

TOYOTA

TOYOTA AUSTRALIA – FUEL CELL PROJECT



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TOYOTA     
ENVIRONMENTAL
CHALLENGE 2050



TOPICS



**FUEL CELLS
& TOYOTA**



**ENGAGEMENT
ACTIVITIES**

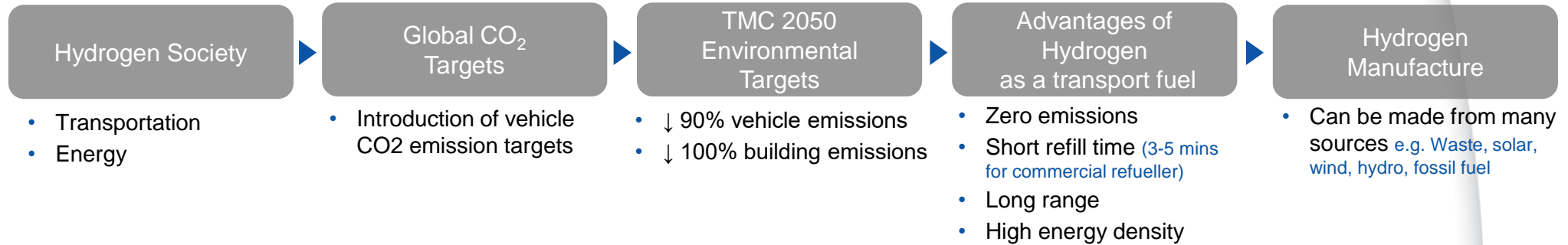


**HYDROGEN
MOBILITY**



**INDUSTRY SUPPORT &
H₂ INFRASTRUCTURE**

THE DRIVING FORCES OF FUEL CELL ADOPTION



- Industry Approach (together with Government)
- Fuel Costs should be Competitive with other Fuels
- Hydrogen should be “Green” in the mid-term
- Stations should be Near Users and Convenient
- Fuel Cells are not just for Cars but Forklifts, Buses, Delivery Trucks & Stationary Power
- Demonstrate Hydrogen & Fuel Cell through Pilot activities



Toyota is working to establish a Hydrogen Society to meet the Environmental challenges of tomorrow.

HYDROGEN INDUSTRY ANNOUNCEMENTS

2018 was a big year for hydrogen in Australia.

COAG Energy Council

- Dr Finkel presentation supporting hydrogen economy
- Consider starting with approx. 20 stations nationwide focusing in capital cities
- Established Hydrogen Working Group of the council following this meeting

CSIRO Hydrogen Roadmap

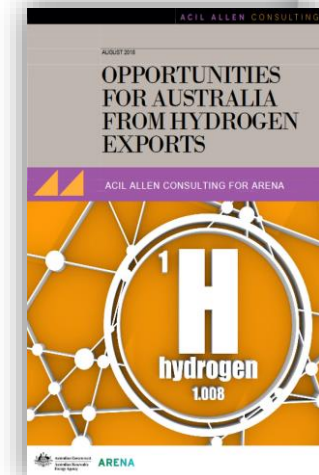
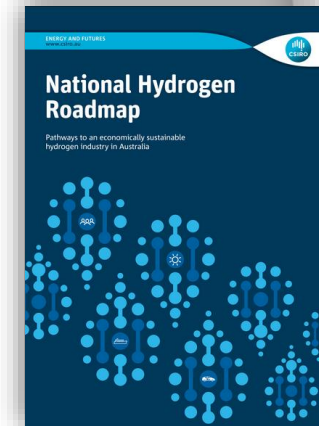
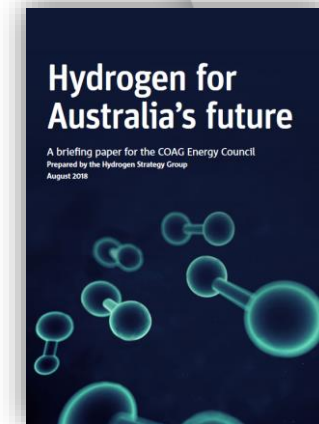
- Provides a blueprint for the development of a hydrogen industry in Australia

ARENA Future Export Study

- Opportunities to meet future global demand
- Significant opportunity for Australia

CSIRO Ammonia Research

- Official launch in Brisbane (August 2018)
- 10 years developing process to extract hydrogen from Ammonia (NH₃)
- Increases opportunity to support hydrogen export industry.



MIRAI IN AUSTRALIA

- TMCA introduced 3 Mirai vehicles to Australia in June 2016 to build awareness into the technology
- TMCA established its own Mobile Refuelling and Service facility in Altona in October 2016
- TMCA has been engaging with Government, Participants in the Hydrogen Industry, Customers and the General Public to increase awareness of Fuel Cell technology and encouraging the establishment of Infrastructure



MIRAI IN AUSTRALIA - MARKETING & ENGAGEMENT

- TMCA not actively marketing the vehicle → Building awareness and knowledge of the vehicle technology and the opportunities for hydrogen utilisation
 - Government – Federal, State and Local
 - Industry Groups
 - Fleet and Dealership events
 - Universities, Schools and Research Institutes
 - STEM Events
 - Media
 - First Responders (e.g. Police, Fire & Rescue)
 - General Public



FEDERAL GOVERNMENT & ARENA



VICTORIAN GOVERNMENT



SOUTH AUSTRALIAN GOVERNMENT



HYDROGEN MOBILITY AUSTRALIA DRIVE EVENT



LOCAL COUNCIL EVENTS



TOYOTA DEALERSHIP OPENING

STEM
SPARK ENGINEERING CAMP

ENERGY STORAGE CONFERENCE



VACC EVENT



EMERGENCY SERVICES



LOCAL COMMUNITY FESTIVALS

MIRAI LOAN PROGRAM

Why?

- Continue building on achievements since initial vehicle import in 2015.
- Positive engagement with Government and Industry
- Short Drive Opportunities provide only insights into the technology
- Focus on development of supporting infrastructure
- Normalise Fuel Cell Technology through “real world” usage
- Maintain focus on Mirai (FC) during limited product availability

Australian First Fuel Cell Electric Vehicle Trial

- Ten Fuel Cell vehicles in public hands, on public roads

Challenges:

- Refuelling
- Vehicle Importation and Registration



CURRENT PROGRAM STATUS

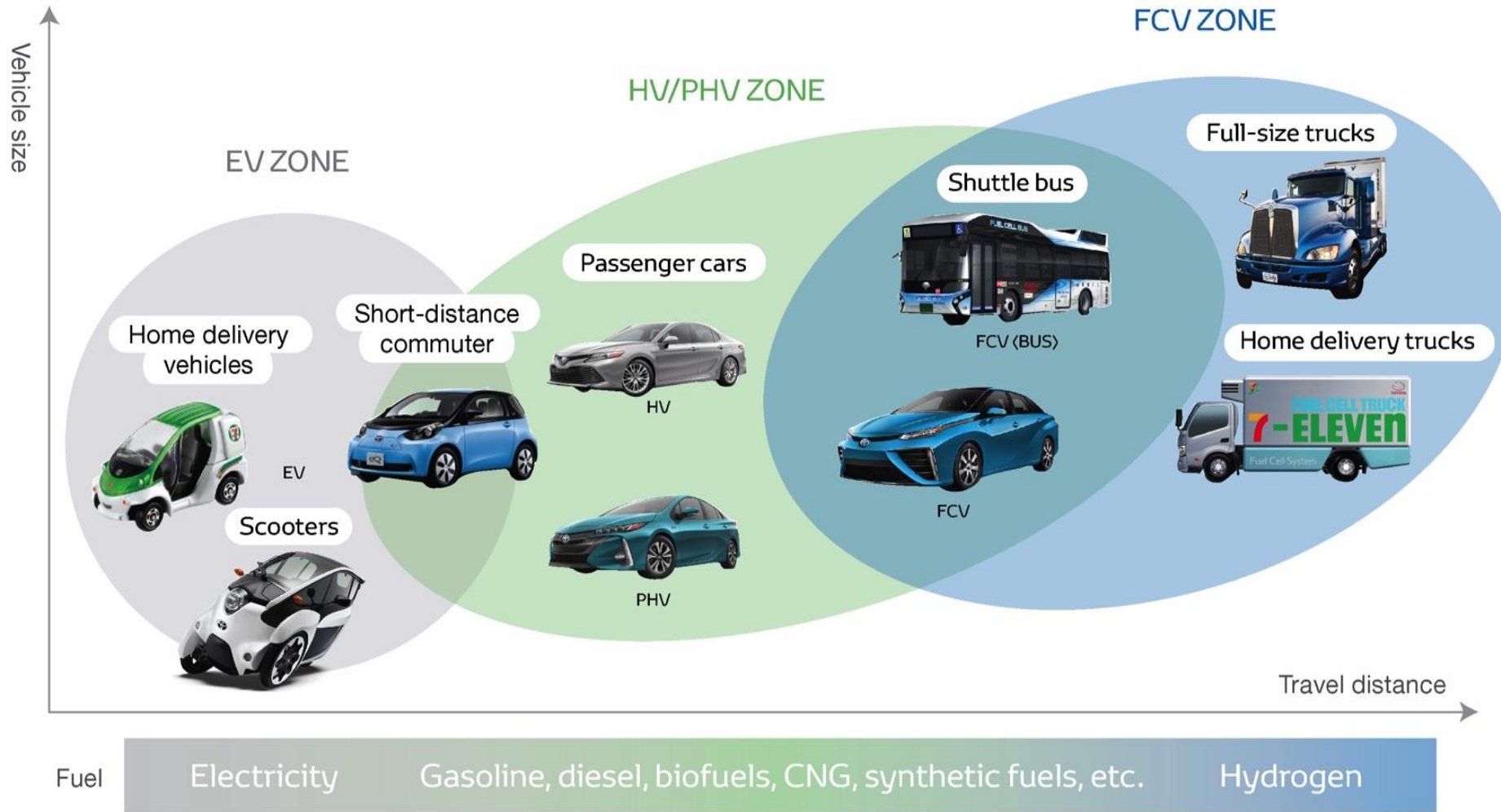
Participants so far include:



Some Key Points

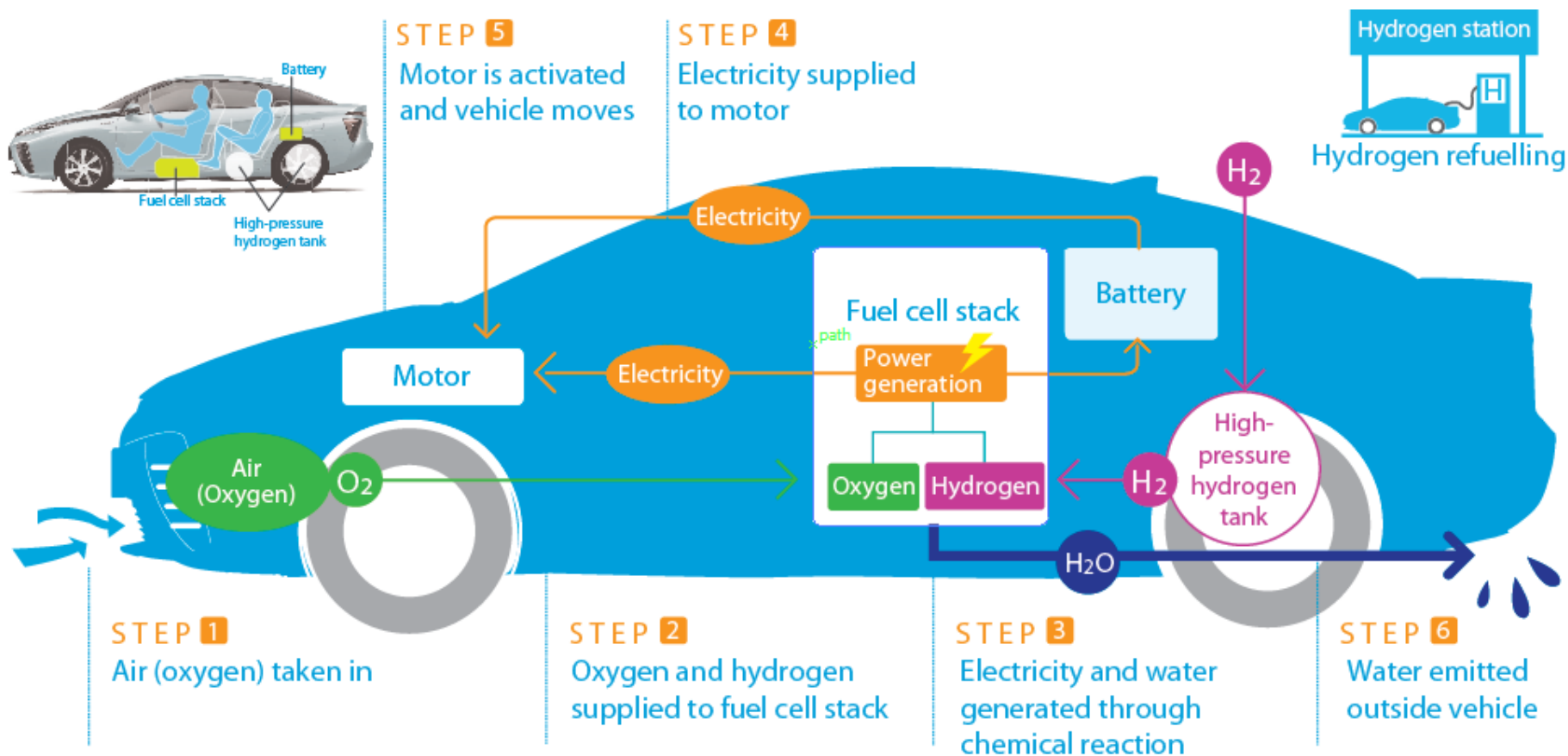
- This is a paid program – all participants want to be part of the trial as it supports their environmental & sustainability strategies
- So far, we've travelled over 10,000km using Fuel Cell technology
- Social Media is playing a key role with highlighting the availability of this technology and how it can be used in “daily” life.
- Education & Engagement is important in raising the profile of FCEVs as a viable contributor to reducing transport emissions.

IS HYDROGEN THE ONLY SOLUTION?



EV: Short-distance, HV & PHV: Wide-use, FCV: Medium-to-long distance

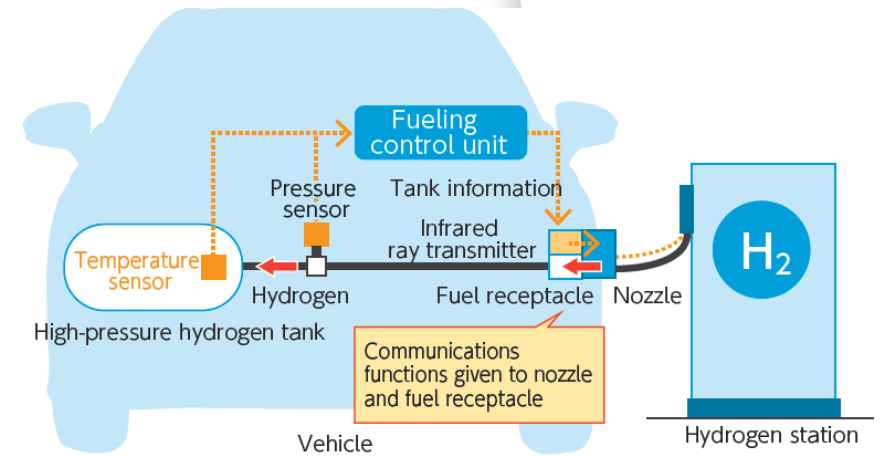
HOW THE MIRAI FUEL CELL SYSTEM WORKS



FC stack generates electricity on demand through a chemical reaction between hydrogen and oxygen. Water vapour is the only emission from the vehicle

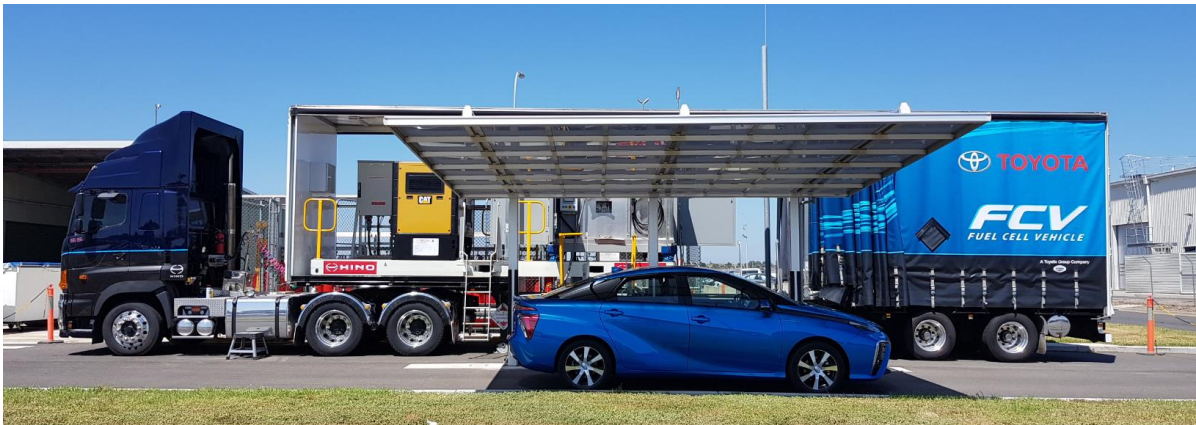
REFUELLING THE MIRAI

- Hydrogen refuelling stations operate similar to that of a conventional petrol station.
- An infrared transmitter near the fuel receptacle communicates with the refuelling station which allows for an efficient fuelling process.
- Once the system checks for a tight seal, fuelling takes approx 3-5 mins
- The filling port is standardised for Fuel Cell vehicles



TOYOTA AUSTRALIA'S MOBILE REFUELLER

- Refuel Mirai (and other Vehicles) throughout Australia
- Demonstrate Refuelling Infrastructure/Technology



REFUELLER SPECIFICATION

Supplier:	The Linde Group
Compressor Type:	Linear 3-Stage GH ₂
Discharge Pressure:	Up to 900 bar at 5kg/h
Delivery Pressures:	350 bar and 700 bar
Pre-cooling Temp:	-20 Deg C

FUEL CELL INITIATIVES IN THE TOYOTA GROUP – Commercial Vehicles

Fuel Cell technology is “scalable”

BUSES

- Tokyo Metropolitan Dep’t of Transportation took delivery of 2x Toyota FC buses in Q1 2017
- March 2018, Toyota launches “Sora” Fuel Cell bus in Japan
- Plans to introduce 100 units prior to 2020 Olympic Games

TRUCKS

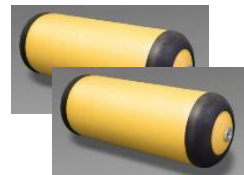
- Project Portal is a Toyota USA project which demonstrates a Class 8 truck converted to run on Toyota Mirai Fuel Cells
- Toyota USA and PACCAR (Kenworth) agree to develop ten more trucks for an expanded trial
- 7-Eleven delivery trucks in Japan have also been converted to run on Toyota Mirai Fuel Cells



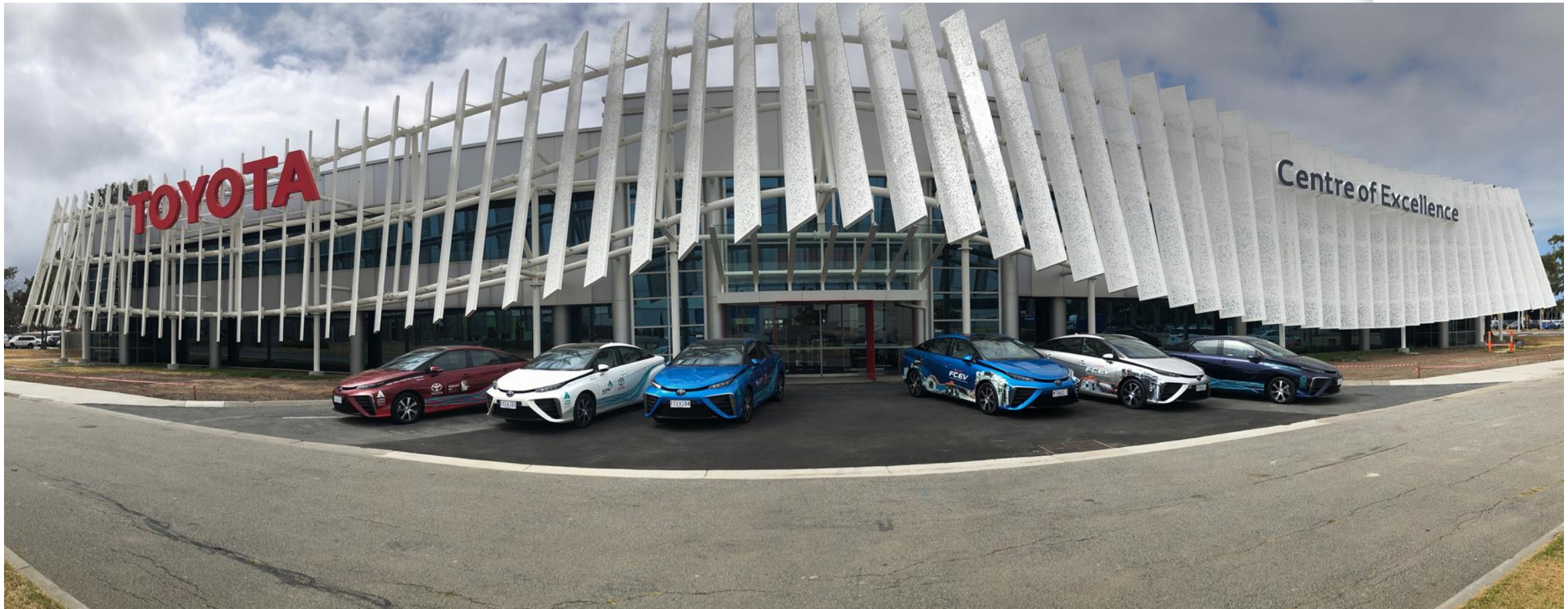
More Power



More Range



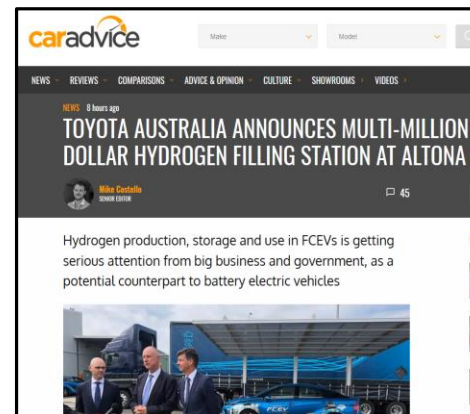
TOYOTA AUSTRALIA CENTRE OF EXCELLENCE: HYDROGEN CENTRE



TOYOTA AUSTRALIA HYDROGEN CENTRE (1)

Formal Announcement – 19/3/19

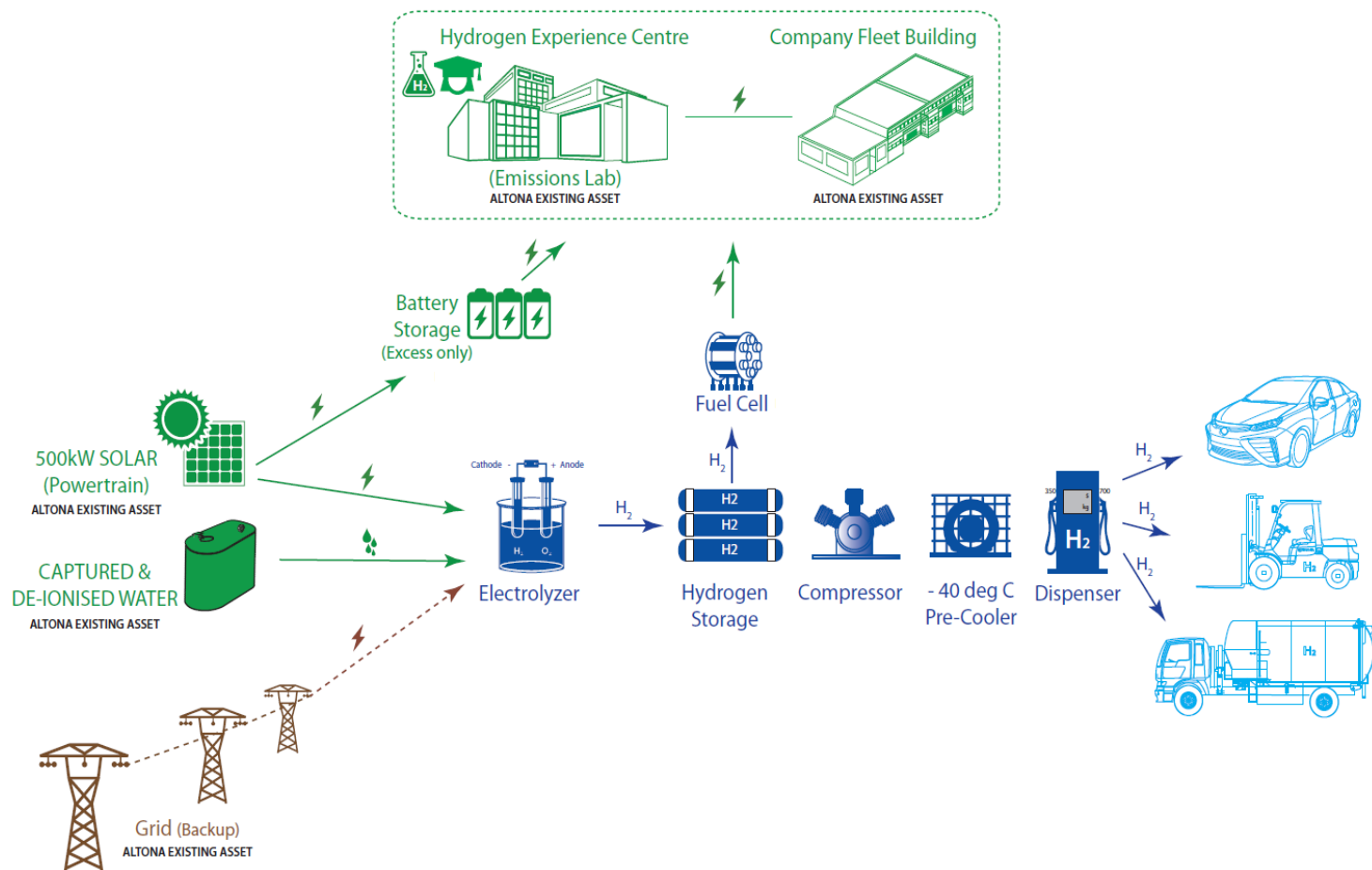
- Attendance from Government and Industry including
- Federal Energy Minister Angus Taylor
- ARENA CEO Darren Miller
- Toyota VP Sales Sean Hanley
- Strong Media Attendance and Coverage
 - TV Spots
 - Print Media (Online)
 - Social Media



TOYOTA AUSTRALIA HYDROGEN CENTRE (2)

WHAT IS IT? WHY ARE WE DOING IT?

- Seed the Hydrogen Economy in Australia



DEMONSTRATION

- Hydrogen Economy
 - Sector Coupling
- Generate Green H₂
- Cost Effective



EDUCATION

- Safety
- Benefits
- “Mythbusting”



COLLABORATION

- Industry Support
- Research Opportunity

TOYOTA



Thank You.