 第 3 天, 2021 年 4 月 1 日, 周四

08:00 **Session 4: Electric Buses in China - Operations & Maintenance**

第 4 节：中国的电动公交车——运营与维护

**Chris LIANG, Operations Manager, Shenzhen Bus Group, China | 深圳巴士集团运营经理  
梁渝东**

09:15 *Break (tea-break) | 休息 (茶歇)*

09:30 **Session 5: Case Study - Insight into technologies**

第 5 节：华为讲解案例分析——深入了解技术

**Li Zixiao, VP of Transportation Development, Huawei Technologies, China | 华为交通拓展部副总裁 李紫霄**

11:00 End of Day 3 | 第 3 天结束

Day 4, Monday 5th April 2021 | 第 4 天, 2021 年 4 月 5 日, 周一

08:00 **Session 6: The power of data in electric bus operations**

第 6A 节：电动公交车运营中数据的力量

**Eric NÖH, Head of Sales Public Transport, PSI Transcom GmbH, Germany**

Energy consumption, charging and overall performance need be monitored and managed in the most optimal way to ensure efficient and seamless electric bus operations. How to intelligently use data to achieve such performance will be presented and discussed in this session. Continuous improvement by integration of

smart data (feedback loop) for the optimisation in operational simulations is thereby the key.

为确保高效无缝的电动公交车运营，需要以最佳的方式监控与管理能源消耗、充电与整体性能。本节将介绍与探讨如何智能地利用数据来实现这一性能。关键在于将实现优化的智能数据（反馈回路）融入运营模拟，从而实现持续优化。

09:30 Break (tea-break) | 休息 (茶歇)

**09:45 Session 7: The impact of driving behaviour in the performance of EV bus fleet**

**第 7 节：驾驶行为对电动汽车车队性能的影响**

**Fernando APARICIO, Business Development Director and Associate, ADN Mobile Solutions S.L, Spain**

Managing successful efficient driving on bus operators has been a must for combustion vehicles. Urban EV fleet present a new challenge and possibilities for improving energy consumption and overall performance. Homogenizing driving styles according to vehicle makers and incorporating a continuous improving methodology can decisively contribute to a predictable operation, minimizing potential issues. This session will show how to walk the way in a successful approach.

管理公交车运营商的成功高效驾驶一直是燃烧型车辆必须做到的。城市电动汽车车队为提高能源消耗和整体性能提出了新的挑战 and 可能性。根据车辆制造商的不同，将驾驶风格进行同质化，并结合持续改进的方法，可以决定性地促进可预测的操作，最大限度地减少潜在问题。本节将展示如何以成功的方式走这条路。

11:00 End of Day 4 | 第 4 天结束

**Day 5, Wednesday 7th April 2021 | 第 5 天, 2021 年 4 月 7 日, 周三**

**08:00 Session 8: Operation of electric buses**

**第 8 节：电动公交车的运营**

**Li Qianqian, Vehicle O&M Manager, Shenzhen Bus Group, China | 深圳巴士集团车辆运维经理李倩倩**

- Requirements and performance: standardization, interoperability  
要求与性能：标准化和互通性
- Impact on operations: LCC, Maintenance, data, autonomy and performance  
对运营的影响：生命周期成本、维护、数据、自主与性能
- Contractual framework: system approach, share of risks, commitment  
合同框架：系统方法、风险共担、承诺

- International experience in operating electric buses  
运营电动公交车的国际经验

09:15 Break (tea-break) | 休息 (茶歇)

**09:30 Session 9: Batteries for electric buses**

**第 9 节：电动公交车电池**

**Representative from Contemporary Amperex Technology Co., Ltd. (CATL), China | 来自宁德时代新能源科技股份有限公司代表**

- Technologies cell type | 技术电池类型
- Behaviour | 性能
- Management systems | 管理系统
- Lifetime | 生命周期
- Standards | 标准
- Safety | 安全
- Thermal management | 热管理
- Models | 模型

11:00 End of Online Course Programme  
在线课程项目结束

*\*UITP reserves the right to make amendments to the programme or any related activity at its discretion | UITP 有权自行修改项目及相关活动*

*\*For more information, please visit our website | 详细信息请浏览我们官方网站:*  
<https://www.uitp.org/trainings/electric-bus-operation-maintenance/>