

Forward Looking Statements

This presentation includes "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements, other than statements of present or historical fact included in this presentation, are forwardlooking statements. When used herein, the words "aims", "could," "should," "will," "may," "believe," "anticipate," "intend," "estimate," "expect," "project," the negative of such terms and other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain such identifying words. Forward-looking statements are based on management's current expectations and assumptions about future events and are based on currently available information as to the outcome and timing of future events. Except as otherwise required by applicable law, Hyzon disclaims any duty to update any forward-looking statements, all of which are expressly qualified by events or circumstances after the date of this presentation. Hyzon cautions you that forward-looking statements are subject to numerous risks and uncertainties, most of which are difficult to predict and many of which are beyond the control of Hyzon, including, but not limited to, the following: our ability to commercialize our products and strategic plans, including our ability to establish facilities to produce our fuel cells, assemble our vehicles or secure hydrogen supply in appropriate volumes, at competitive costs or with competitive emissions profiles; our ability to effectively compete in the heavy-duty transportation sector, and withstand intense competition and competitive pressures from other companies worldwide in the industries in which we operate; our ability to convert non-binding memoranda of understanding into binding orders or sales (including because of the current or prospective resources of our counterparties) and the ability of our counterparties to make payments on orders; our ability to invest in hydrogen production, distribution, and refueling operations to supply our customers with hydrogen at competitive costs to operate their fuel cell electric vehicles; disruptions to the global supply chain, including as a result of geopolitical events, and shortages of raw materials, and the related impacts on our third party suppliers and assemblers; our ability to maintain the listing of our common stock on the Nasdag Capital Market; our ability to raise financing in the future; our ability to retain or recruit, or changes required in, our officers, key employees or directors; our ability to protect, defend, or enforce our intellectual property on which we depend; and the impacts of legal proceedings, regulatory disputes, and governmental inquiries.

Additional information on potential factors that could affect the financial results of Hyzon and its forward-looking statements is included in the "Risk Factors" section of Hyzon's Annual Report filed on Form 10-K and other documents filed by Hyzon from time to time with the SEC. These filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. Hyzon gives no assurances that Hyzon will achieve its expectations as may be described herein.



Q12023 Strategy & Commercial Development Update

- Parker Meeks, Chief Executive Officer

Highly Focused Restructured Strategy & Operations

	Action taken	Forward strategy
Technology	 Refocused on fuel cell and fuel cell manufacturing Prioritized R&D spend on highest value projects 	 Focus on 200kW fuel development Accelerate commercialization and scalable manufacturing
Product	Rationalized product portfolio	Commercialize single vehicle platform per region
Geography	 Re-evaluated market and customer contracts Trimmed operating subsidiaries 	 Target high-growth markets with strong government support
Organizational Structure	 Tightened accountability and management reporting lines Strengthened leadership team (COO, CHRO) Integrated global functions 	 Drive culture of innovation and excellence through performance, professional and personal development Global, centralized vehicle & technology design & development
Governance	 Completed Special Committee Investigation Created Sarbanes Oxley and ERP implementation teams Stood up complete performance management toolkit 	 Advance stringent and transparent processes and controls across the organization Fully implement Special Committee recommendations



Hyzon's Proprietary Fuel Cell Production Facility

Bolingbrook Facility, IL

Proprietary, inhouse design, development and manufacturing of 200kW FCS

On track for Start of Production or SOP of 200kW FCS in 2024



Driving Hyzon's 200 kW Single FCS Technology to Commercialization

200 kW FCS Major Milestones: Start-of-Production and Durability

- 200 kW FCS A-Samples produced and tested
- 3x 200 kW FCS B1 Samples produced and tested
- Design Verification Plan (DVP)
- 6x 200 kW FCS B2 Samples produced and tested (3 systems completed so far)

1H 2023 2H 2023

 200 kW FCS durability with simulated vehicle drive cycles

 In-vehicle on-road 200 kW FCS validation tests

1H 2024



2H 2024

- Manufacture and test 16x 200 kW FCS B2 and C samples
- Design Verification Plan and Report (DVP&R)
- Short stack durability (Accelerated Stress Testing – AST & Load Cycle Testing – LCT)

- Declare pre-production
- Process Verification Plan and Report (PVP&R)
- Start of Production (SOP)

...Providing Significant Advantages Over Two ~100 kW FCS Deployments Due to Hyzon's Advantaged IP and Design

Advantages of Hyzon's 200 kW single fuel cell system IP and benefits vs. two ~100 kW fuel cell systems

1

 Innovative MEA design increase the robustness, performance and durability

 Exclusively own 20 US and international patent applications on MEA

2

Patented hybrid bipolar plate (graphite and metallic)

- Combined advantages of graphite and metallic plates
- Enables much larger cell size
- Improved heat distribution & water management
- Suitable for heavy-duty applications

3

More individual fuel cells than typical industry fuel cell stacks

 Integrated design eliminating external connectors and cables



Adhering to robust engineering testing and standards

- DVP&R ongoing
- 25 200kW fuel cells are being made
- Continuous manufacturing upgrade

Hyzon's 200 kW single FCS shows significant benefits vs. traditional approach of two ~100 kW fuel cells



Total Volume

-25%

Total FCS cost in truck BOM (200 kW vs. 2x~100 kW)

-30%

Total FCS weight vs. 2 systems

+20%

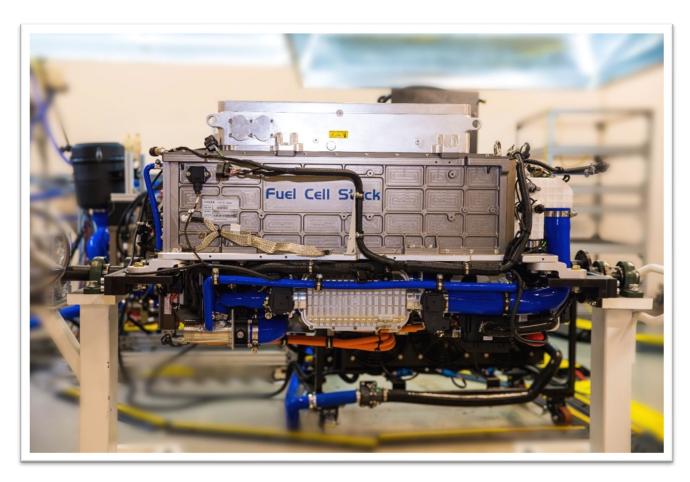
Miles per kg H2 vs. 120 kW FC truck¹



1. 200 vs. 120kW at 120kW; Estimated based on early 200 kW truck testing at test track in similar simulated routes on flat road vs. similar use case performance with single 120 kW FCS

Hyzon's Technology Advantages is Based on Proprietary Fuel Cell IP

Leveraging IP to produce and commercialize 200kW FC system



Category	# of patents	Significant areas
Membrane Electrode Assembly (MEA)	25	Covers, electrode design, membrane catalyst, gas diffusion layer
Bipolar Plate (BPP)	16	Flow field design, durability improvement
Unit Cell	15	Sealing, bonding
FC Stack	6	Stack design, assembly
Balance of Plant (BOP)	35	Humidifier, sensors, system controllers and peripherals
Fuel Cell System	23	Anode, cathode and coolant loops, Modular boost converter
Other	37	Hydrogen storage, vehicle and battery (incl. SOC management)
Total	157	

Note: These are exclusively utilized by Hyzon Motors in mobility in Hyzon's core markets of North America, Europe and Australia / New Zealand. Numbers include patents applied, including those awarded or pending.



Three Streamlined and Region-Specific Core Platforms

Region-specific product platforms minimize asset requirements and maximize standardization

- One platform developed per region
- 2 Standardized fuel cell powertrain
- Modularized balance of plant/electrified components
- 4 Third party contractor assembly strategy¹
- 5 Customer deployments in 2023 in all three regions

Conventional



- Fully developed 110kW platform + SOP with Fontaine in progress
- 200kW A-sample truck in testing, Csample bench testing started
- Commercial agreements signed with blue chip customers with deliveries planned in 2H 2023
- Liquid hydrogen long-range truck in on-track testing, pending customer demonstration

Cabover



- 110kW deployed to customers for trials/ demonstrations
- 200kW development in process



- Fully developed 110kW platform
- · ISO certified for safety, quality end environmental
- Commercial delivery planned in 2H 2023

1. Hyson Motors US and Hzyon Motors Europe to leverage third party contract assembly for FCEV truck assembly; Hyzon Australia planned to assemble its own vehicles in scale-up of production



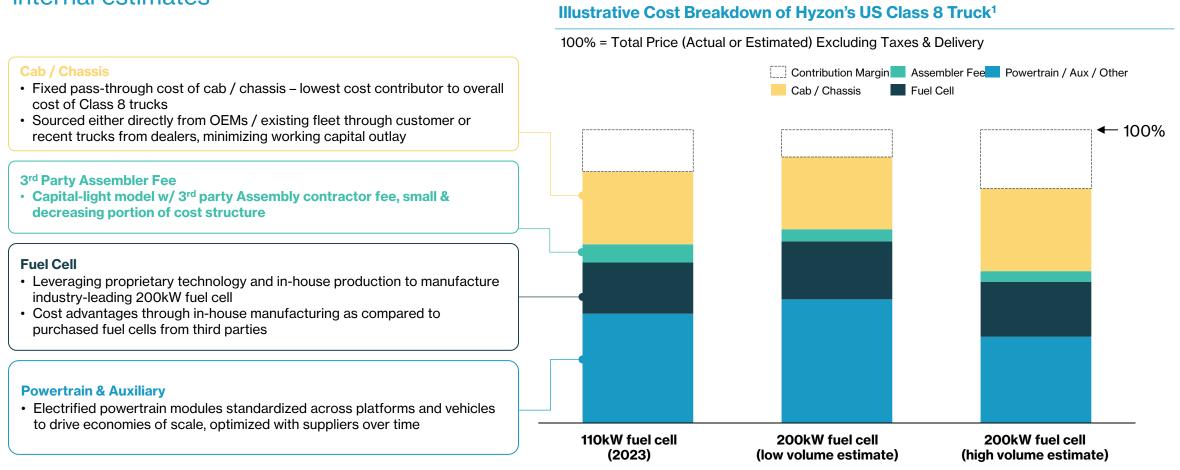
Third Party Assembly Model Drives Cost & Capital Efficiency Combined with Subassembly-Driven Modular Design

Commercializing Through Capital Light Model

Subassembly Modules Final Assembly Customer Experience US (3rd party contract assembly) Subassembly Build Demonstration/Sales Units System Validation Europe (Evaluating 3rd party Customer Confidence contract assemblers) Scalable Production After Sales Support • ANZ (In-house)

Positive Contribution Margin at Truck-Level Today, with Specific Cost Reduction and Fuel Efficiency Improvement Initiatives to Expand

Illustrative unit economics of Hyzon's Class 8 fuel cell electric vehicle; U.S. example based on Hyzon internal estimates

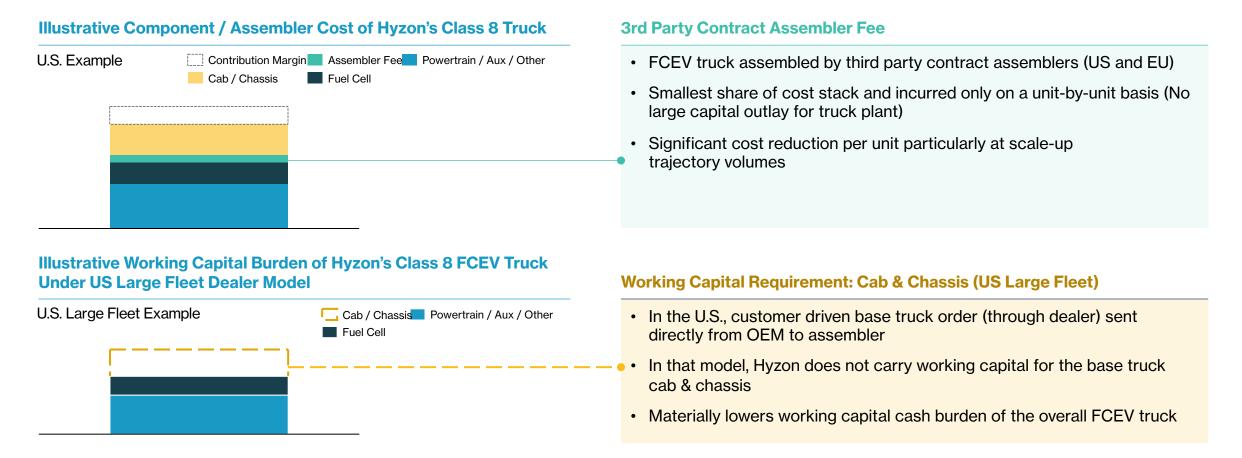


1. Illustrative graph is drawn to scale; unit level contribution margins (direct costs plus warranty reserve) – 110kW fuel cell based on current cost stack and 200kW fuel cell (low and high volume) based on Hyzon Motors internal estimates



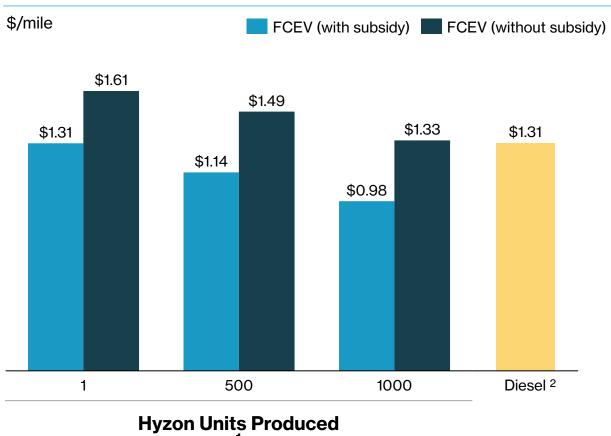
Capital-Light Model Leveraging Third-Party Contract Assemblers Drives Both Cost and Partial Working Capital Advantages vs. Full Vehicle Manufacturing

Overview of Capital Light Third Party Assembly Model Benefits to FCEV Cost Structure and Cash: US Example



Anticipating Approaching Diesel Parity Without Relying on Truck Subsidies at Volume of 1,000 Trucks Annually

Illustrative Total Cost of Ownership Comparison



Manufacturing 200 kW fuel cells in house offers significant cost advantages through scale impact

Vehicle production currently transitioning to at-scale production via modularization & standards

Detailed R&D pathway identified to drive fuel efficiency improvement on Class 8 Cascadia, including 200 kW benefits

1. Based on fuel cell electric Class 8 truck illustrative sales price of \$500k, for analysis purposes reduced to \$425k @ 1,000 units (with and without purchase subsidies of \$240k), 100k miles per year for 8 years, \$5.0 / kg H2 cost, vehicle maintenance of \$0.17 / mile and fuel economy of 6.0 (1), 7.0 (500), 8.0 mi/kg (1,000) Assumed acquisition cost of \$139k. Diesel fuel economy assumed 5.4 mpg @ \$4.80 / Gal with maintenance costs of \$0.20 / mile.

Active and Progressing Pipeline with Initial Anchor Customers Contracted in Each Region

Number of fleets active at each Pipeline Stage

Global Pipeline



- Traction in all three regions primarily focused on California, Netherlands, Germany/Austria, and ANZ
- Anchor customer agreements in place in each region, commercially activated in 2023
- Priority back to base use cases including drayage, food & beverage, short haul freight

Note: Company logos are trademarked images of the respective firms



Large Fleet Focus with Three-Step Ramp-up, Enabling 1,000 Trucks per Year with just 10 Large Fleet Customers

Example Large Fleet Customer Order Intention Ramp-Up Schedule w/ Hydrogen Fuel Requirements

	Pilot	Implementatio n	Milestone	Ramp-up
Number of Class 8 FCEV trucks	5-10	15-20	30-50	75-100
Cumulative Class 8 FCEV trucks in fleet	5-10	20-30	50-80	125-180
Cumulative hydrogen consumption (tons/day) ¹	~0.2 – 0.4	~0.8 – 1.2	~2.0 – 3.2	~5.0 – 7.0
Hydrogen Fueling Solutions		refueler or public access	the fence base	ess or behind ed on interest and onal needs

- Hyzon's commercial model collaborates with customers through the FCEV ramp-up, starting with trials attached to confirmed pilots and milestone orders
- Post-trial fleet ramp-up to 100 trucks per year over 3-4 year period
- 3 10 customers per region leads to 1,000 trucks per year over multiple phases
- Active trial and customer pipeline with anchor customers under agreements in US, Europe and Australia/New Zealand

^{1.} Based on 40kg of hydrogen consumption per day per FCEV Class 8 truck.



Rigid Platform Nearing First Globalization Event with US-build nearing Ready-To-Ship





Australia

- ISO-Certified truck platform
- Final production version and full homologation targeted in July 2023
- First vehicle set to hit Australian roads in Sydney in July 2023
- Initial contract announced with Remondis





U.S.

- First truck built in Australia, operational and nearing ready-to-ship to the U.S. w/o refuse body
- To enter trial program w/ California customers following refuse body upfit and testing
- Pairs well with circular ecosystem and fuels for potential H2 production from landfills in California (e.g. Raven SR Richmond project)

Liquid Hydrogen Truck Testing at MITRP Underway, with Customer Demonstration In Planning





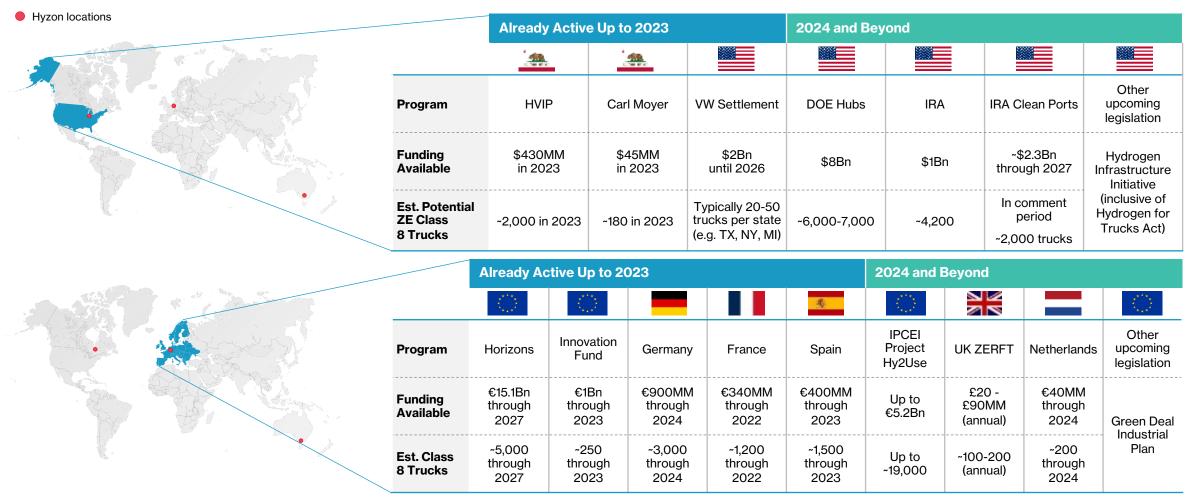


- Truck fully assembled, in track testing at Michigan Technical Resource Park (MITRP)
- Demonstration vehicle packaged with 110kW FCS + ~100kg of LH2 on-board
- Customer demonstration in planning for commercial operations, targeting minimum 600-mile range
- Liquid dispensing partnerships in initial shaping stages ahead of commercialization planning

Note: Company logos are trademarked images of the respective firms



Subsidy Availability Drives Thousands Of Zero Emission Trucks With Diesel Parity Conversion Potential in Near-Term

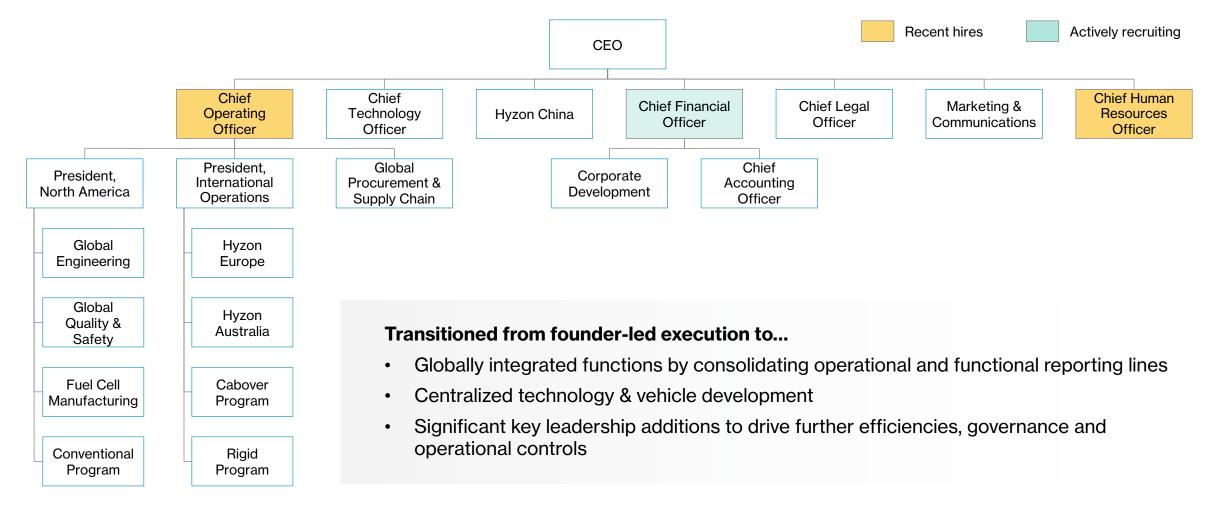


Source: California Air Resources Board, New York State Truck Voucher Incentive Program, Rocky Mountain Institute, U.S. EPA, U.S. Senate Energy and Natural Resources Committee, U.S. Senate Initiatives, EU Research & Innovation Programme, UK Innovation Funding Service, European Federation for Transport and Environment, Hydrogen Europe, The International Council on Clean Transportation, press releases.



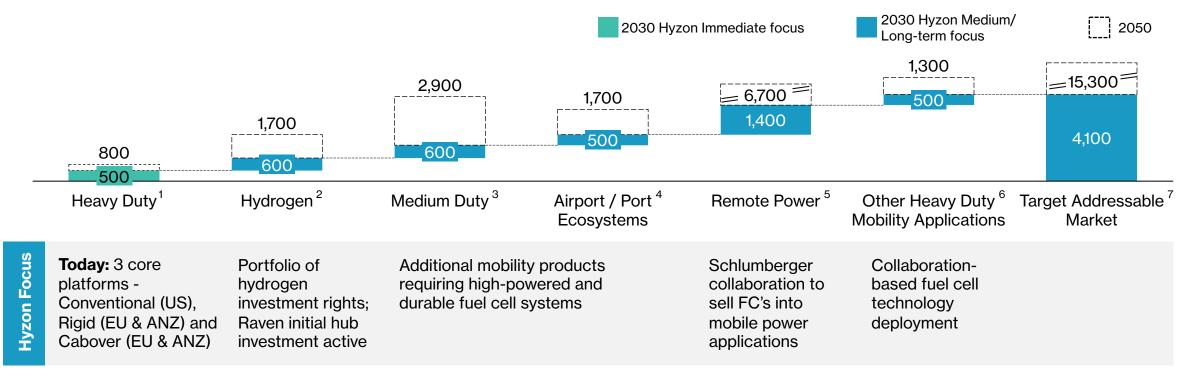
Significantly Restructured since August 2022

Organization Structure Today



Significant Global Market Opportunity in HD Trucking Alone, with Multiple Layers of Upside Optionality through 2030 and Beyond

Target Addressable Global Market Across Hydrogen Ecosystems, \$ Billions



^{1.} Statista HD Truck Projections (2019). 2030 and 2050 TAM based on extrapolation of 2019 - 2026 CAGR of 2.57%.

^{2.} Goldman Sachs Global Demand & Supply Model (2022); 2050 TAM based on extrapolation of 2020 - 2040 CAGR of 5.38%.

^{3.} Mordor Intelligence MD and HD Commercial Vehicles Market Research Report (2022). 2030 and 2050 TAM based on extrapolation of 2018 – 2028 CAGR of 8%.

^{4.} Airport: The Business Research Company Commercial Aircraft Market Research Report (2023). 2030 and 2050 TAM based on extrapolation of 2023 – 2027 CAGR of 7.9%. Port: Skyquest Tech Consulting Marine Vessel Market Research Report (2022). 2030 and 2050 TAM based on extrapolation of 2022 – 2028 CAGR of 1.61%.

^{5.} Markets and Markets Hybrid Power Solutions Market Research Report (2015). 2030 and 2050 TAM based on extrapolation of 2016 – 2021 CAGR of 8.13%.

^{6.} Other Heavy Duty Mobility Applications consists of Locomotive, Agricultural Machinery, Construction Machinery, ATV markets.

Locomotive: Statista Locomotive Projections (2021). 2030 and 2050 TAM based on extrapolation of 2020 – 2027 CAGR of 3.0%. Agricultural Machinery: TechNavio Agricultural Machinery Market Research Report (2022). 2030 and 2050 TAM based on extrapolation of 2021 – 2026 CAGR of 5.87%. Construction Machinery: TechNavio Construction Machinery Market Research Report (2022). 2030 and 2050 TAM based on extrapolation of 2022 – 2027 CAGR of 4.3%. ATV: TechNavio All-Terrain Vehicle Market Research Report (2022). 2030 and 2050 TAM based on extrapolation of 2022 – 2027 CAGR of 7.59%.

Hydrogen Production Relationships & Investment Rights Provide Access to Fuel at Diesel Parity

Hyzon Location Focus Applicability by Feedstock MSW¹ **RNG** Solar/Wind Ind. gas **Biomass** CA, Europe RAVEN TRANSFURM Midwestern U.S. MATERIALS (TC Energy Western U.S. RECARBON, INC. Western U.S. OK

Note: Company logos are trademarked images of the respective firms 1. Includes unrecyclable plastics



RAVEN

Richmond, CA
Republic Services West Contra Costa Landfill
S-Series • Waste-To-Hydrogen



Raven S1, LLC Partners:







Note: Company logos are trademarked images of the respective firms Source: Raven

Technology

Steam/CO₂ Reformation, non-combustion

Expected Launch Date

Spring 2024

California Environmental Quality Act Approval

May 16, 2023

Bay Area Air Quality Management District Expected Approval

Summer 2023

Construction

Summer/Fall 2023

Feedstock

Organic waste, up to 99 wet tons per day, 34,155 MT per year (based on 345 days of operation per year)

Hydrogen Production

5 tons per day/2,400 MT per year

Avoided Emissions

7,200 MT CO₂e annually



Hyzon's Focus in 2023-2024: Execution, Which is Well Underway

Priority Milestones to achieve in 2023-2024

			Fuel cell
Category	Timing	Priority Milestones (Subset)	Status
	2H 2022	Restructure Hyzon Europe & China Ops	Ø
	2H 2022	Rigid Platform ISO Certification & Launch	⊘
	1H 2023	Europe Cabover Gen 1 4x2 Customer Launch with Anchor Customers	⊘
	1H 2023	First 200kW B-sample fuel cell produced and tested	⊘
	1H 2023	First U.S. customer order contracted	⊘
	1H 2023	First 200kW FCEV truck in testing	⊘
	2H 2023	200kW fuel cell C-sample declaration	
	2H 2023	Deliver first commercial Class 8 Hyzon FCEV to U.S. customer	
	2H 2023	25 200kW fuel cell prototypes produced / validated and C-Sample 200 kW Declared	
	1H 2024	200kW FCEV Truck Commercial Launch	
	2H 2024	200kW production facility SOP declared	



Q12023 Financial Highlights and Update

- Jiajia Wu, Interim Chief Financial Officer

Q1 2023 Financial Summary

(in thousands)	 1Q 2023	4Q 2022	3Q 2022	2Q 2022	1Q 2022
Revenue	\$ _	\$ 787	\$ 5	\$ 46	\$ 2,888
Cost of revenue	838	13,094	8,203	1,370	653
Research and development	9,340	12,472	9,241	10,483	6,936
Selling, general, and administrative	 30,857	38,153	36,103	20,065	19,752
Loss from operations	 (41,035)	(62,932)	(53,542)	(31,872)	(24,453)
Other income (expense)	 10,777	14,099	17,889	70,663	16,161
Net loss before income taxes	\$ (30,258)	\$ (48,833)	\$ (35,653)	\$ 38,791	\$ (8,292)
Income tax expense	_	_	_	_	526
Non-controlling interest	 (10)	(5,966)	(10,858)	(3,208)	(2,295)
Net loss attributable to Hyzon	\$ (30,248)	\$ (42,867)	\$ (24,795)	\$ 41,999	\$ (6,523)
Capital expenditures (including deposits)	(1,461)	(2,813)	(3,668)	(3,757)	(3,895)
Depreciation and amortization	1,082	1,259	839	702	904
Stock based compensation	1,359	1,217	1,063	1,859	1,193
Cash equivalents + Short term investments	\$ 209,015	\$ 255,329	\$ 310,250	\$ 363,941	\$ 407,333
Total headcount (rounded)	330	330	320	320	240



Non-GAAP Measures

EBITDA and Adjusted **EBITDA**

	Three Months Ended March 31, 2023		Year Ended December 31, 2022	
Net loss	\$	(30,258)	\$	(54,513)
Interest income, net		(135)		(457)
Income tax expense		_		526
Depreciation and amortization		1,082		3,704
EBITDA	\$	(29,311)	\$	(50,740)
Adjusted for:				
Change in fair value of private placement warrant liability		(641)		(14,106)
Change in fair value of earnout liability		(6,420)		(92,834)
(Gain) loss on equity securities		_		(10,082)
Stock-based compensation		1,359		5,332
Executive transition charges (1)		_		602
Regulatory and legal matters (2)		7,742		29,816
Acquisition-related expenses (3)				8,400
Adjusted EBITDA	\$	(27,271)	\$	(123,612)

⁽¹⁾ The 2022 executive transition charges include a separation payment and salary expense for technical advisory services related to the Company's former Executive Chairman who continues to serve as Non-Executive Chairman.



⁽²⁾ Transaction costs of \$3.3 million attributable to the liability classified earnout shares and \$0.1 million of write-off of debt issuance costs.

⁽³⁾ Regulatory and legal matters include legal, advisory, and other professional service fees incurred in connection with the short-seller analyst article from September 2021, and investigations and litigation related thereto.

⁽⁴⁾ Acquisition-related expenses incurred for potential and actual acquisitions that are unrelated to the current operations and neither are comparable to the prior period nor predictive of future results. The 2022 expenses relate to the Orten business combination cancellation.

Strategy and Corporate Development Update

- Sayanta Dutta, SVP Corporate Development

Closing Remarks

- Parker Meeks, Chief Executive Officer

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Appendix



Introducing a Revitalized Hyzon

Fuel Cell Technology Leader, Driving "Early Mover" Commercialization of Heavy-Duty FCEV Trucks

Proprietary fuel cell technology and 200 kW fuel cell system (FCS)









Repowered fuel cell trucks









Hydrogen relationships and investments







TRANSFURM MATERIALS





200 kW

Net fuel cell single stack system in on-road testing



4.5 kW/L

Current generation power-density of PEM fuel cell stacks



Total patents granted and filed/pending1



Based

Note: Company logos are trademarked images of the respective firms. 1. Patent counts are totals of exclusively and jointly owned, both granted and filed / pending



Product Maturity Declaration

Product Maturity Matrix

Category	A-Sample	B-Sample	C-Sample	Production
Functionality/ Performance	Demonstrate functionality and performanceMay not meet all targets	Fully functionalMeets internal performance targets	Fully functionalMeets performance targets	Fully functionalMeets internal performance targets
Durability	Lifetime limited, but demonstrates stable operation in intended use.	Limited durability testing	 Passes internal and customer durability requirements 	Passes internal and customer durability requirements
Packaging	Representative size, but not final packaging for application	Packaged for application	Packaged for application	Packaged for application
Manufacturing	 Hand built with draft assembly processes Prototype parts purpose built for intended function 	 Representative parts, but prototype tooling/machining Preliminary standardized assembly processes 	Standardized production tooling and assembly process	 Production tooling and assembly process Production quality processes active Aftersales and service support in place



Patent Overview

Patent Control Summary as of April 19, 2023

	Patents Awarded	Patents Applied	Patents Pending	Non- Provisional Applied	Provisional Applied	Totals
Exclusively Owned	0	80	80	74	6	80
Jointly Owned ²	59	77	18	77	0	77
Totals	59	157	98	151	6	157

All Patents Applied are Pending (not Awarded);
 Jointly owned with one or more Horizon entities (per IP Agreement) except three unrelated parties (in discovery)

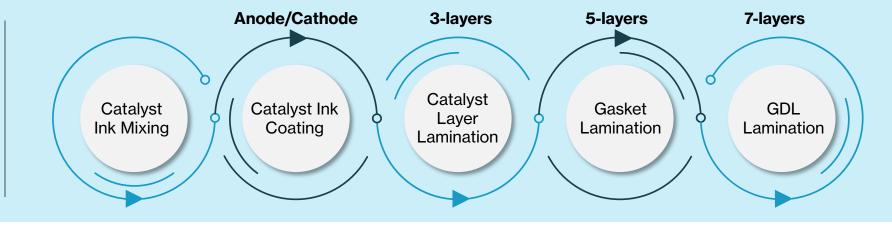


Hyzon has an Innovative MEA Manufacturing Process

7-Layer Membrane Electrode Assembly (MEA)

- Cathode catalyst layer is coated on the membrane (this is the layer where oxygen reduction reaction happen at the cathode in the final MEA)
- 2 Coating anode catalyst layer on a substrate film (this is where hydrogen oxidation happen at the anode in the final MEA)
- The anode catalyst layer on the substrate is transferred to the non-coated side of the membrane in a roll-to-roll lamination equipment (anode catalyst layer / membrane / cathode catalyst layer constitute the 3-layers
- In the next step, the 3-layer roll is integrated into sub-gasket in a roll-to-roll equipment (two sub gaskets: one for anode side and one for cathode side) to form the 5-layers
- Finally, gas diffusion layers are integrated in a roll-to-roll equipment (one for anode and one for cathode) to form 7-layers and this is referred to as MEA (MEA has 7-layers in total)

Proprietary roll-to-roll MEA manufacturing process



Hyzon's 200kW Fuel Cell Offers Significant Advantages vs. Competitors Typical Approach of Two ~100kW Dual Fuel Cell Systems

HYZON Single 200kW system ~360 kg ~30% lighter than two systems Single ~20% more efficient¹ (initial vehicle testing) ~25% Lower total fuel cell system cost +

Typical Approach by Competitors

(Approximated by 2x Hyzon 110kW FCS's)



Two systems

~520 kg

Each system weights ~260 kg

Double

Two each of air compressors, water pumps, humidifiers, HV cables, valves, sensors etc.

Single ~110 kW system ranges 5-7 mi/kg

Depends on use case

Higher total fuel cell systems cost, FCS unit cost (\$/kW, 3rd party sourced) and est. maintenance + service cost

1. 200 vs. 120kW at 120kW; Estimated based on early 200 kW truck testing at test track in similar simulated routes on flat road vs. similar use case performance with single 120 kW FCS

Lower FCS unit cost (\$/kW) and est.

maintenance + service cost



Fuel Cell

Weight

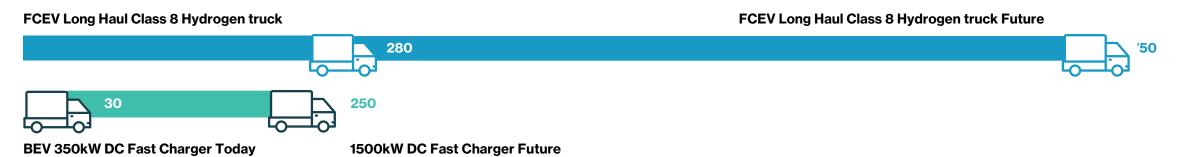
plant

Balance of

Efficiency

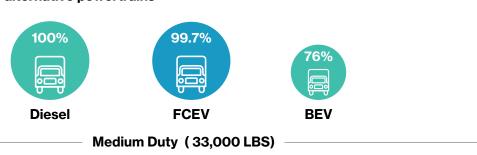
FCEV Heavy-Duty Trucks Expected to Out-Compete BEV when Heavy Loads, Long Distances and/or Short Fueling Times are Needed – Majority of Class 8 in US

Mileage Comparison 10 Mins Of Refueling/Recharging: Real time lost waiting for charging durations vs. hydrogen refueling expectations

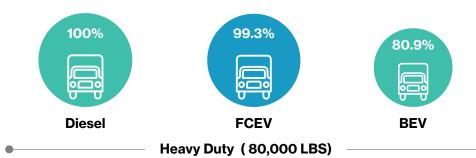


Payload Performance: Real potential revenue loss and/or operational cost increases for fleets who maximize weight up to allowed limits

Payload benchmark of alternative powertrains



Sources: Assumptions: Diesel: (1) Typical HD vehicles achieve 6.5 mpg (Davis and Boundy 2019; Schoettle, Sivak, and Tunnell 2016). (2) Fueling rates for diesel truck dispensers are commonly 15 gpm or faster; BET: (1) Tesla and Daimler advertise vehicle efficiencies of ~2 kWh/mile (Tesla 2020; Daimler Trucks North America LLC 2020). Therefore, setting case today at 2 kWh/mile and future case at 1 kWh/mile, 50% reduction in energy use. (2) Charge rates for today will be 350kW fast charger and future case 1,500kW fast charger; FCET: (1) Nikola Motor predicting 600-mile range with 80kg of hydrogen, which equates to 7.5 mi/kg, so at 100kg of hydrogen total capacity provides 750- mile total range. In context of FCEBS showing efficiency around 4-6 mi/kg for on-road efficiency and bus drive cycles being tougher than drive cycles for trucks, so 7.5 mi/kg estimate reasonable, and use this for both today and future case. (2) Fill rates for today and the future case will be 3.6 kg/min and 10 kg/min, respectively



Sources: Fuel Cells and Hydrogen 2 Joint Undertaking. (2017, August).

Development of Business Cases for Fuel Cells and Hydrogen Applications
for Regions and Cities: FCH Heavy'-duty trucks.

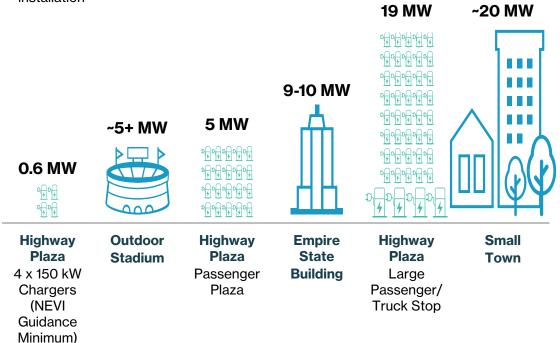
https://www.fch.europa.eu/sites/default/files/171121 FCH2JU Application-Package WG 1 _

Heavy duty trucks (ID 2910560) (ID 2911646). pdf

Hydrogen Infrastructure Advantage

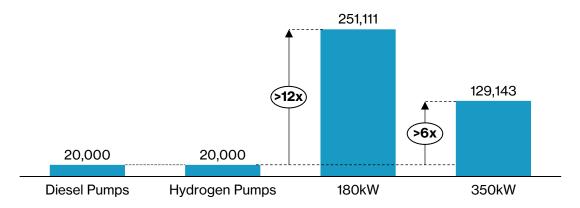
Comparative Peak Loads for Illustrative Sites and Other Major Users 1

- Charging sites will bring about significant electric loads and these loads will begin to exceed distribution line capacity in the next 5-10 years
- The timelines and investment required for grid infrastructure upgrades, particularly transmission, are much longer than those required for EV supply equipment installation



Significantly Higher Last Mile Infrastructure Required for BEV

- Creates a substantial grid burden
- Requires 6-12x fueling real estate needed vs hydrogen fueling
- Future target of 60-90 minutes to recharge Class 8 vehicle vs refueling time of 10-15 minutes today with diesel or hydrogen
- Commercial megawatt rapid charging infrastructure has a significant cost and additional grid burden



Source: Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation (2022), Hyzon Motors Business Update (2022)

- 1. Design developed by National Grid, inspired by: CALSTART (2015). Electric Truck and Bus Grid Integration. Opportunities, Challenges and Recommendations
- 2. Based on ~2,000 truck stops in the U.S.; assumes 10 lanes per truck stop
- 3. Assumes time to refuel a diesel truck is the same as a hydrogen fueled FCEV truck at 15 minutes
- 4. Based on a 550kWh rated battery on a Class 8 truck; recharging times based on charging from 0-100% at rated power for charger

