

VOLVO BUS



Volvo Group

- We are one of the world's leading manufacturers of trucks, buses, construction equipment and marine and industrial engines.
- We also provide complete solutions for financing and service.
- Long history of vehicle supply in UK, clearly defined Electro and City mobility strategy, started in 2007.
- Over 650 electric vehicles delivered to date.



Volvo Group In The UK



Volvo Group UK
Employees
> 3,500

Certified to:

- ISO 9001
- ISO 14001
- OHSAS 18001



Distribution & Product Support:

146 Locations: Volvo Truck & Bus
Renault Trucks
SMT - Volvo Construction Equipment





LOW EMISSION WORKSHOP, 20TH FEBRUARY 2020 - BIRMINGHAM AIRPORT - UK

Opportunity Charging Technology

Oliver Johnson – Business Development Manager

ABB eBus charging v3.0, December 23rd 2019



Volvo Buses

Volvo Buses. Driving quality of life



EV fast charging and global standardization

ABB leading in major developments this decade



2010
Founding of CHAdeMO
ABB was involved from the start



2010
Launch ABB Terra 51
50 kW CHAdeMO charger



2012
Founding of CCS alliance
ABB was involved from the start, basis for IEC standard



2013
Launch CCS & multi-standard Terra 53
CCS + CHAdeMO + AC



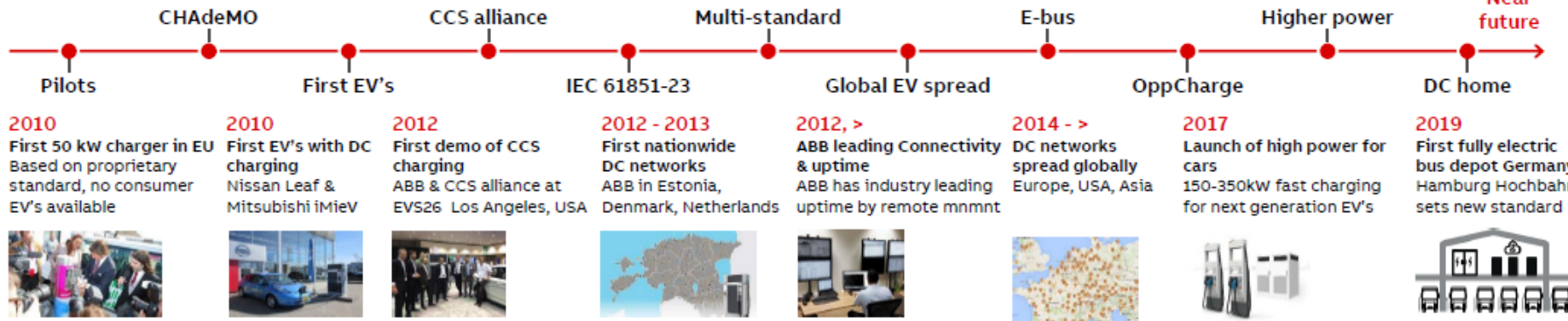
2013-2015
Launch global variants Terra 53
China, USA, APAC



2016
First eBus chargers in EU
Global partnerships with bus OEMs



2018
First eTruck chargers
Global partnerships with OEMs



Global leader in EV fast charging solutions

Proven technology in the field since 2010

ABB EV Charging Infrastructure

HQ: Delft (HQ) and in Eindhoven, the Netherlands.

Employees: Approx. 500 FTE worldwide, of which 100+ FTE in NL and 200+ FTE in IT

Volume: > 13.000 DC fast chargers sold world wide including > 1.800 high power chargers (150-450)kW, biggest installed base of all manufacturers

Regions: Europe, Americas, Africa, Asia, China, Pacific. Installations in > 77 countries.

Standards: CCS-1, CCS-2, GB/T, CHAdeMO, ISO 15118, IEC-61851-23, SAE J1772, OppCharge

Connectivity: Remote management and support, > 99,5% Uptime, integration with payment solutions and 3rd party IT systems.



ABB eBus charging – Reference projects



Namur & Charleroi, BE
TEC
– 15 x HVC 150P



Trondheim, NO
Trondelag
– 8 x HVC 450P



Ostersund, SE
Nettbus
– 2 x HVC 300P



Gothenburg, SE
Volvo Busar
– 1 x HVC 150P
– 1 x HVC 300P
– 1 x HVC 150C
– R&D



Luxembourg, Lux
Ville de Luxembourg
– 4 x HVC 150P
MDDI & Sales
Lentz
– 4 x HVC 150P



Harrogate, UK
Transdev
– 3 x HVC 300P



La Rochelle, Fra
Transdev
– 3 x 150kW CCS2



STL, Laval, Canada
1 x HVC 450P



Singapore
– NTU Test track
– 2 x HVC 300P



Södertälje, SE
Scania Buses
– 1 x HVC 300P
– R&D test track



Plattsburgh, USA
Novabus
– 1 x HVC 300P



Munich, DE & AT
MAN Truck & Bus
– 7 x HVC 150C
– R&D







Coventry



- Worldwide, experts work to deliver a range of safe and sustainable solutions & services across the entire industrial life cycle. In its day-to-day operations, Actemium builds on its powerful networking system expertise in each process in order to provide turnkey solutions.
- Actemium Coventry dedicated office for E-Mobility.





-  Actemium Business Unit
-  Cougar Automation Office
-  Meldrum Business Unit
-  Twyver Business Unit
-  North West Projects Office



The Birmingham Airport Story.

The Project Requirements

- 6 Electric buses to operate 24 hour landside operations
- OPP Charge and CCS Combo 2 DC charging
- December Launch
- Turn Key solution
- Had to improve customer experience
- Had to improve driver environment



How Were The Requirements Delivered?

At Volvo we did not just supply the Vehicles we supplied a one stop turn key project, it was delivered by developed new bespoke solutions through a partnership way of working.

The stakeholder group was required to work in a cross functional way, each stakeholder was responsible for delivering the project tasks as part of the Volvo solution.

- Vehicle Supply and commissioning: Volvo
- Charging infrastructure and commissioning: ABB (Volvo Infrastructure Partner)
- Electrical design and Civils: Actemium
- Driver training: Volvo
- Vehicle maintenance and reporting: Volvo
- High profile launch event: Birmingham Airport and Volvo



Project Timeline.



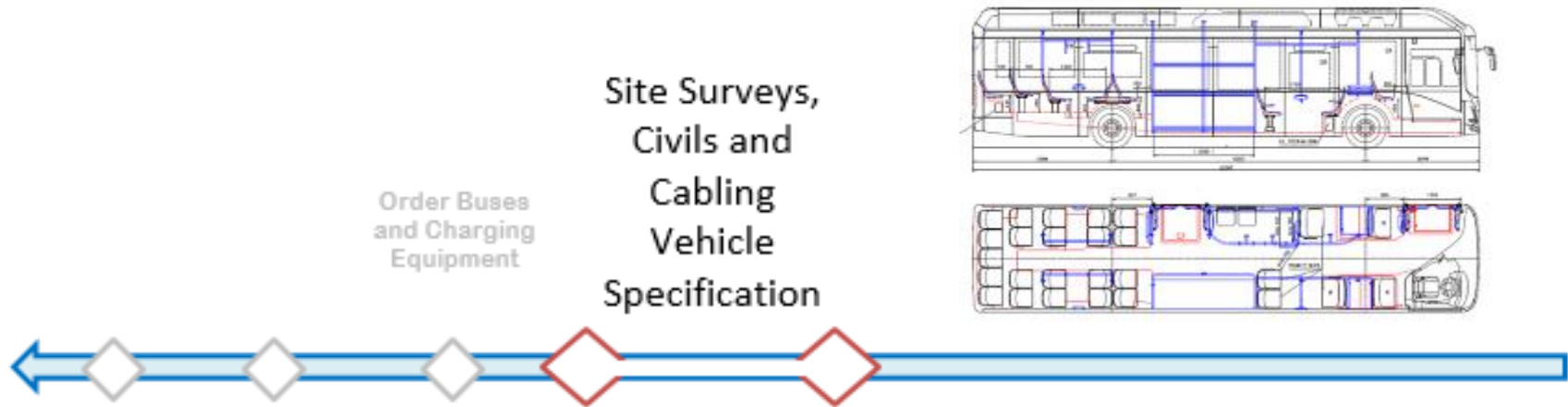
Order
Buses and
Charging
Equipment



Feb 2019



Project Timeline.



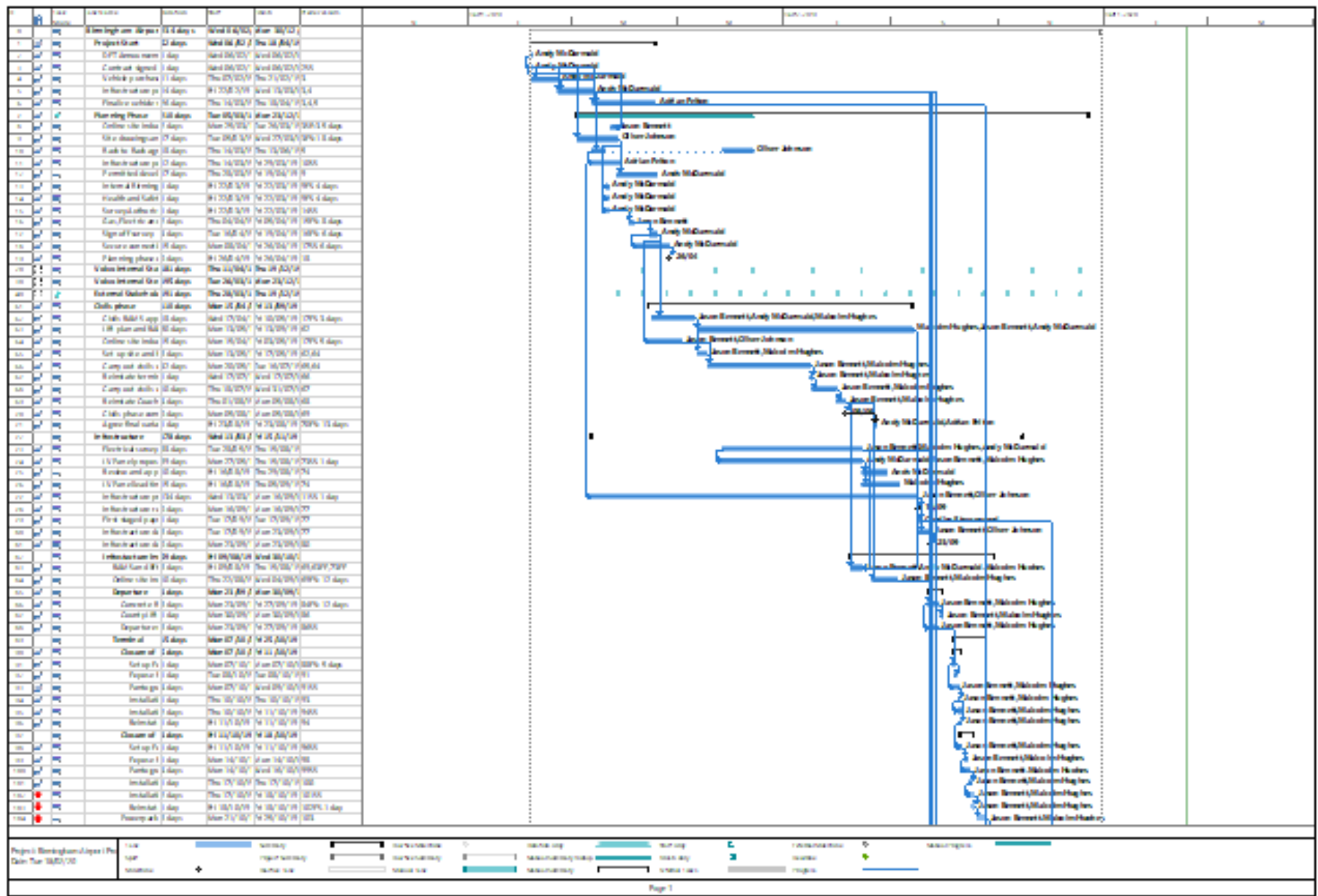
Site Surveys,
Civils and
Cabling
Vehicle
Specification

Order Buses
and Charging
Equipment

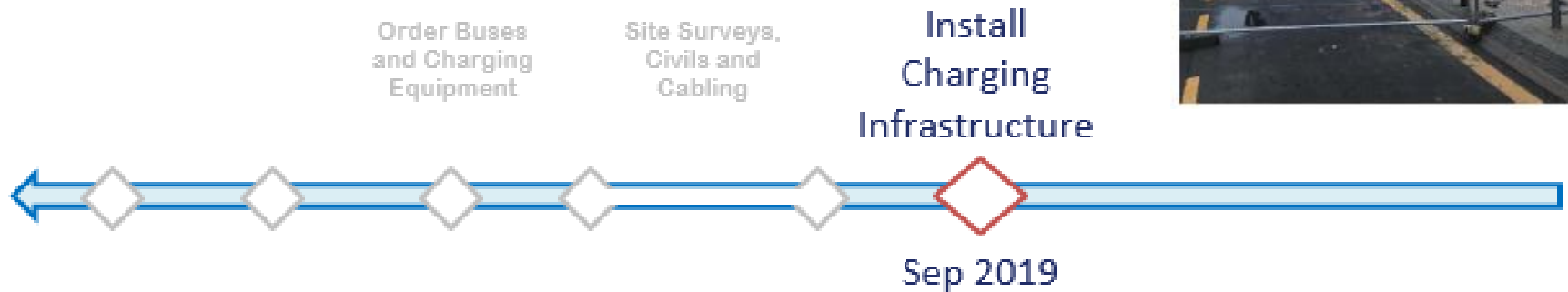
Jan-Jul
2019

- Production of detailed project plan
- Stakeholders appointed and roles and responsibilities identified
- Working permit process and NEC3 contracting
- Civils planned to minimise disruption to the Airport
- Vehicle Specification Completed





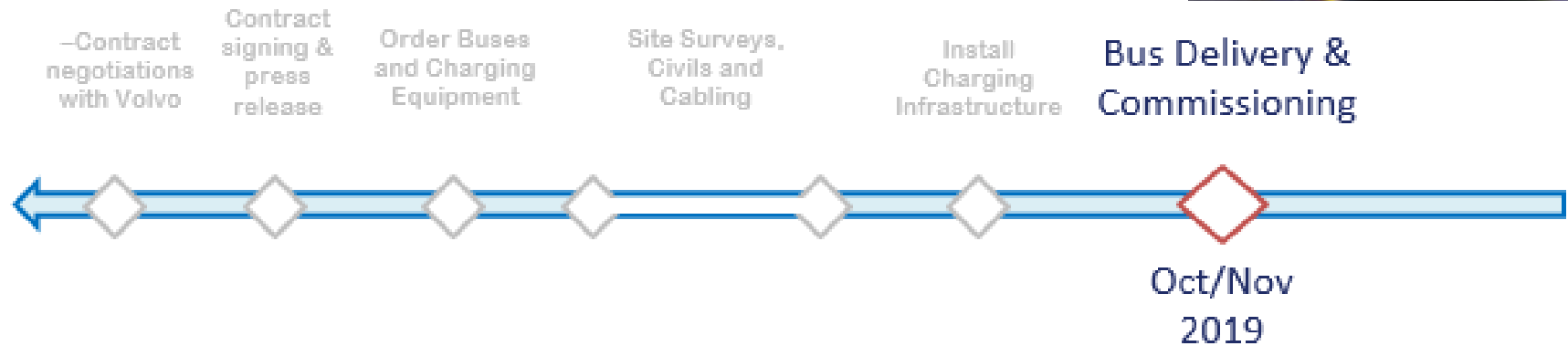
Project Timeline.



- Pantographs installed outside the terminal
- CCS Combo 2 DC chargers installed at the coach park
- New panels installed at the terminal and the coach park
- Charger cabinets installed at the south service yard and the coach park



Project Timeline.



- Vehicles delivered
- Infrastructure commissioned
- Driver Training Completed
- Zone Management Implemented



Project Timeline.



1 Dec
2019

- Vehicle Launch
- Maintenance and support packages implemented
- Staff training
- Real project starts here



Opportunity Charging.

Generation 2 flexibility to charge with CCS Combo 2 DC

Opportunity Charging

- Even distribution of power demand
- Energy consumption spread through the day and night
- Allows for 24 hour operation
- Common open interface
- High utilisation of the charger
- Less infrastructure required.
- Allows flexibility for operators and Local Authorities

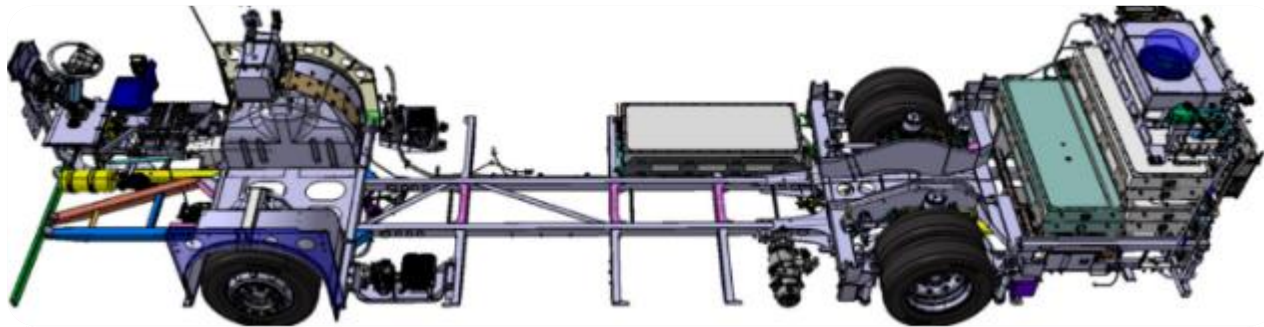
CCS Combo 2 DC charging

- Range of options available from 22-150kW
- 100km Range in just over an hour
- Common open interface
- Allows for charging when vehicles return to the depot.



Closing Statement - Future Developments

- Transport Solutions matched to specific customer needs
- ESS 4/5 x 99 kW energy Packs (396/495kW)
- Distance to meet 100-180 miles SD
- Distance to meet 100-150 miles DD
- Combination Charging – Opportunity/Overnight
- Modular chassis Single/Double Deck
- Full Selection of Maintenance Packages
- Market Ready 2022



Conclusions

- That there are challenges but electrification is possible and available today.
- Whilst we know that Opportunity charging works it will not be the solution for all routes hence the developments in generation 2 technology giving full operational flexibility.
- Natural evolution of battery technology will allow Volvo to meet the majority of operational requirements, not just for buses but trucks, vans and construction equipment on a global scale.
- Security of supply for the lifetime of the transport solution is key to Volvo Bus.



VOLVO

Volvo Group



Volvo Group

Driving prosperity through transport solutions

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Volvo Buses. Driving quality of life

