

Battery technology and workforce development

**Dr Colin Herron, Managing Director,
Zero Carbon Futures**

North East England
Leading the way for
Low Carbon Transport



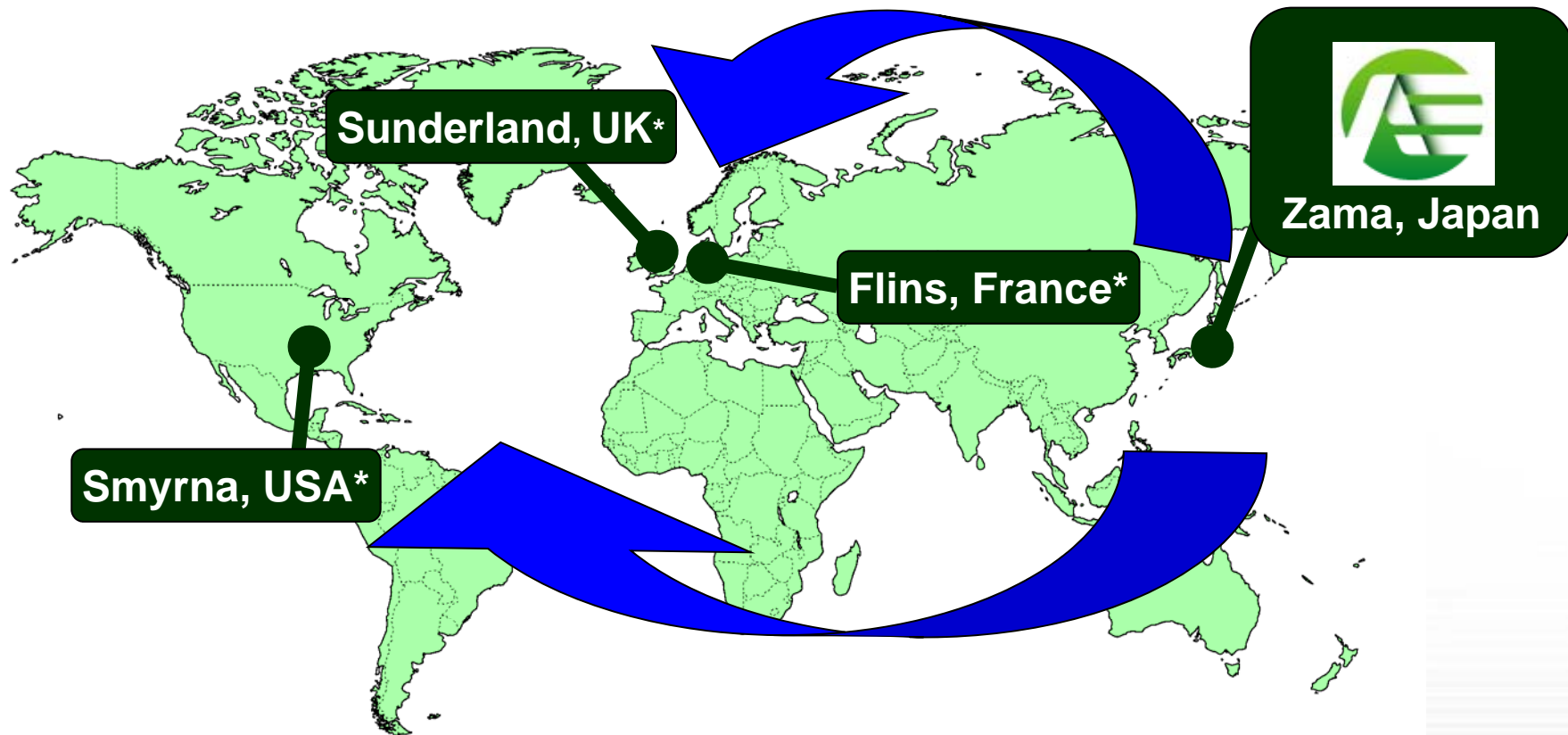
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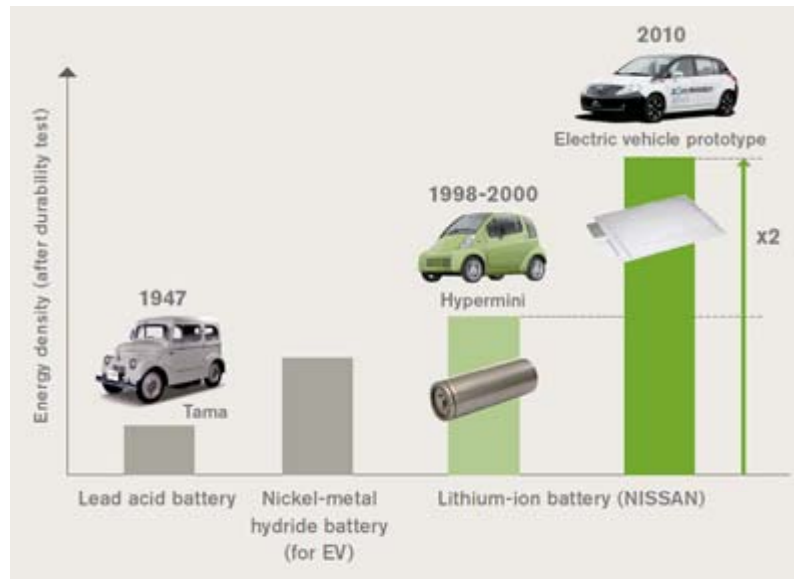
Global expansion

NISSAN

■ Three additional plants* to be launched for “ global mass production “.



•AESC : Automotive Energy Supply Corporation
(JV : Nissan 51 & NEC 49%)



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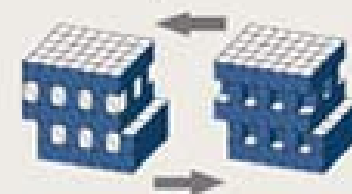
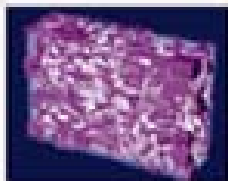


Nano-level electrodes

Rich in resource

Stable spinel structure

Use of manganese positive-electrode



High cooling performance

Simple structure using fewer parts

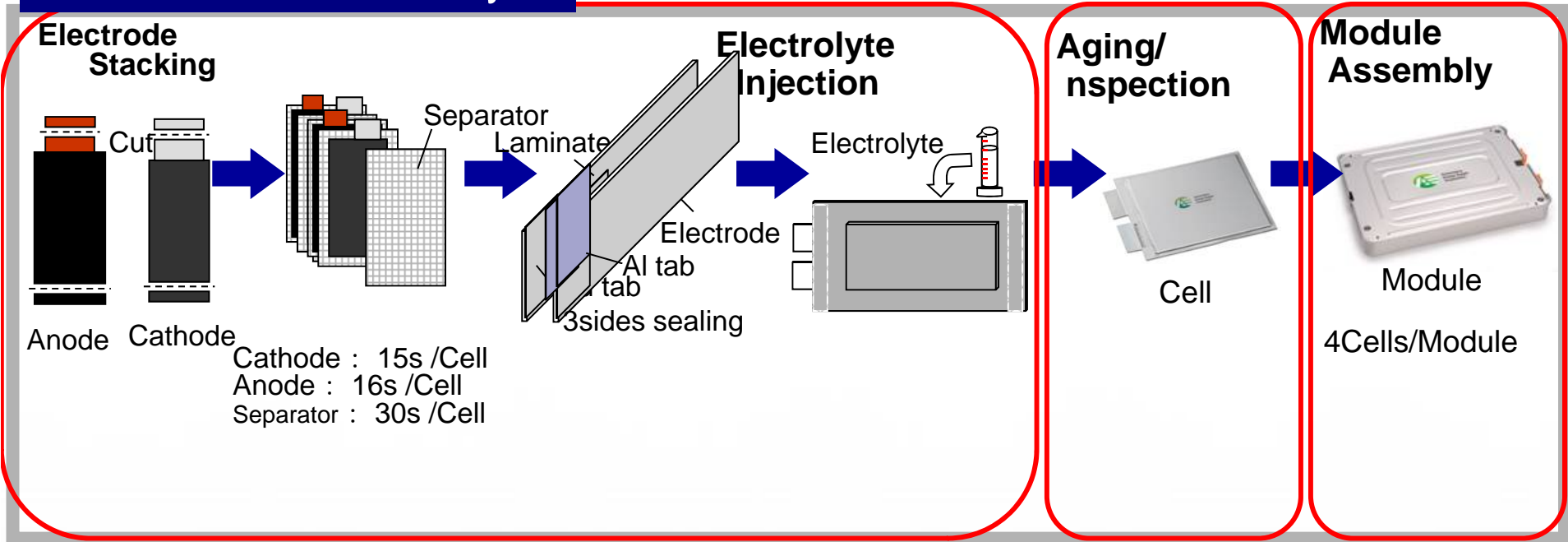
Laminated structure



Battery Module Production



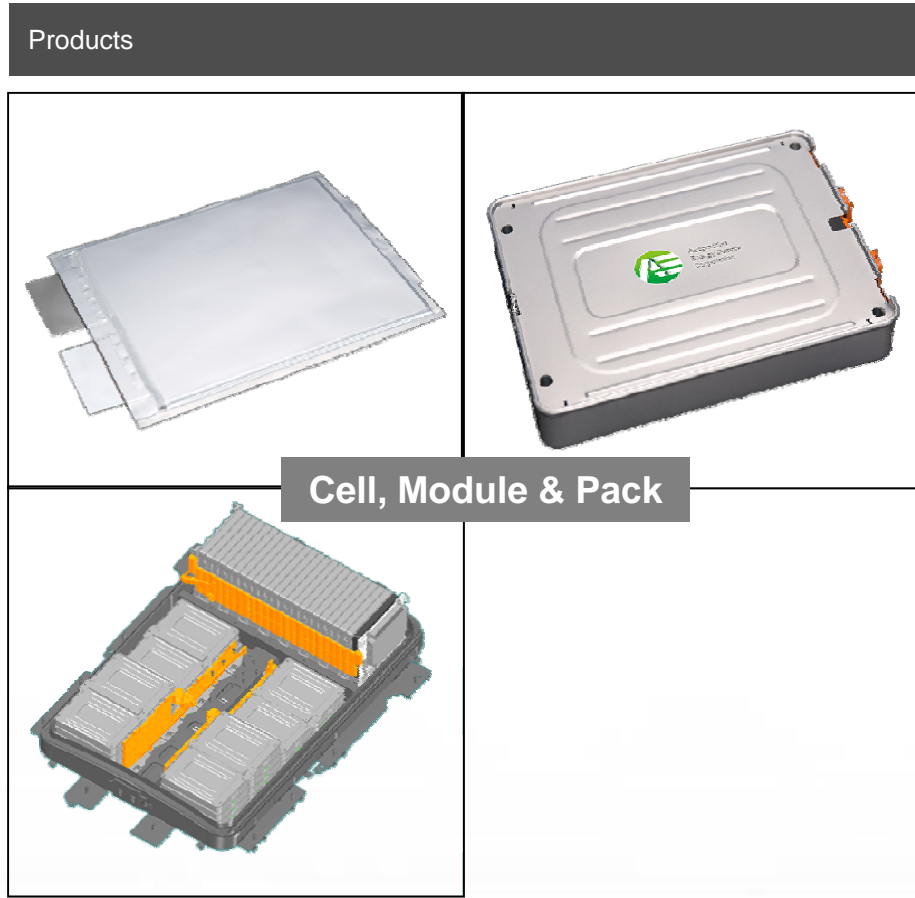
Cell & Module Assembly



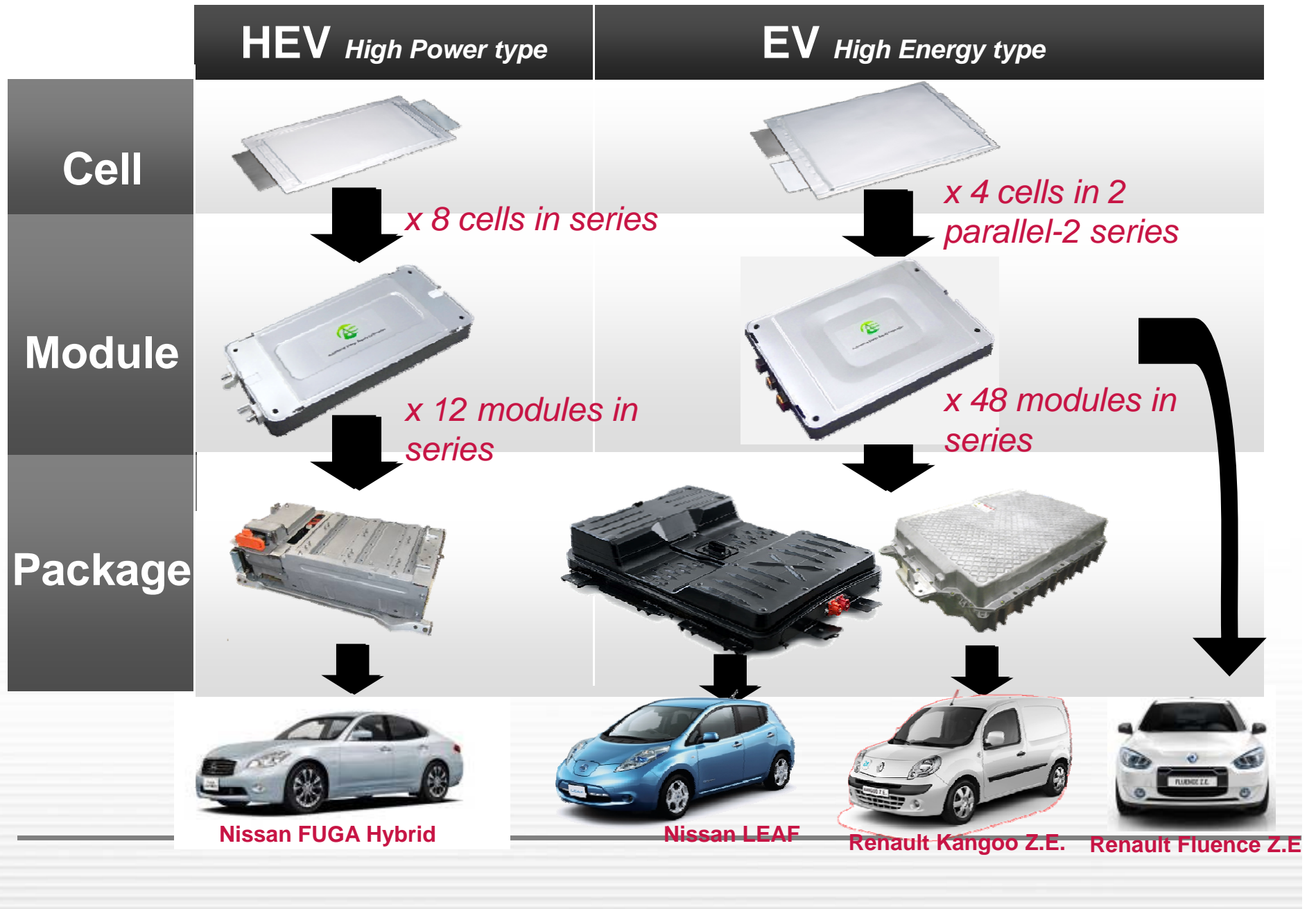
UK Battery Plant - Summary



1. Shop area	25,000m ²
2. Production capacity	10JPH : approx 60K/yr
3. Head count	209 as of now



Zama Operation Ctr (AESC) Products



Regional Low Carbon Curriculum

Sunderland University

Curriculum

BEng Automotive Engineering
 BEng Renewable Energy Engineering
 MSc Low Carbon Vehicle Technology
 MSc Engineering Management
 Energy Project investigating modular energy systems for EV's

Research

Smart NAV
 Project HyPower
 HyVan
 Zero Emmission Transport

Durham University

Curriculum

Technology for the Modern World -
 Transport Energy Markets ,
 Low Carbon and Thermal Technologies
 Advanced Manufacturing Technology
 Energy Generation and Conversion Technologies
 Highway Engineering
 Durham University Solar Car

Research

Aglaes for BioFuels
 Base Cavity Aerodynamics Effects for LCV Drag Reduction (2011)
 Condition Monitoring for Power Electronics Reliability
 Low Carbon Networks : Customer Led Network Revolution SUPERGEN FlexNet (Flexible Networks)
 Buffering , Storage and Transmission Investigating energy storage systems in smart grids.
 Energy Recovery Using an Exhaust Heat Wrap

Newcastle University

Curriculum

BEng/MENG Electrical /Electronic Engineering
 Transport Engineering and Operations
 Transportation Planning and Policy
 Transport and Business Management
 Transport and the Environment
 MSc Electrical Power
 MSc Automation and Control
 Module CEG 8406 - Lecture on EVs

Research

Smart Move Trials
 Switch EV (formally known as EVADINE)
 Electric power drive trains , energy storage , energy management , cooling

Northumbria University

Curriculum

BA Transportation Design (TD)
 BA Design for Industry
 MA in High Value Low Carbon
 MA Design (with specialist pathways in industrial design , transportation , etc)
 MA Design Professional Practice

Research

DDP Doctor of Design Practice
 PhD Doctor of Philosophy in Design
 High Value Low Carbon R & D design entity - School of Design

Gateshead College Skills

INSIDE THE FACTORY GATE

- Foundation Degree – Low Carbon Vehicles
- EV Manufacturing Safety – EAL
- EV Manufacture
- Aluminium Welding
- Coded Welding
- National Vehicle Design
- Battery Assembly – EAL
- Battery Manufacture
- Battery Testing and cycling
- Battery charging
- Clean Room Technology y for Battery Manufacture
- Fluid Power Smiths – CETOP

OUTSIDE THE FACTORY GATE

- Electric Vehicle Awareness – IMI Level 1
- Introduction to Hydrogen Safety
- Hydrogen Fuel Cells
- Electrically Propelled Vehicle Hazard Management – IMI Level 2
- EV Hazard Management B -TEC
- Routine Maintenance Activities on Electrically Propelled Vehicles
- Electric / Hybrid Safe Working Module – ATA
- EV Safety - ATA
- Electrically Propelled Vehicle Repair and Replacement – IMI Level 3
- Electric Vehicle Technician – ATA
- Hybrid Service Repair and Maintenance - ATA
- Smart Metering
- Telemetry
- Charging Point Installation
- EMTA Motorsport Welding and Fabrication




Involvement in the motor industry comprises 5 strands:

- 1) Motor Vehicle service, maintenance and repair
- 2) Motor Vehicle technician ATA accreditation
- 3) High Voltage Electric Vehicle programmes
- 4) Emergency Services EV Hazard Management
- 5) Curriculum development and training in Low Carbon Transport



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- curriculum now has the following elements:
 - EV Manufacture
 - EV service and repair
 - Infrastructure
 - Knowledge and Skills
 - Level 2 and 3 EV hazard management.
 - Level 2 and 3 EV service and repair.
 - Level 3 Automotive Design
 - Level 3 Automotive manufacture
 - Battery Assembly and Manufacture
 - Foundation Degree Electric Vehicle Technology.



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