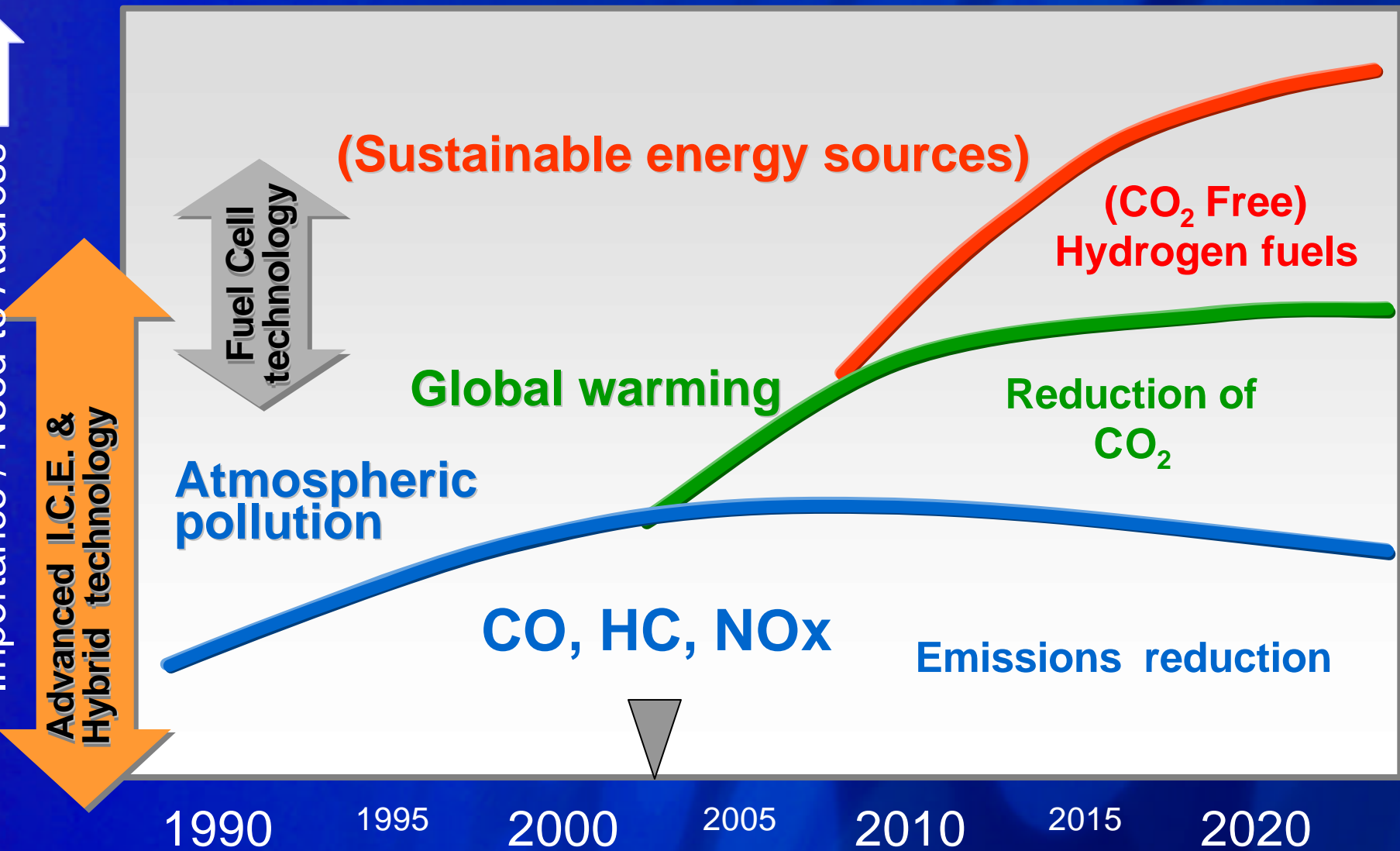


# ***The Honda FC stack technology***

**Yuji Kawaguchi**

**Senior Chief Engineer, Honda R&D Co., Ltd.**

# Technical Options



# Development history of Honda FCV

Mid '90s '99 '00 '01 '02 '03 '04

R&D start of FCV



V1 . Metal hydride



V3 .Honda stack Compressed H2



V2 .Honda stack Methanol reform



V4 . Compressed H2



FCX



Limited production

# Fuel Cell Technology

Honda FCX

Original FC STACK



# Fuel Cell Technology

Honda FCX

Original FC STACK

# Launch of FCX on Dec. 2nd, 2002



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF MOBILE SOURCES  
ANN ARBOR, MICHIGAN 48105

2003 MODEL YEAR

ZERO-EMISSION VEHICLE (ZEV) AND INHERENTLY LOW-EMISSION VEHICLE (ILEV)

CERTIFICATE OF CONFORMITY  
WITH THE CLEAN AIR ACT OF 1990 ISSUED TO:

Honda Motor Co., Ltd.

HONDA-ZEV-T2-2003-01

July 16, 2002

MANUFACTURER

CERTIFICATE NO.

EFFECTIVE DATE

Vehicle Group: 3HNKV00.07XC Evaporative/Refueling Family: 3HNXR0000CDA

Applicable Emission Standards: Tier 2: Bin 1: NLEV: ZEV: CEV: ILEV: ZEV

A handwritten signature in black ink, appearing to read "Gregory A. GR".

Signed by GREGORY A. GR  
Director of Certification  
and Compliance Division

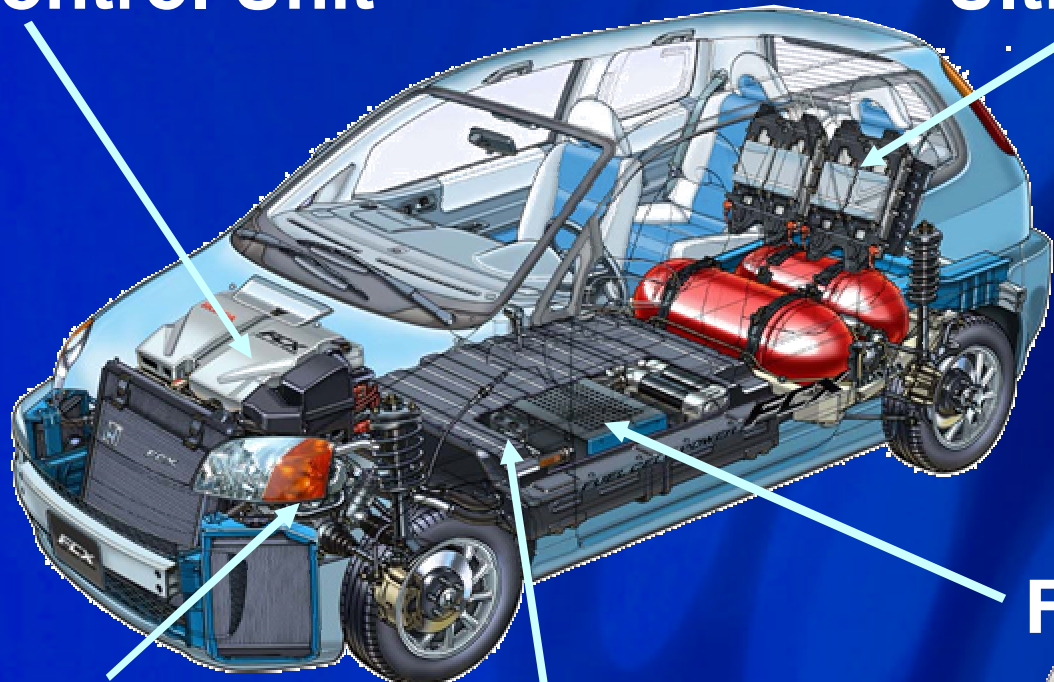
Date Issued: July 16, 2002



# Honda's original technologies for the latest FCV

**Power Control Unit**

**Ultra Capacitor**



**FC Stack**

**Traction Motor**

**FC Sub system**





# Fuel Cell Technology

Honda FCX

Original FC STACK



Development concept

FCV widespread use

Next generation fuel cell stack

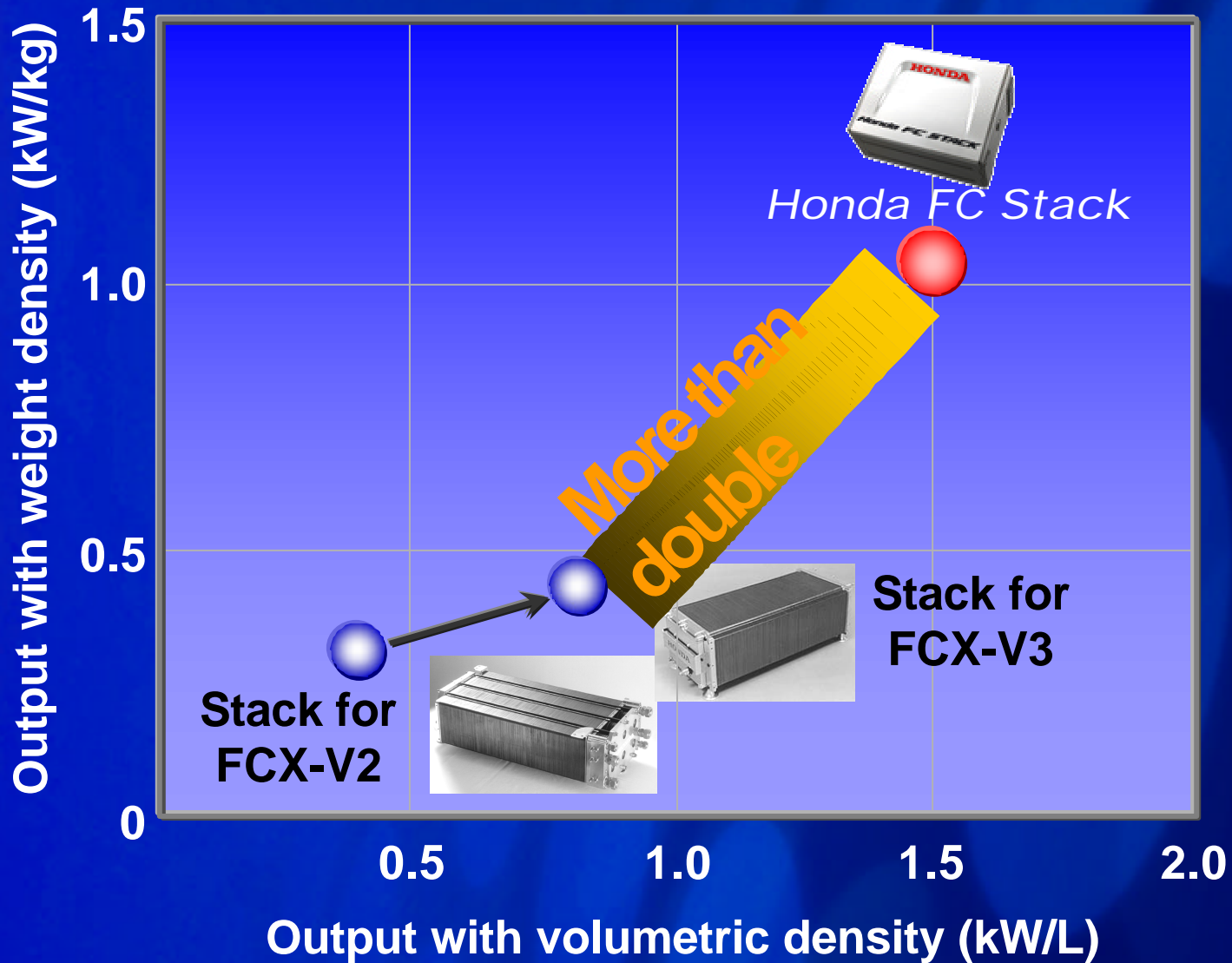
***Honda FC STACK***

**Compact, high output**

**For volume production in the future**

**Environmental adaptability**

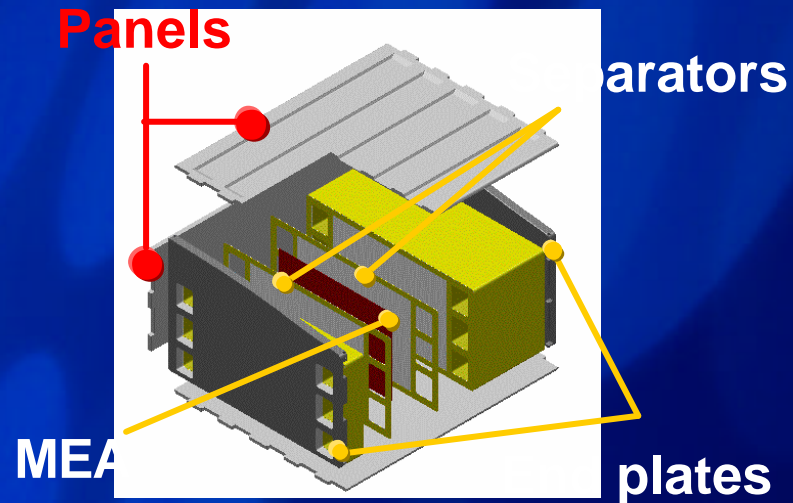
# Output density of Honda FC stack



# Number of components reduced to half

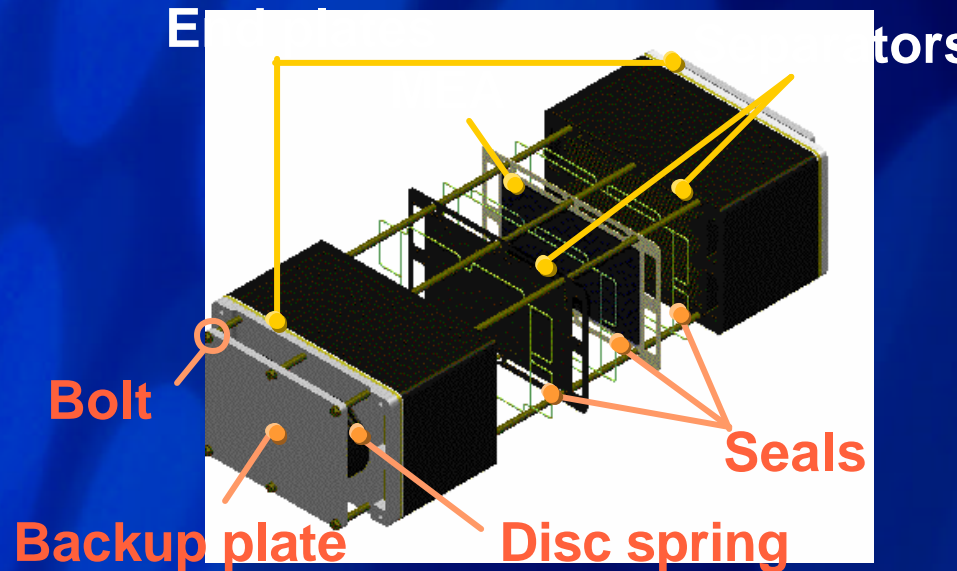
## New structure

- ? Stamped metal separators with rubber seals attached
- ? Load supported with stamped metal separators
- ? Enclosed with panels



## Previous structure

- ? Separate seals
- ? Load supported with disc springs
- ? Fastened together with bolts



# Specifications



Specifications	FCX with Honda FC Stack	03FCX
Dimensions (L x W x H, mm)	4165 × 1760 × 1645	?
Max. speed	150 km/h	?
Max. motor output	<b>80 kW . 109 PS.</b>	60 kW [ <b>82 PS</b> ]
Max. motor drive torque	<b>272 Nm . 27.5kgm .</b>	?
Max. fuel cell stack output	<b>86 kW (Honda Original)</b>	78 kW (manufactured by BPS)
Energy storage	Ultracapacitor (Honda Original)	?
Hydrogen storage	156.6L .350 atmospheres	?



# Hydrogen Refueling Station



## System configuration:

Solar cell / Converter / Water electrolyze  
Compressor / High-pressure tanks

## Hydrogen manufacturing capacity:

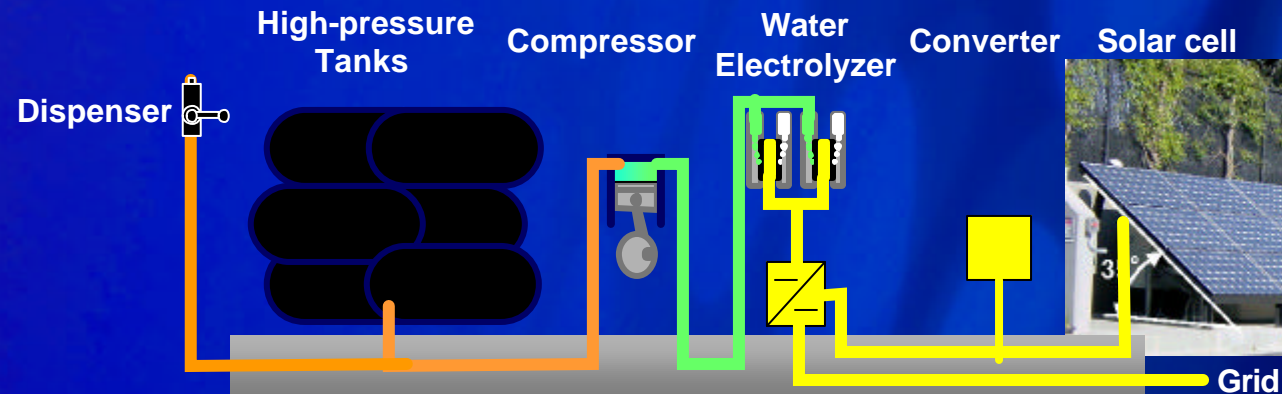
With commercial electricity

Max. 2N/h

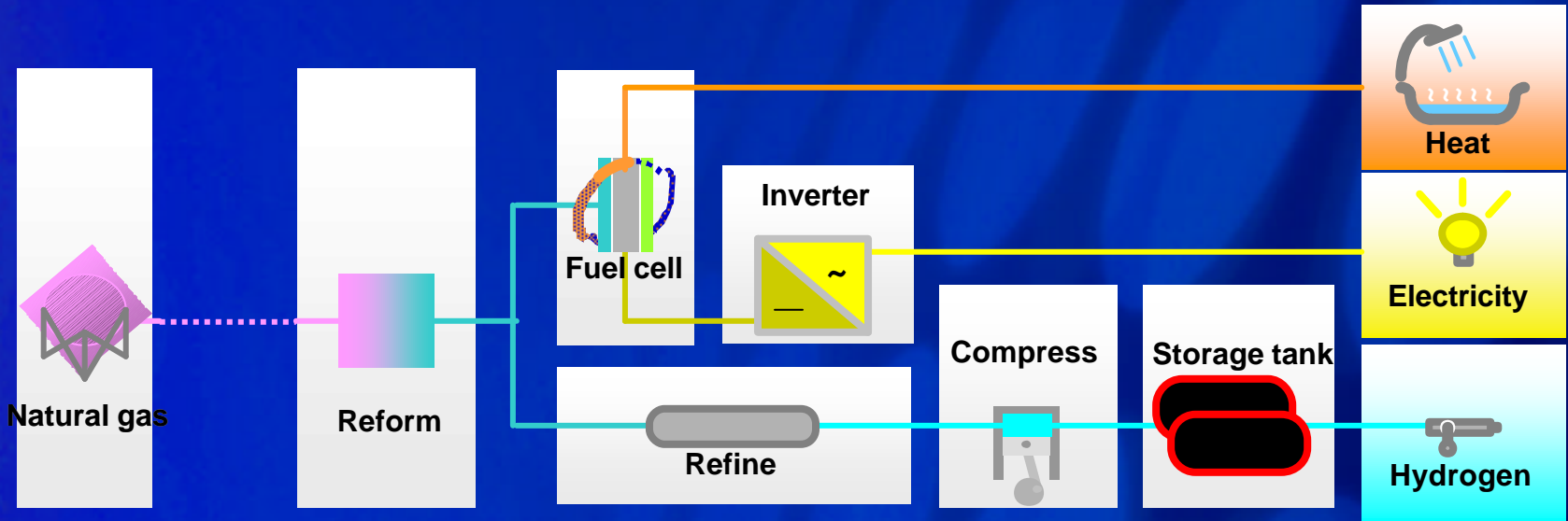
Solar cell only Max.1.2N/h

## Hydrogen storage:

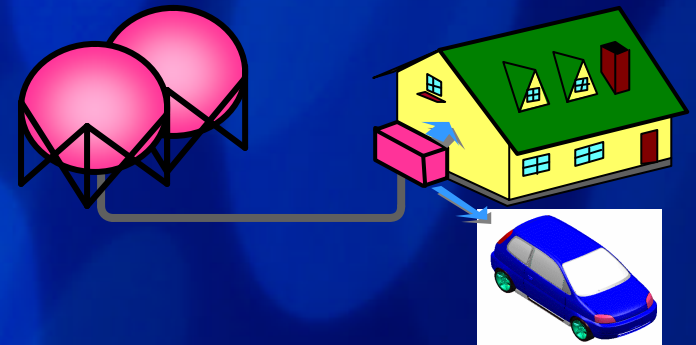
400 liters (350 atmospheres )



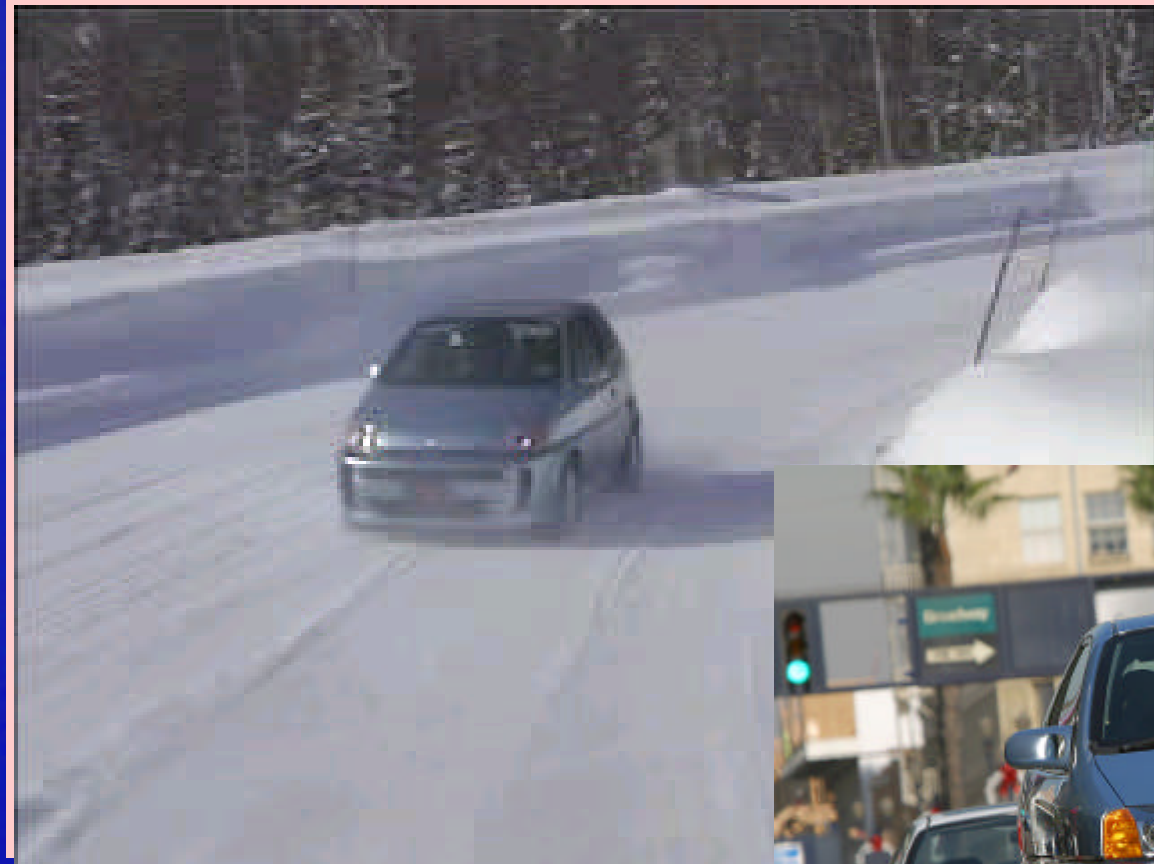
# Home Energy Station



## Reformate Gas Home Refueling with Co-generation



# Toward future





**HONDA**

The power of dreams.™