



NEW THINKING.
NEW POSSIBILITIES.

ix35 Fuel Cell





ix35 FUEL CELL ELECTRIC VEHICLE

THE PRODUCT OF NEW THINKING. NEW POSSIBILITIES.

While auto manufacturers around the world have driven themselves to develop faster, more convenient and more innovative technology, Hyundai Motor Company has moved ahead of the pack by committing itself to developing technology that contributes to the realization of New Thinking, New Possibilities. Its efforts have brought about the creation of a perfect hydrogen fuel cell vehicle that runs on hydrogen instead of fossil fuel and emits clean water instead of pollutants. Hyundai Motor Company is now proudly beginning the commercialisation of hydrogen fuel cell vehicles, an unprecedented endeavour in the automotive industry. The ix35 Fuel Cell is not only in our dreams and imaginations; it's driving into our lives right now.

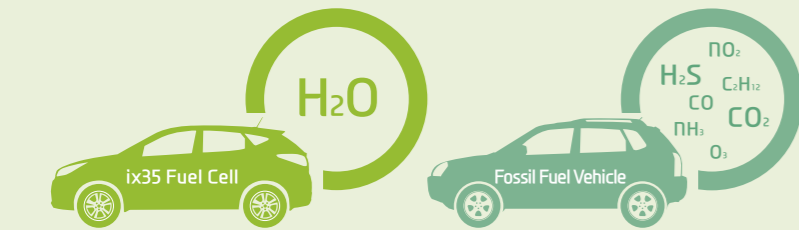


NEW PARADIGM

The traditional images of bulky SUVs and weak eco-friendly vehicles have lost meaning with the birth of the ix35 Fuel Cell, heralding a new paradigm in the green vehicle market. It's time to overcome the dilemma of choosing between performance and the environment. You can have both.

AN INNOVATIVE ECO-FRIENDLY VEHICLE

COMPLETELY ECO-FRIENDLY



Internal combustion engine vehicles burn fossil fuel to create motion, and so emit exhaust gas components such as carbon dioxide, carbon monoxide, hydrocarbon, sulphur oxide and hydrogen sulphide, which can be harmful to the environment. The ix35 Fuel Cell uses hydrogen and oxygen to generate electricity, which is its main source of power and emits water instead of exhaust gas. It is the product of Hyundai Motor Company's commitment to supporting the environment.

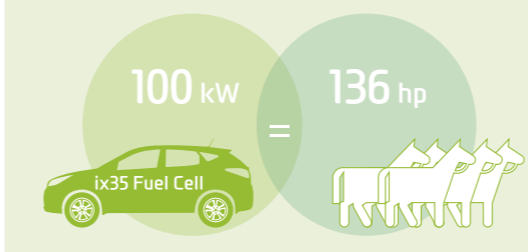
DIFFERENCES IN EMISSIONS



By 2015, the European Union plans on restricting vehicle emissions to an average of 130 grams of emissions gas per kilometre driven. However, even vehicles that meet this regulation will emit up to 130 grams per kilometre, and so will continue to affect the environment. With the ix35 Fuel Cell, the only thing released by the exhaust pipe is water, which makes it an environmentally-friendly vehicle in the truest sense.

The EU will restrict emissions gas level to 130 g/km by 2015 and to 95 g/km by 2020.

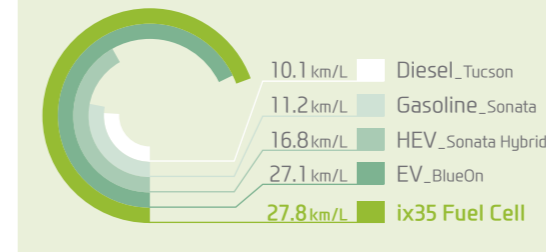
IMPROVED MOTOR PERFORMANCE



The ix35 Fuel Cell's motor performs just as strongly as an internal combustion engine.

Maximum output of the ix35 Fuel Cell is 100 kW or 136 horsepower.

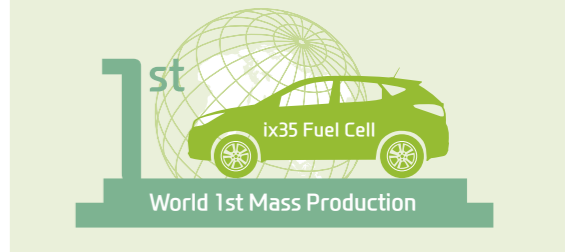
BETTER FUEL ECONOMY



One litre of hydrogen fuel is all the ix35 Fuel Cell needs to cover 27.8 km, which is the equivalent of a 2.0 litre model sold on the market today (EV models excluded).

The distance that a ix35 Fuel Cell can travel with hydrogen energy is similar to that of a car running on energy generated from 1L of gasoline. Fuel efficiencies may differ depending on certificate authorities, markets and engine trims. For more information, please visit our website.

WORLD'S FIRST MASS PRODUCTION FACILITY



Hyundai Motor Company established the world's first mass production facility for Fuel Cell Electric Vehicles, which opened in February 2013. Through systematic processes and specialized equipment, the company implemented mass production capabilities and established standardized quality criteria.

CHARGING TIME & MILEAGE



The ix35 Fuel Cell requires approximately 3 minutes to fully charge, which is almost equal to the time required to refuel a conventional vehicle (based on 700-bar charging station), while currently available electric vehicles require about 30 minutes for express charging and 360 minutes for normal charging (based on in-house EV).

SILENT POWER



Since the ix35 Fuel Cell has an electric motor instead of an engine powered by fuel combustion, it makes significantly less noise than conventional cars.

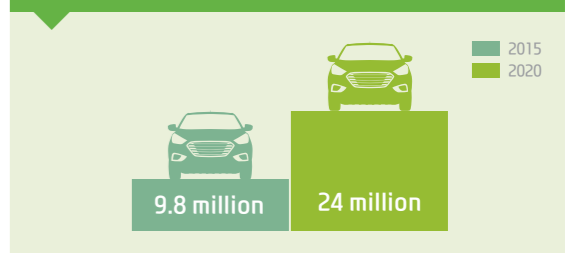
HIGH-STRENGTH HYDROGEN STORAGE TANK



When fully charged, the ix35 Fuel Cell's hydrogen storage container can store 5.67 kg of hydrogen. It is designed with a precision structure that allows it to withstand up to 700-bars of pressure.

A bar is a unit of pressure, and roughly one bar (1.013) is equivalent to the atmospheric pressure of one atmosphere. One bar is thus the air pressure exerted on a person in everyday life.

PROSPECTS FOR THE GREEN VEHICLE MARKET



By 2015, the market for eco-friendly vehicles is expected to grow to 9,800,000 units, followed by explosive demand for hybrid, electric and fuel cell vehicles.

Source: Nomura Research Institute. The Nomura Research Institute, Ltd. provides business consulting and develops various solutions for a wide range of industries. See www.nri.co.jp for more details. The picture above shows the number of all eco-friendly vehicles (EV/HEV/FCEV).

UNMATCHED CONVENIENCE

The sophisticated style and convenience of the ix35 remain, while the distinct features of the ix35 Fuel Cell add new depth to an already impressive repertoire. Comfort is boosted by the fuel cell's zero noise and vibration, making it completely silent. Convenient features and sophisticated details make it clear that the ix35 Fuel Cell experience is a special one.



A. DISTANCE TO EMPTY

The distance to empty informs the driver of the estimated distance that the vehicle can be driven with the fuel remaining.

B. INSTANT FUEL ECONOMY

This function instantly displays the fuel economy during the last few seconds, whenever the vehicle has been travelling at a speed of more than 10 km/h.

C. ELAPSED TIME

The elapsed time shows the total driving time since the last reset.

D. REFUELING COUNT

This function displays the number of times the vehicle has been refuelled since the last reset.



E. FUEL CELL MODE

Hydrogen stored in the tank and oxygen from the atmosphere are supplied to the fuel cell stack to generate electricity, which is then used by the motor to drive the vehicle.

F. IDLE CHARGING MODE

In this mode, when kinetic energy is low, electricity generated in the fuel cell stack is used to charge the battery.

G. POWER ASSIST MODE

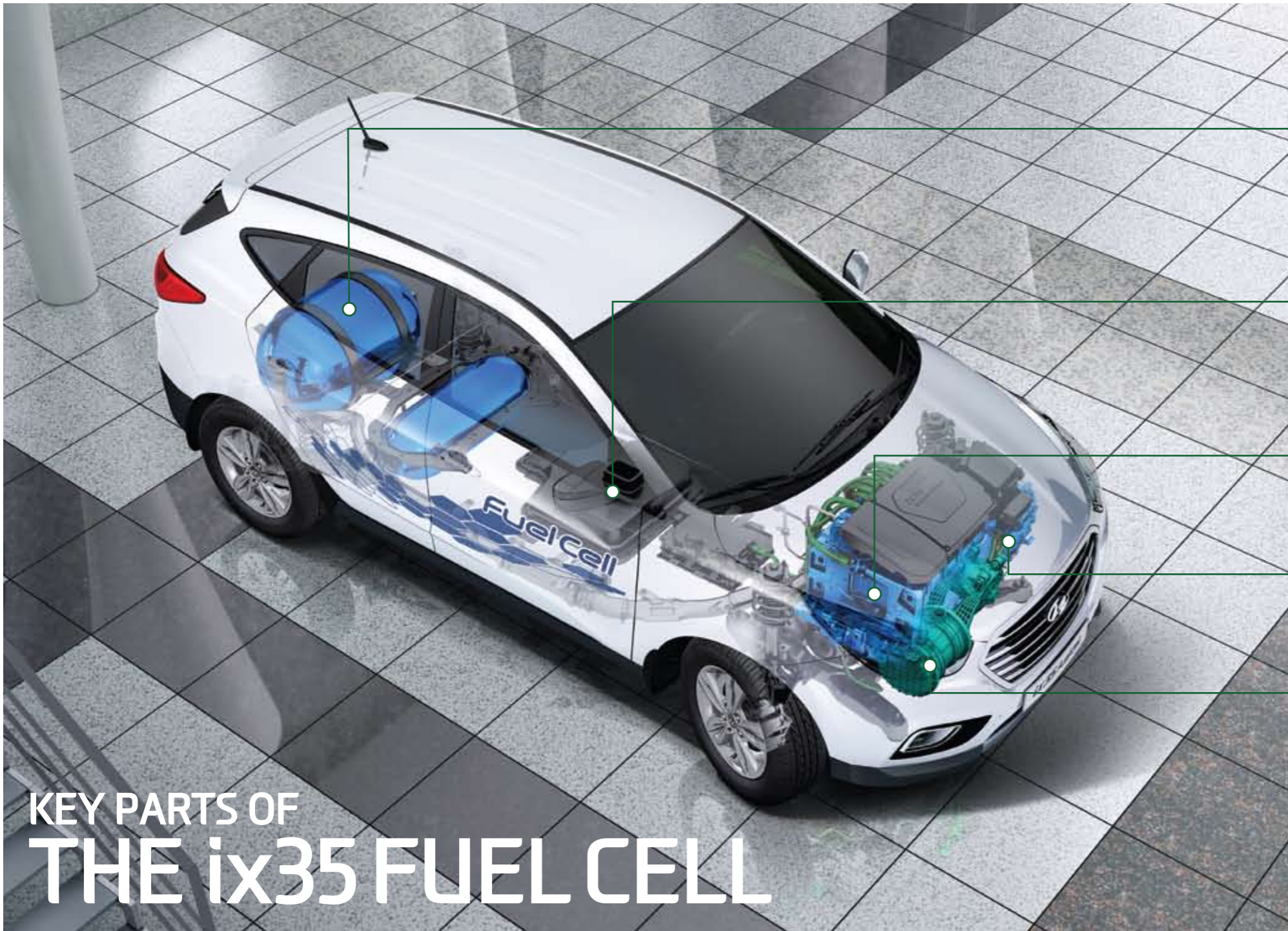
Electricity generated in the fuel cell stack is used together with electricity stored in the high-voltage battery to boost output temporarily.

H. REGENERATIVE BRAKING MODE

The kinetic energy of the vehicle is converted back to electricity through the motor to recharge the high-voltage battery.



KEY PARTS OF THE ix35 FUEL CELL



HYDROGEN STORAGE SYSTEM

The hydrogen storage system is the fuel tank of the ix35 Fuel Cell. It consists of composite hydrogen tanks and a number of sub-systems, including the solenoid valve, high pressure regulator and overflow control valve for maximum safety. Thanks to the 700-bar high pressure hydrogen storage system, the ix35 Fuel Cell has an operating range of 594 km per charge.

HIGH VOLTAGE BATTERY

The ix35 Fuel Cell is equipped with a lightweight and compact lithium polymer battery with high output and efficiency, which temporarily stores a portion of the electricity generated by the fuel cell stack. Electricity stored in the battery, along with electricity generated by the stack, is used to give the vehicle an extra boost during acceleration.

FUEL CELL STACK

Hydrogen and oxygen combine in the fuel cell stack to produce the electricity that powers the ix35 Fuel Cell. Water is the only byproduct of this reaction, making the ix35 Fuel Cell a truly zero-CO₂-emissions vehicle.

INVERTER

The inverter converts high voltage direct current from the fuel cell stack into alternating current, which is then used to operate the electric motor. It also controls the rotation speed and torque of the motor.

ELECTRIC DRIVE MOTOR AND REDUCER

The electric drive motor is a powertrain that connects the motor with the wheels and converts electric energy supplied through the inverter into mechanical torque. When the vehicle decelerates, the motor also converts mechanical torque into electricity, which is then stored in the battery. The reducer, which plays the role of a gear lever, amplifies torque by adjusting the rotational speed of the motor, allowing for more efficient operation of the vehicle on different terrains.

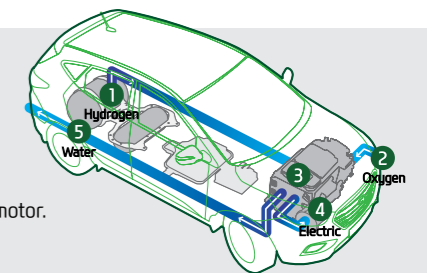
NEXT-GENERATION TRANSPORTATION IN THE TRUEST SENSE

Solutions to environmental issues arising from limited resources and fossil fuel use have been long sought after. While practical options such as wind, solar, and other renewable energies have yet to overcome storage and efficiency issues, the Fuel Cell Electric Vehicle offers the optimal alternative.

ix35 FUEL CELL DRIVETRAIN

The fuel cell stack, electric motor, battery and hydrogen tank are the main components of the Fuel Cell Electric Vehicle that is the ix35 Fuel Cell. When hydrogen stored in the tank enters the fuel cell stack, it is broken down into protons and electrons. The flow of electrons created in the fuel cell provides electricity, and the protons react with oxygen molecules from the air, generating heat and water. Electricity generated by the fuel cell is first transmitted to the inverter and then to the motor, which creates power that turns the wheels, making the vehicle move.

1. Hydrogen stored in the tank is supplied to the fuel cell stack.
2. An inflow of air is supplied to the fuel cell stack.
3. The reaction of air and hydrogen in the fuel cell stack generates electricity and water.
4. Generated electricity is supplied to the electric motor.
5. Water is emitted.



PROVEN RELIABILITY BASED ON RIGOROUS TESTING

The most crucial element of the world's first mass production Fuel Cell Electric Vehicle is reliability. Prioritising safety and durability over any other features, Hyundai Motor Company engineers put the ix35 Fuel Cell through countless verification processes to produce a vehicle that puts customers' safety first.

Based on the same test criteria for internal combustion engine vehicles, the vehicle was put through a variety of experiments. On-road driving tests were conducted in locations around the world, proving the ix35 Fuel Cell's outstanding durability.



Extreme heat testing in Death Valley, USA.



Arctic weather testing in Sweden.



High-elevation mountain road testing in Korea.


The ix35 Fuel Cell's safety was verified through on-road tests conducted over an accumulated distance of 4 million km in extreme conditions, including Death Valley in the U.S., where temperatures can reach 50 °C, and in sub-zero temperatures and heavy snow in Sweden. Everywhere, under all circumstances, the ix35 Fuel Cell consistently proved its robust driving capabilities. It also demonstrated strong performance and outstanding durability when it was tested on high-elevation mountain roads, 1,000 metres above sea level in Korea. The ix35 Fuel Cell is setting new records at this very moment.



4 MILLION km
TOTAL KILOMETRES COVERED IN ON-ROAD DRIVING TESTING

OPTIMAL TESTS FOR OPTIMAL SAFETY

Safety is one reason that Fuel Cell Electric Vehicles are known as the ultimate in next-generation eco-friendly vehicles. The ix35 Fuel Cell has passed numerous tests and meets the most demanding safety standards required by governments around the world.



AIRBAG PROTECTION
The ix35 Fuel Cell comes with six airbags: dual front airbags for the driver and passenger, dual front seat-mounted airbags, and dual side curtain airbags, which offer additional protection against side impacts.

ACTIVE HEADREST
In the event of a rear-end collision, active headrests channel the force of the driver and passengers' size and weight into motion.

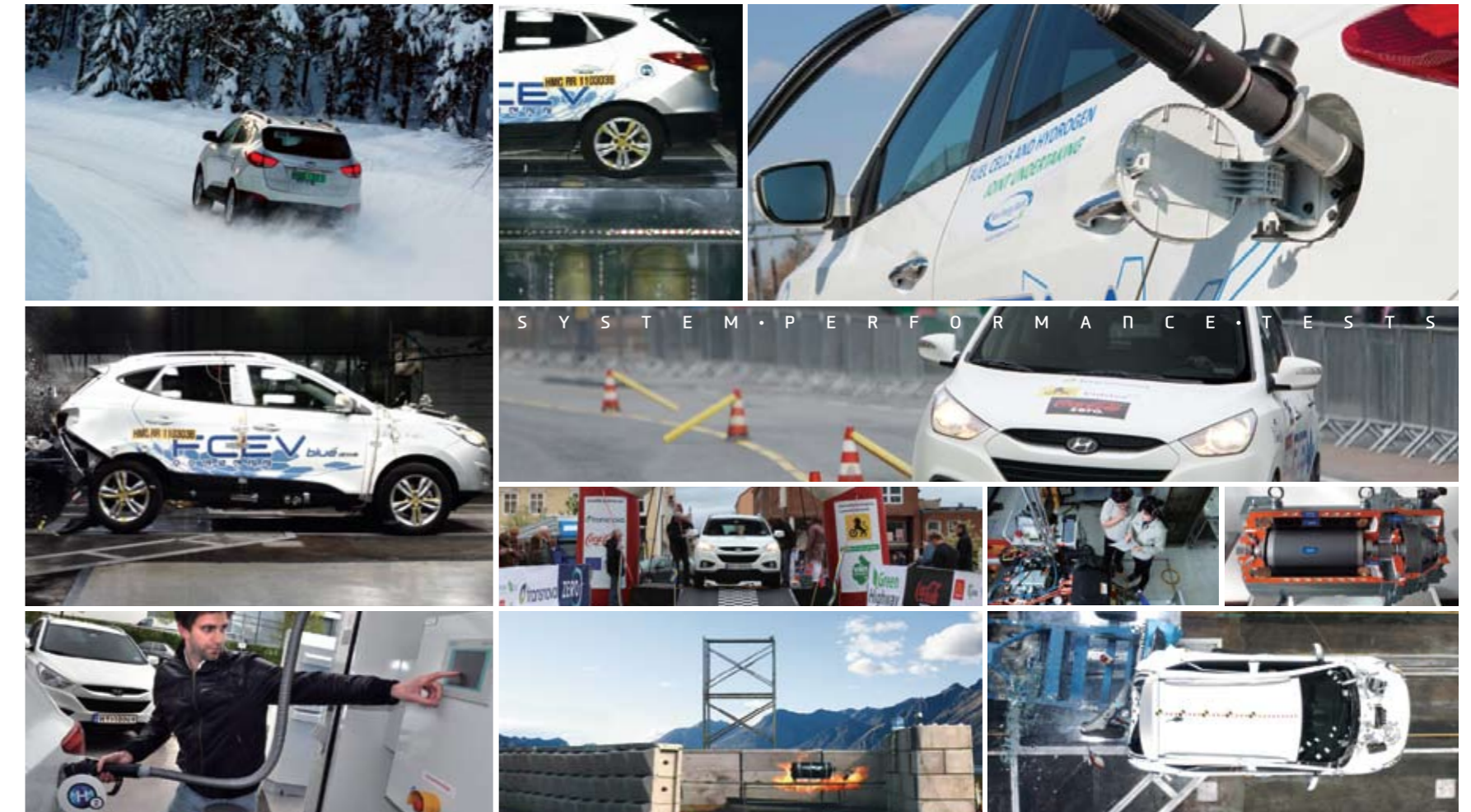
CRASH TEST
Crash tests for the ix35 Fuel Cell were conducted in the same conditions used to test internal combustion engine vehicles. In various collision simulations (e.g. front-end, rear-end, and broad-side), the vehicle showed an excellent level of safety, operating normally for the most part after collisions, and without any hydrogen leak or damage to the hydrogen tank.
Based on FMVSS 301 fuel system stiffness evaluation and FMVSS 305 EV and hybrid hydrogen vehicle crash test regulations (FMVSS = Federal Motor Vehicle Safety Standards).

H₂ HYDROGEN TANK CERTIFICATION TEST
The hydrogen tank, as the core element of the ix35 Fuel Cell's safety system, is well protected by four sensors that detect collision and leakage, as well as safety valves that block, emit and ventilate hydrogen depending on the emergency scenario involved. Fabricated from aluminium alloy and carbon composite, the hydrogen tanks have passed numerous tests and verifications, such as burst tests in pressures higher than working pressure, drop tests in accident scenarios and crash tests involving guns, so that their safety could be certified for mass production.

FIRE TEST
In a comparative fire safety test, conducted with internal combustion engine vehicles, the ix35 Fuel Cell performed outstandingly. Unlike internal combustion engine vehicles, which lack high-pressure fuel tanks and sensors, the ix35 Fuel Cell averted explosions by sensing the fire's heat and emitting hydrogen safely. Hydrogen is the lightest element in the world. Its high diffusion rate (1.84 km per second) makes it a highly safe fuel with low probability of suffocation, spontaneous combustion and radiant heat.

THE MAXIMUM TESTS FOR MAXIMUM SAFETY

The ix35 Fuel Cell's comprehensive safety and quality tests are part of Hyundai Motor Company's commitment to always putting our customers first. Through these efforts, the ix35 Fuel Cell will become a new standard for future Fuel Cell Electric Vehicles and the next generation of eco-friendly vehicles.

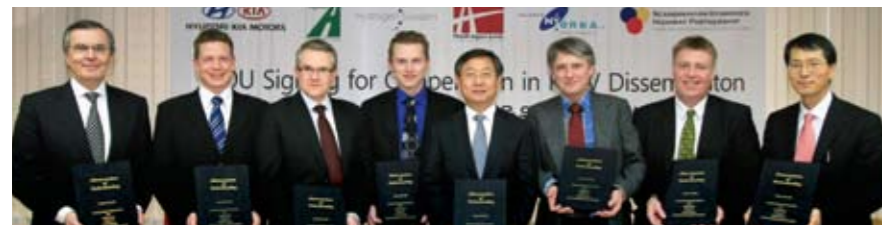


These images show the development process. There may be some differences in the shape and specifications of the current production models.

HYUNDAI MOTOR COMPANY'S SUSTAINED COMMITMENT TO THE ENVIRONMENT

Since the announcement of our eco-friendly management policies, as a responsible global company, Hyundai Motor Company has been involved in various R&D activities across all environment-related fields and in relevant business activities. By signing MOUs for demonstration projects with governments around the world and continuing to collaborate with global environmental associations, the company is taking great strides in raising awareness of Fuel Cell Electric Vehicles. Alongside countries actively engaged in setting up hydrogen infrastructures, such as the northern European countries, Germany, Italy and the United States, Hyundai Motor Company is making a joint effort to expand the network of hydrogen charging stations to improve the future of our environment. Meanwhile, it is also promoting eco-friendly mobility through diverse test drive events.

Hyundai Motor Company has been dedicated to the development of Fuel Cell Electric Vehicles since the announcement of our eco-friendly technology development program in 1998, and plans to do more than just become the world's first mass producer of these vehicles. We are committed to living up to our vision and fully playing our role as the global brand leader in eco-friendly technology.



1	2
3	

1, 2. Winner of the '2013 Car of the Future' Award
3. Hyundai Motor Group signs an MOU with four Northern European countries to operate a test fleet of Fuel Cell Electric Vehicles (FCEV) (January 2011)

REGIONAL H₂ STATION NUMBERS



The numbers of hydrogen refuelling stations by region are based on the number of refuelling stations completed as of June 2013, and may change depending on the timing of assessment.

HYDROGEN NETWORK INFRASTRUCTURE PLANS

SCANDINAVIAN HYDROGEN HIGHWAY PARTNERSHIP 2015 VISION (SHHP)



Norway, Sweden and Denmark have formed the "Scandinavian Hydrogen Highway Partnership (SHHP)," in collaboration with other Northern European countries, to actively expand hydrogen networks for Fuel Cell Electric Vehicles. Following the "SHHP 2015 Vision" objectives, 27 hydrogen stations will be established, allowing consumers in the region to operate Fuel Cell Electric Vehicles and purchase hydrogen fuel more easily.

H₂ MOBILITY



In Germany, stakeholders formed the Clean Energy Partnership, which aims to establish a foundation for the wide dissemination of Fuel Cell Electric Vehicles through activities like building a German hydrogen network, selling Fuel Cell Electric Vehicles and establishing an industry standard for hydrogen fuel quality and hydrogen stations. According to the H₂ Mobility Report, there were 31 hydrogen stations in Germany as of the end of 2011, which is expected to increase to 100 stations by 2015 and 400 stations by 2020.

ITALIAN HYDROGEN HIGHWAY



The Italian Hydrogen Highway project is designed with links to SHHP and H₂ Mobility and aims to create a hydrogen network that connects Scandinavia, Germany and Italy. The objective of the Italian Hydrogen Highway project is to establish a hydrogen infrastructure that allows Fuel Cell Electric Vehicles to travel freely throughout Europe.

CALIFORNIA FUEL CELL PARTNERSHIP (CaFCP)



The United States has been working toward Fuel Cell Electric Vehicle pilot operation and building infrastructure through CaFCP (California Fuel Cell Partnership) since 1999. California has led the effort to establish a hydrogen network, with 37 stations installed so far. The number of hydrogen stations in California is expected to increase to 68 by 2015. New York is also planning to establish 20 hydrogen stations by 2015 and 100 stations by 2020 (70 stations in New York City and 30 stations along the highway), so as to enable the seamless operation of Fuel Cell Electric Vehicles.

SOPHISTICATED STYLE AND UNIQUE SPECIFICATIONS

The ix35 Fuel Cell is not a prototype designed for tests. It is a unique vehicle equipped with the diverse functions required for everyday life and is prepared for real road conditions with additional features that contribute to its safety, convenience and unique personality.



A. RADIATOR GRILLE

The strongly defined hexagonal radiator grille sets the direction for future models, with a blue emblem representing the vehicle's unique eco-friendly image.

B. 17-INCH ALLOY WHEELS

The 17-inch alloy wheels, unique to the ix35 Fuel Cell, add sophistication to its design and contribute to a smoother, safer drive.

C. HYDROGEN RECEPTACLE

The hydrogen receptacle is precisely designed for fast and safe hydrogen charging, and is the feature that most clearly defines the ix35 Fuel Cell as a hydrogen fuel cell vehicle.

D. HEADLAMPS

Headlamps with subtle details enable outstanding projection capacity and add to the style of the ix35 Fuel Cell.

E. FOG LAMPS WITH DRL

Super bright LED DRL (Daytime Running Lights) and highly luminous, sophisticated fog lamps enable safe driving in all situations and any weather conditions.

F. REAR COMBINATION LAMPS

Bright rear lamps allow drivers to cope with any incidents and enable visibility even in poor weather conditions, ensuring the safety of passengers.

G. PARKING ASSIST SYSTEM

The parking assist system alerts the driver of any obstacles behind the vehicle when parking, preventing emergencies and small accidents.



H. TILT AND TELESCOPIC STEERING WHEEL

The height and depth of the steering wheel can be adjusted to fit the driver perfectly, enabling a more comfortable driving experience.

I. REARVIEW CAMERA & DISPLAY

Reverse parking is made safer and more convenient by the vehicle's camera monitoring system.

J. STEERING WHEEL REMOTE CONTROL

The remote control on the steering wheel allows for easy control of the audio system, helping to prevent accidents resulting from distracted driving.

K. DUAL ZONE FULL AUTO AIR CONDITIONING

Drivers and passengers can independently control optimal temperatures to keep interior conditions pleasant at all times.

L. HYDROGEN SENSOR

Four hydrogen sensors strategically located inside the vehicle detect any potential hydrogen leakage into the cabin.

M. TRUNK CAPACITY

The hydrogen fuel tank in the ix35 Fuel Cell has been significantly reduced in size to provide ample trunk space. The rear seats can also be folded to accommodate various uses of space.

N. POWER BUTTON

The single-touch start button makes starting and stopping the vehicle easier and more intuitive than ever before.

O. DRIVING MODE

The "E" mode offers low-cost fuel efficiency for normal driving. The "L" mode is a low-speed mode that enables the engine to react to high deceleration and brake like a conventional vehicle.

DIMENSIONS

unit : mm



SPECIFICATIONS

DIMENSIONS		
Overall length (mm)		4,410
Overall width (mm)		1,820
Overall height (mm)		1,650
Wheelbase (mm)		2,640
Wheel tread (mm)	Front	1,585
	Rear	1,586
Head room (mm)	Front	880
	Rear	890
Engine label		Front mounted induction motor
Wheel & Tyre	Front/Rear Wheels	6.5JX17"
	Front/Rear Tyres	225/60R17
ENGINE		
Engine capacity (kW)		100.0
Fuel system		Hydrogen
Max. power (ps/rpm)		136/5,000
Max. torque (kg-f-m/rpm)		30.6/1,000
Max. speed (kph)		160
Acceleration (0-100 kph) (sec)		12.5
Drive type		FWD
FUEL CONSUMPTION		
Fuel consumption (kg/100 km)	Urban/City	0.8896
	Extra Urban/Highway	0.9868
	Combined	0.9512
Driving range (km)		594
CO ₂ emission (g/km)		0
Fuel tank capacity (kg)		5.64 (144 L)

- The above values are results from internal testing and are subjected to change after validation.
- Some of the equipment illustrated or described in this catalogue may not be supplied as standard equipment and may be available at extra cost.
- Hyundai Motor Co. reserves the right to change specifications and equipment without prior notice.
- The colour plates shown may vary slightly from the actual colours due to the limitations of the printing process.
- Please consult your dealer for full information and availability on colours and trims.

NEW THINKING. NEW POSSIBILITIES.

People's expectation toward individual mobility requires more than just a convenient means of transportation. The old understanding of cars has become outdated. A car represents individuals' lifestyles, and it became an integral part of their lives. At the same time, the automobile industry has experienced seismic change. Hyundai Motor Company has grown rapidly to become one of the largest automakers, backed by world class production capability and superior quality. We have now reached a point where we need a qualitative approach to bring bigger ideas and relevant solutions to our customers.

This is an opportunity to move forward and we have developed a new brand slogan that encapsulates our willingness to take a big leap. Led by our new slogan and the new thinking underlying it, we will become a company that keeps challenging itself to unlock new possibilities for people and the planet.

Hyundai Motor Company
www.hyundai.com

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