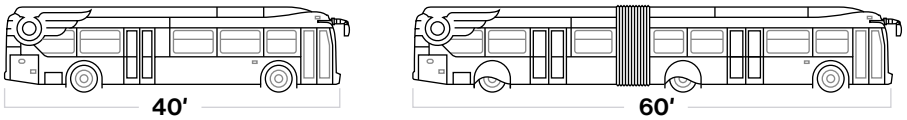
NEW FLYER

xcelsior *CHARGE FC™*

Our next-generation, fuel cell-electric, zero-emission transit bus.

Xcelsior CHARGE FC™ delivers longer range, better energy recovery and is smart city capable – making it the most advanced hydrogen fuel cell-electric bus in North America.

Available in 2 Lengths



Four distinct technology advancements to deliver a high-performance bus.

High-Power Batteries

The newest high-power, rapid-charge batteries.

Battery Packaging

Advanced protective battery packaging designed for easy installation and streamlined maintenance.

Fuel Cell Power Module

A new high-performing fuel cell power module that is simpler, more robust, and has a lower lifecycle cost.

Traction Propulsion System

A new lightweight electric traction propulsion system with up to 90% energy recovery.

Technology advancements.

1 Fuel cell power module.

FCmove™-HD+ is Ballard Power Systems' next-generation heavy-duty fuel cell power module for zero-emission vehicle applications that introduces a more compact and robust design with substantial lifecycle cost reductions.

Reduced lifecycle cost is achieved through lower maintenance requirements, higher reliability, and fewer parts.

Simplified System Integration

- All subsystems are integrated into one enclosure.
- Easier to service and takes up less space on the bus.

Increased Reliability

- Delivers >97% fuel cell power availability while in service.
- More robust components.
- With an IP69K rating, the module is 100% protected from intrusion of dust and water particles.

More Efficient

- Wide operating range across temperatures of -30°C (-22°F) to +49°C (120°F).
- Freeze start to -25°C (-13°F) without external energy or use of special start procedures.

2 Battery packaging.

A standardized waterproof battery enclosure is mounted on the rooftop using a "plug and play" approach, lending simplicity and efficiency in design, install, maintenance and manufacturing.

Rooftop application uses a modular approach with a simplified mounting system comprised of two rails running the length of the bus.

Simple

- One simple and standardized approach for better quality, consistency, and accuracy.
- If a battery needs to be replaced, the module can be removed and replaced with a new/backup module. The module needing troubleshooting can be serviced in the shop while the bus with the new/backup module onboard returns to service.
- With every battery having the same enclosure, service manuals are the same for every single bus model and length.
- Service parts are reduced by 90% going from 250 to less than 50 parts.

Waterproof

- With an ingress protection rating of IP67, the battery enclosure is 100% waterproof which greatly reduces the likelihood of water leaking into the battery enclosure.
- With an ingress protection rating of IP69K for dust, high temperatures, and high-pressure washing, there is 100% protection from intrusion of dust or water particles. This is ideal for demanding operating conditions, and situations where sanitization and rigorous cleaning is undertaken.

Easy to Service

- The casings are built using a reinforced composite fiber that is non-conductive.
- Service technicians can simply and safely plug in or unplug the battery module with less exposure to high-voltage electricity.

More Efficient

- Modules are better insulated resulting in better management of battery temperature for optimal performance.

3 The newest high-power batteries.

The batteries are made of world-class energy storage systems (ESS), engineered for safe, robust, and reliable use in transit.

The battery chemistry is Lithium Nickel Manganese Cobalt (NMC), providing the best balance of energy, power, safety, and life.

More Energy

- More energy available in conjunction with the fuel cell power module, allowing both the 40' and 60' models to standardize to a two-pack design.
- Greater capture of regenerative energy (during braking at top state of charge).

More Efficient

Better controlled and more consistent cell temperature in high-demand applications.

4 Accelera™ by Cummins ELFA 3 traction system.

Accelera™ by Cummins ELFA 3 next-generation traction system introduces a more efficient design with compact inverters and embedded drive controllers.

Safer

Easier and safer to maintain with shorter cable runs and touch-safe high-voltage connections.

Smaller

Smaller and lighter, taking up less space on the bus.

More Efficient

- Minimal rack requiring no covers.
- Shorter cable runs offer decreased risk of issues or faults, improved electromagnetic compatibility (EMC) and greater power efficiency.
- Delivers up to 90% energy recuperation.
- Delivers smooth, quiet, emission-free driving (with no engine noise, no idling, and zero local emissions).
- Offers better torque accuracy.

Extended range with zero emissions.

New Flyer fuel cell technology is a unique and innovative way to obtain extended-range operation similar to existing transit vehicles using a fully zero-emission solution.

Zero Emissions

Clean
The only output from the tailpipe is water vapor.

Robust Design

Built on the proven Xcelsior® platform, the Xcelsior CHARGE FC™ utilizes the same robust electric propulsion system as the Xcelsior CHARGE NG™ battery-electric bus, featuring industry-proven Accelera and ZF components.

Enhanced Range

The Xcelsior CHARGE FC™ can travel up to 370* miles on a single refueling and requires no off-board electric recharging.

*Range achieved with combination of normal fuel cell energy generation and battery-only mode. Range will vary depending on duty cycle and climate conditions.

Eco Friendly

Hydrogen is clean, abundant, and can be reformed into hydrogen from natural gas (methane) or created from renewable sources such as wind or solar energy through electrolysis.

The Xcelsior CHARGE FC™ will avoid 110+ tons of greenhouse gases per year from tailpipe emissions compared to a diesel bus.

Range Extender

To support extended operations, Xcelsior CHARGE FC™ can be equipped with an optional extended range feature providing approximately 50% additional fuel capacity and extending the vehicle range by as much as 120 miles**.

**Range will vary depending on duty cycle and climate conditions.

How it works.

Xcelsior CHARGE FC™ is an electric vehicle that uses compressed hydrogen as an energy source.

Integration with Battery-Electric Technology

Smart Refueling

Powered by Ballard Fuel Cells

What is a fuel cell?

It is a device that converts chemical energy into electric energy.

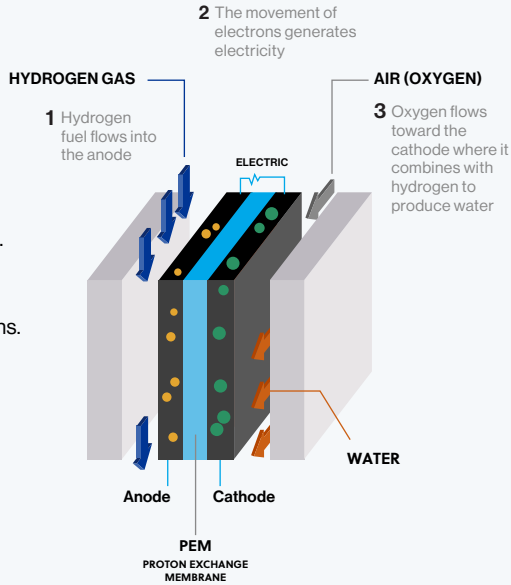
A series of chemical reactions splits hydrogen into protons and a current of electrons and then combines them with oxygen, which produces water. The flow of electrons is the electric current. The electric current is used to power the batteries and ultimately power the bus.

Fueling

40-foot: 10 – 14 min
60-foot: 14 – 18 min
**depending on fill station infrastructure (H2 in liquid or gas form)*

Equipped with either or both TN1 or TN5 fill receptacles or a multi-fill port configuration. Receptacles can also be equipped with IR transmitters or hardwired communication ports to support fast filling at smart fill stations.

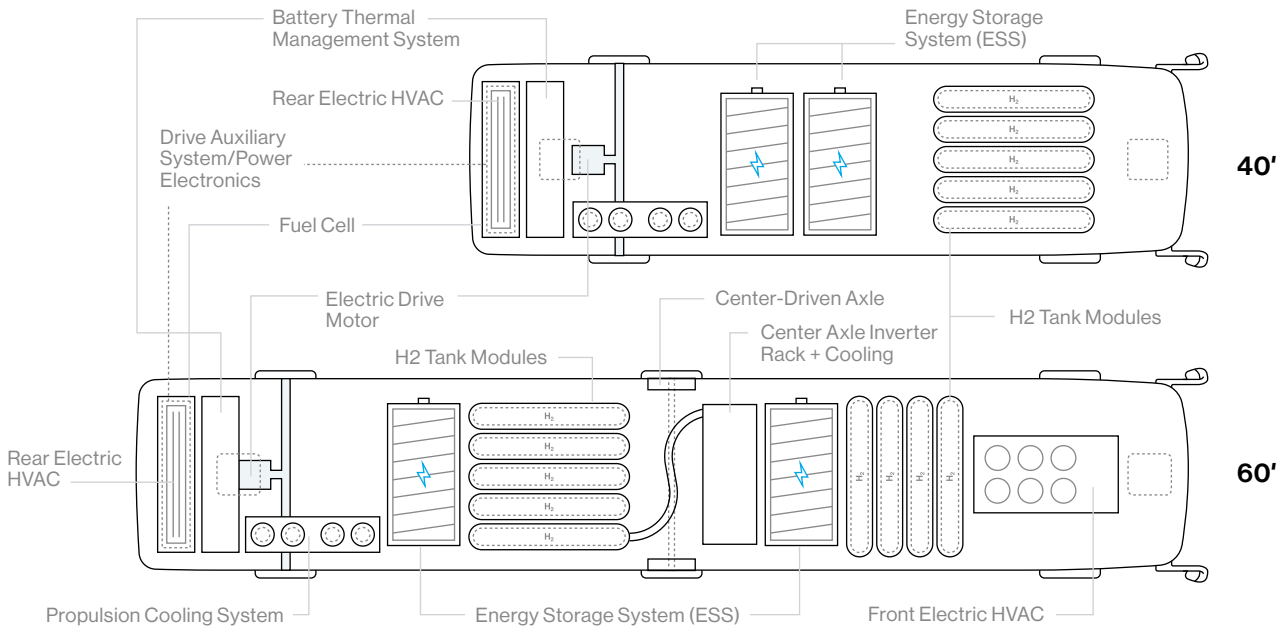
Lightweight Type 4 HGV2 tanks with 95% usable capacity.



Technology

Fuel cell-electric buses combine the best of battery-electric bus technology with an on-board power generator (fuel cell).

Fuel cell-electric buses use a battery-dominant hybrid architecture, where the batteries are large enough to handle all vehicle performance needs while the fuel cell acts like a continuous battery charger to extend the range of the vehicle.



Functionality + accessibility.

Kneeling

SmartRider™ enables kneeling to variable heights and minimizes the slope difference between a low-floor ramp and the bus floor.

Self-Leveling

SmartRider™ ramp achieves a 1:6 slope ratio with a self-leveling feature that can withstand up to 1000lbs.

Capacity

Industry-leading passenger carrying capacity with up to 82 total (40 seated and 42 standees).

CONNECT 360™

Connect 360™, operated by NFI Connect™, is a customizable performance dashboard that provides smart analytic reporting to expand insight and intelligence for managing your Xcelsior CHARGE FC™ fuel cell-electric bus.

Connect 360™ is included on every new Xcelsior CHARGE FC™. Learn more at **newflyer.com/connect**

Additional range capability with improved driver performance.

Intelligence on how to preserve battery energy throughout the day.

Decision-making information to optimize charging strategies.

Reduced operating cost and maximum fleet utilization.

NFI Infrastructure Solutions™

NFI Infrastructure Solutions™ is dedicated to delivering safe, reliable project management for smart, sustainable, zero-emission mobility.

Learn what Infrastructure Solutions can do for you at **newflyer.com/IS**

What our Infrastructure Solutions team provides.

- Project management of zero-emission mobility projects.
- Focuses on energy management optimization.
- Maximization of energy and fuel transfer and usage.

	40′ *XHE40*	60′ *XHE60*
Measurements		
Length	41′ 0″ (12.50m) over bumpers 40′ 2″ (12.24m) over body	60′ 10″ (18.54m) over bumpers 60′ 0″ (18.29m) over body
Width	102″ (2.6m)	102″ (2.6m)
Roof Height	11′ 1″ (3.3m)	11′ 1″ (3.3m)
Step Height	14″ (356mm)	14″(356mm)
Front Step Height (Kneeled)	10″ (254mm)	10″ (254mm)
Interior Height – Floor to Ceiling	79″ (2m) over front and rear axle; 95″ (2.4m) mid-coach	79″ (2m) over front and rear axle; 95″ (2.4m) mid-coach
Tire Size	305/70R22.5	305/70R22.5
Wheelbase	283.75″ (7.2m)	229″ (5.8m) front / 293″ (7.4m) rear
Propulsion		
Motor	Accelera Electric Drive System Optional High Gradeability Motor	Accelera Electric Drive System ZF AVE130 In-Wheel Motor Center Drive Axle
Rated Power	160 kW (209 kW on optional high-grade model)	280 kW
Rated Torque (*Based on 5.67:1 ratio axle)	1,033 lb-ft (2,212 lb-ft on optional high-grade model)	2,066 lb-ft
Passenger Capacity (*Based on 150kWh ESS configuration)		
Seats	Up to 40*	Up to 52 (with one exit door)*
Standees	Up to 42*	Up to 73 (with one exit door)*
Accessibility		
Doors	2	2 or 3 (option for up to 5 doors)
Wheelchair Accessibility	32″ (813mm) wide, 1:6 slope Flip out NFIL ramp, front door	32″ (813mm) wide, 1:6 slope Flip out NFIL ramp, front door
Wheelchair Locations	2 - front location, rear location also available (other options available)	2 - front location, rear location also available (other options available)
Approach Angle		
Approach/Departure/Breakover Angles	9°/9°/9°	9°/9°/12° (front) 9° (back)
Turning Radius (Body, with aluminum wheels; *varies with wheel type)		
Turning Radius	43.5′ (13.3)*	42′ (12.8m)*
Main Components		
Floor	Marine Grade Plywood Floor Optional Composite Floor Composite Rear Interior Step Tarabus, Altro, RCA Floor Covering	Marine Grade Plywood Floor Optional Composite Floor Composite Rear Interior Step Tarabus, Altro, RCA Floor Covering
Electrical System	Parker Vansco	Parker Vansco
Cooling System	Electric cooling fans	Electric cooling fans
HVAC	Thermo King TE15 (rear)	Thermo King RLFE (front) TE15 (rear)
Axles	MAN VOK 08 is the new axle front disc brakes MAN HY-1350 rear disc brakes, single reduction axle	MAN VOK 08 front disc brakes, ZF AVE 130 is the center electric drive axle model center disc brake MAN HY-1350 rear disc brakes, single reduction axle
Energy Storage System		
Fuel Cell	Ballard Power Systems FCmove ™-HD+	Ballard Power Systems FCmove ™-HD+
Equivalent Battery Energy	734 kWh base configuration	Up to 1030 kWh
Hydrogen Storage Capacity	37.5 kg (base)	56 kg
Net Power	100 kW	100 kW

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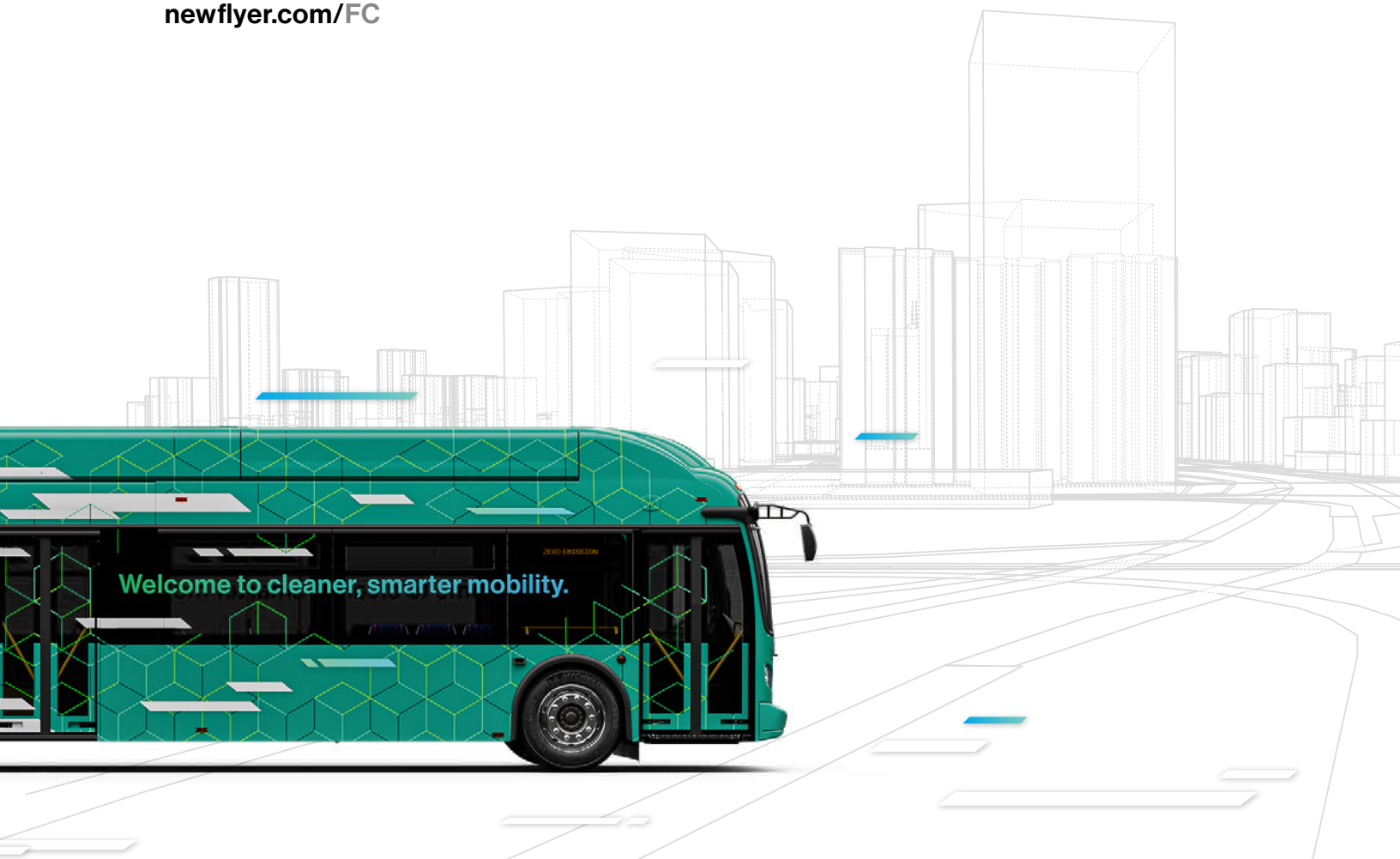
newflyer.com/FC



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Learn more about this technology at the Vehicle Innovation Center
newflyer.com/vic