

2014 Consumer Electronics Show (CES) - Toyota Fuel Cell Concept (FCV) Debut

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As Prepared for

**2014 Consumer Electronics Show
Toyota Fuel Cell Press Conference
Las Vegas, January 6, 1PM**

Bob Carter, Senior Vice President, Automotive Operations, Toyota Motor Sales, U.S.A., Inc.

*“We aren’t trying to re-invent the wheel; just everything necessary to make them turn.”
–Bob Carter*

*“Fuel cells will be in our future sooner than many people believe...and in much greater numbers than anyone expected.”
–Bob Carter*

*A fuel cell is more efficient to operate than a gasoline engine; which means it requires less fuel... to travel the same distance...with zero emissions.”
–Bob Carter*

*“The issue of infrastructure is not so much about how many, but rather, location, location, location.”
–Bob Carter*

*“If every vehicle in California ran on Hydrogen—we could meet refueling logistics with only 15 percent of the nearly 10,000 gasoline stations currently operating in the state.”
–Bob Carter (citing the UCI-APEP model)*

*“The fuel cell output will be more than 100kW. A fully fueled vehicle will be capable of supplying enough energy to power a small house for a week in an emergency; which is why we are developing an external power supply device.”
–Bob Carter*

Good afternoon everyone. Thanks for joining us today here in Las Vegas...

- the convention center of the universe...
- and home to CES, the world’s largest trade show.

I’ve been here countless times,

- usually at our annual dealer meetings
- where I usually start out with a few bad jokes.

This one is about focus and persistence...

- which is appropriate to our press conference today.

So...A duck walks into the Mandalay bar and asks, "Got any grapes?"

The bartender tells the duck “no.” The duck thanks him and leaves.

The next day, the duck returns and asks, "Got any grapes?"

Again, the bartender tells him, "No — this bar has never served grapes... and will never serve grapes." The duck thanks him and leaves.

The next day, the duck returns, but before he can say anything, the bartender yells, "Listen, duck! If you ask for grapes again, I will nail your duck beak to the bar!"

The duck is silent for a moment, and then asks, "Got any nails?"

Confused, the bartender says no.

"Good!" says the duck. "Got any grapes?"

OK...so here's the connection;

- I believe what I'm going to tell you about today
- is going to change our world;
- and sooner...
- than later.

For years, the use of hydrogen gas to power automobiles

- has been seen by many smart people
- as a foolish quest.

That point of view

- is reminiscent of opinions 20 years ago
- of how the Prius hybrid
- was nothing more than a *science project*...
- and economically unfeasible.
- Change takes persistence.

Instead of turning a clever phrase, we at Toyota...

- have been turning wheels,
- with electricity...
- by combining hydrogen and oxygen
- in an onboard fuel cell system.

Hydrogen as we know,

- works *beautifully* with oxygen...
- to create water
- and electricity...
- and nothing more.

Hydrogen is plentiful

- and there are many ways to produce it;
- many of them, sustainable.

And, as we know,

- a fuel cell is more efficient to operate...
- than a gasoline engine;
- which means it requires less fuel
- to travel the same distance...
- and again... zero emissions.

In 2015, we will bring this technology to market.

That's not to say our work will be done

- and that there are not significant challenges ahead;
- two in particular.

The first is building the vehicle at an affordable price.

The second, is doing what WE can

- to help build
- the critical hydrogen
- refueling infrastructure

First things first; the car.

For the last 20 years,

- Toyota's investment
- in fuel cell R&D
- has been massive.

Since 2002,

- we've been testing and developing
- a series of fuel cell vehicles
- in North America.

In those 11 years,

- and more than a million miles...
- we have dramatically reduced the cost
- of building a fuel cell powertrain.

In fact, we estimate a 95-percent cost reduction

- in the powertrain and fuel tanks
- of the vehicle we will launch in 2015...
- compared to
- what it cost to build the original
- Highlander fuel cell back in 2002.

Unveiled at the Tokyo Motor Show

- last November, it is a
- zero-emission...
- electric-drive...
- mid-size...
- four-door sedan.

It produces sufficient electrical power

- to spin the electric motor
- for about 300 miles on a single fill-up...
- which takes three to five minutes.

How this is accomplished

- is due in no small part
- to 20 years of experience with hybrid technology...
- starting with the Prius.

Here's an example. During development

- of the second-generation Prius hybrid
- engineers reduced the size, weight and cost
- of the expensive main battery
- by using an advanced boost convertor
- to raise overall system voltage.

The same thinking was carried over to fuel cells...

- where a new convertor
- more than triples system voltage
- from the fuel cell... to the electric motor.

This saves weight and space,

- And considerable cost.

The fuel cell

- sits under the front passenger seats;
- the two tanks under and behind the rear seats.

The stack, will have a total output of more than 100kW.

A fully fueled vehicle

- will be capable
- of supplying enough energy
- to power a house
- for a week in an emergency—
- which is why our engineers
- are looking to develop
- an external power supply device
- that could be used in this manner.

Current-generation hybrid components

- were used extensively in the fuel cell,
- including
- the electric motor,
- power control
- and main battery.

The result is a car that will have

- a cabin as quiet as a Lexus hybrid.

In prototype testing here in the U.S.

- we are seeing zero-to-sixty-acceleration in about 10 seconds...
- and a top track speed of over 100 miles per hour.

In other words...

- functionally...
- a *regular car*.

What's not regular

- is its make-a-statement styling.

If the front-end of our vehicle

- looks like its main purpose
- is to induce air flow under the hood...
- you would be correct.

A large flow of air

- is required to draw heat
- from the fuel cell stack.

Not only are the intakes

- critical to system cooling
- they are part of an air management system
- that will deliver
- excellent aerodynamics.

The phrase “*Oxygen in... water out,*” in fact,

- was an important part
- of the styling theme;
- literally... form based on function.

On closer examination, you will notice

- that this car is not really a car at all,
- but a mock-up
- of how the vehicle will look
- when it arrives.

This car, on the other hand,

- is not a car either.

It is what we call

- an *engineering mule*,
- a *Frankenstein*, where a platform and powertrain
- and borrowed parts
- are stuffed into an existing car
- so that critical testing can be accomplished.

For more than a year...and still on-going

- Frankenstein and three others like it,
- have been subjected to critical
- on-road testing in North America.

It has involved more than a week in Yellowknife Canada

- confirming early morning start-ups
- at minus-30 degrees Centigrade.

High altitude performance

- was gauged in the Rockies,
- while the notorious Streets of San Francisco
- were used to test steep, low-speed hill climb
- from a standing start.

This last summer in Death Valley...

- and right here in Las Vegas,
- system cooling and cabin air conditioning
- were severely tested.

While on-road testing is being done in the U.S.,

- hundreds of thousands of miles are being logged
- in Japan
- where complete powertrain systems
- are bench-tested
- in extreme conditions.

Not far away at the Higashifuji Safety Center

- extensive crash testing
- has been on-going for months.

Safety is always a top priority.

But as we learned with Prius,

- the introduction of game-changing technology
- poses new challenges
- that must be fully tested
- and confirmed
- in both lab
- and on-highway environments.

Like the Prius

- this has been
- a fully “in-house” project.

From the start,

- we needed to invent the tools
- with which to develop...
- build...and safety test
- a truly exotic powertrain.

By far the biggest advances in coming to market

- with a reasonably priced car
- have been related to materials,
- design and manufacturing.

The beauty

- is that we see
- considerable improvement
- in all three areas;
- which is why
- we are so bullish on fuel cells.

Toyota has been

- in the automotive drive-battery business
- for a loooonnggg time.

We love batteries. We are the world leader in hybrid electrics. That dedication to battery technology will continue.

But compared to battery-electrics,

- the rate of cost reduction we have seen
- in fuel cell-electric technology
- has been staggering,

That's why hydrogen-fuel-cell-electric-vehicles

- will be in our future sooner than many people believe.
- and in much greater numbers

- than anyone expected.

OK...so now the second part of the challenge...and the biggest;

- the need for a convenient
- re-fueling infrastructure.

And this is where we have gotten a little help from our friends.
The success of fuel cell technology,

- will depend less on the genius of the car,
- than on the *ownership experience.*

That's a very important point.

As you can imagine,

- there are differing opinions
- on how...
- or if...
- this infrastructure can be built.

A few years ago, Governor Schwarzenegger,

- promised a hydrogen highway
- of fueling stations...
- running the length of California.

The bad news is that currently,

- there are only about 10
- active hydrogen fuel cell stations
- in California.

But there's more good news than bad.

The state has approved

- more than \$200 million in funding
- for as many as 100 new stations;
- 20 by 2015,
- And 40 by 2016.

Those numbers might sound small,

- but one thing we have come to believe
- is that the issue of infrastructure
- is not so much about how many:
- But rather location, location, location.

Toyota...and the University of California Irvine's

- *Advanced Power and Energy Program...*"APEP"
- collaborated on a spatial model
- that maps-out a specific distribution
- of fueling stations.

The locations consider a variety of data including

- R.L Polk ownership of hybrids and electrics (pause)
- traffic patterns,
- population density,
- and so on.

The model was designed...

- based on the assumption that owners
- would want to reach
- a refueling station within 6-minutes.

What the model produced

- was an initial cluster map that identified
- *only*.....68 station sites,
- in the San Francisco Bay area,
- Silicon Valley, LA, Orange and San Diego counties.

If implemented, the system could handle a fuel cell population

- conservatively estimated
- at about 10,000 vehicles.

The study goes further.

By using the model,

- and if every vehicle in California ran on Hydrogen...
- we could meet refueling logistics
- with only 15 percent
- of the nearly 10,000 gasoline stations
- currently operating in the state.

It's not about how many. It's about location.

This model is being used by

- the California Energy Commission,
- the Governors Zero Emission Vehicle Initiative
- the California Air Resources Board,
- the U.S. Department of Energy
- and the California Fuel Cell Partnership.

It's not done.

They're not yet built.

And there are many challenges ahead.

But this plan is but one

- of many initiatives going on right now,
- where solutions are being found
- through collaboration
- between government regulators, academia,
- carmakers and energy providers.

Stay tuned....

- Because this *infrastructure thing* is going to happen.

Not long ago,

- our plan was to ease-into the US market,
- starting in California,
- with a fairly low volume.

But things have quickly changed,

- because this vehicle's level of performance,
- refinement
- and cost reductions...
- have evolved at a rapid rate.

We in the U.S....

- have already asked our headquarters for...

- substantially more volume...
- than our original request.

We believe that demand

- will outweigh
- our current supply plan.

This will be a very special vehicle...

- and we believe we can bring it in...
- at a very reasonable price...
- for a lot of people.

Specific volume for each global market

- will be announced not long from now;
- as will the name of the vehicle...
- that I believe will be...
- the *Toyota car of the future*.

Technically, functionally and stylistically

- our goal was not to re-invent the wheel;
- just everything necessary to make the wheels turn.

So...before we close....

Obviously I'm not going to be a headliner comedian here in Vegas. But please stop by our Toyota display to see two star acts, the FunV2 and iRoad concept vehicles.

I'm Bob Carter. Have a great time at the show tomorrow.

Thank you all for joining us this afternoon.

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