

Hydrogen and Fuel Cells in Transportation – the Future is Arriving



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FCV Development history

1980s 1995 2000 2002 2004 2006

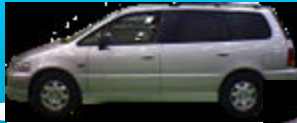
Fundamental
Research

FCX

1/3

1/4

FCX



FCX Clarity

...
Metal Hydride

Methanol reforming

...High Pressure Hydrogen Tank.

FCV
(Fuel Cell Vehicle)

Demonstration

Delivery

Motor
Technology



Compressed Gas
tank Technology



Energy Management
Technology

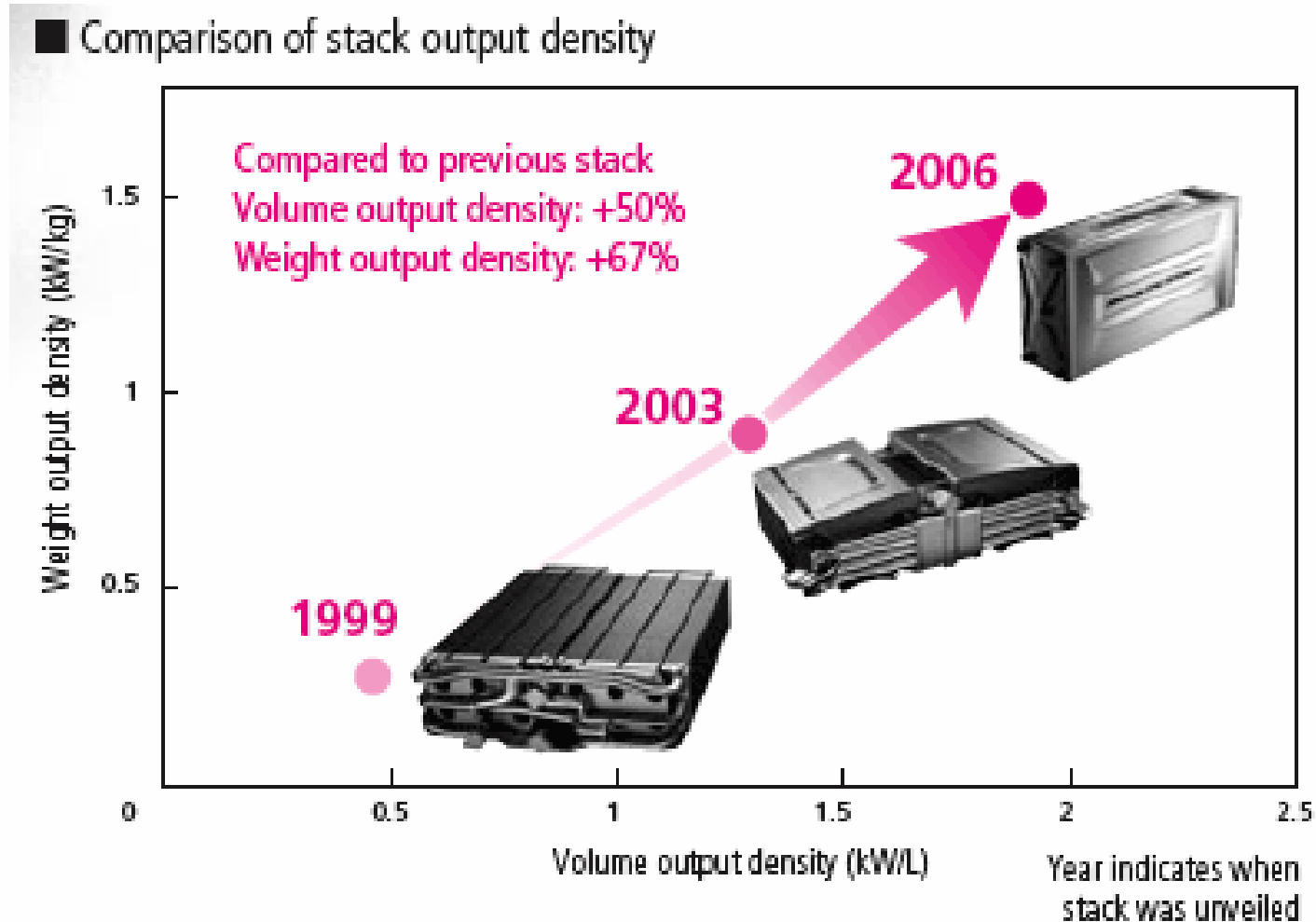


INSIGHT

CIVIC Hybrid (Hybrid)

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Evolution of Honda's Fuel Cell Stack



FCX Clarity

The Zero-Emission Sedan of the Future. **A Reality Today.**



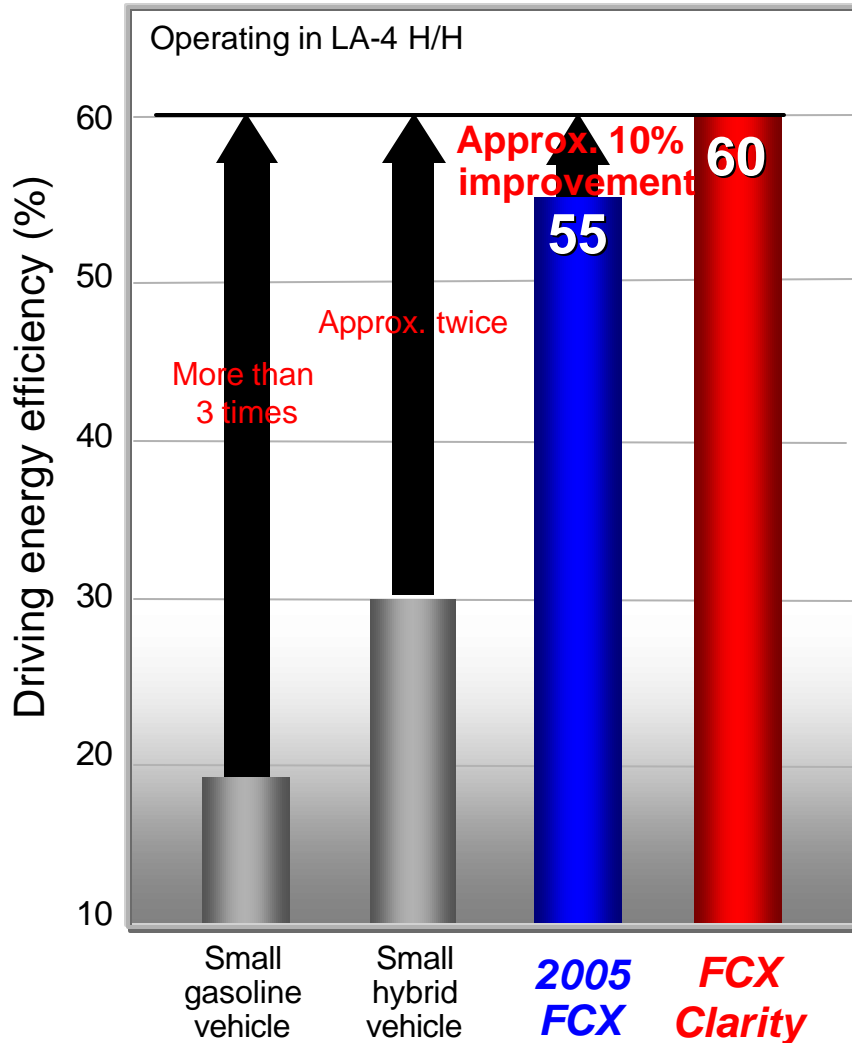
- New V Flow Fuel Cell Stack is smaller and more powerful.
- Higher output, higher torque, higher rpms and quieter operation in amore compact electric motor design.
- Compact , high –efficiency lithium ion battery requires less space
- Driving energy efficiency is approx. twice that of hybrid vehicles: 60%
- The Clarity's efficiency is nearly three times that of a gasoline vehicle, and the nominal range is nearly 280 miles.

The Clarity's performance in now equivalent to a 3.0L, V6 Sedan

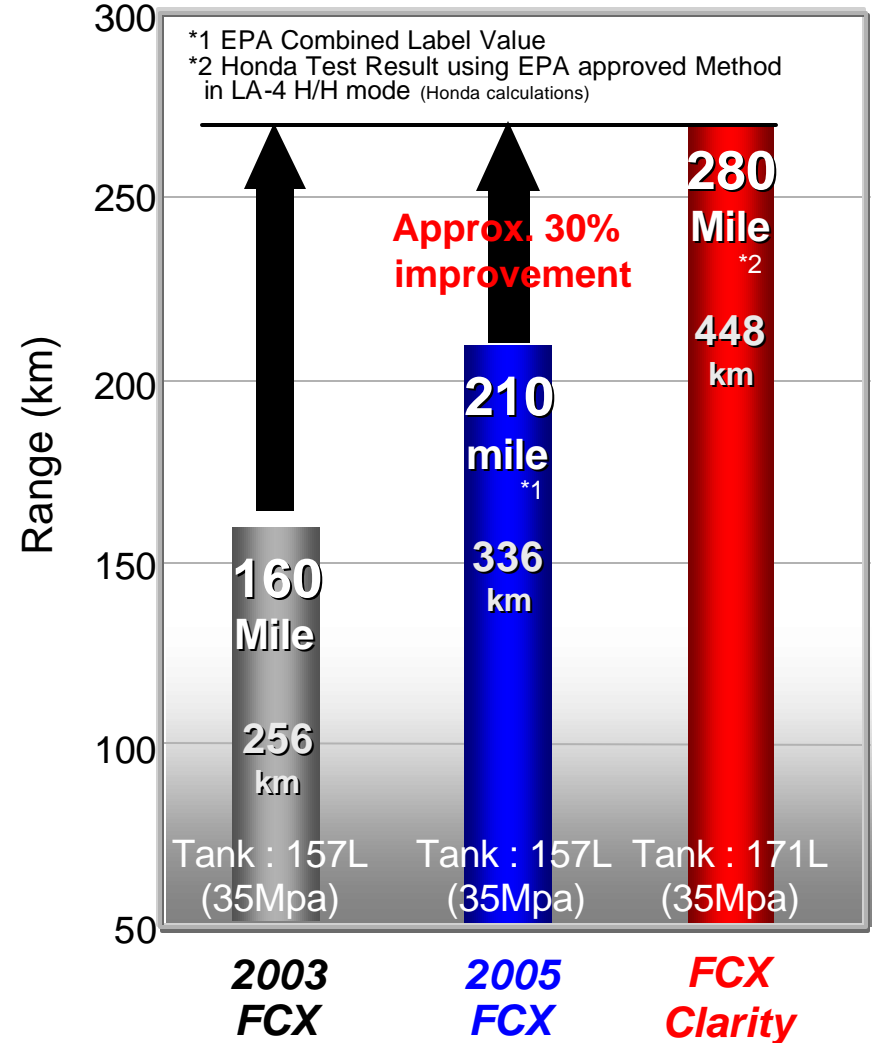
FCX Clarity

Energy Efficiency and Fuel Economy

Driving energy efficiency is approx. twice that of hybrid vehicles: 60%



Range increased Approx. 30% over earlier FCX models



Energy, CO2 and Efficiency for

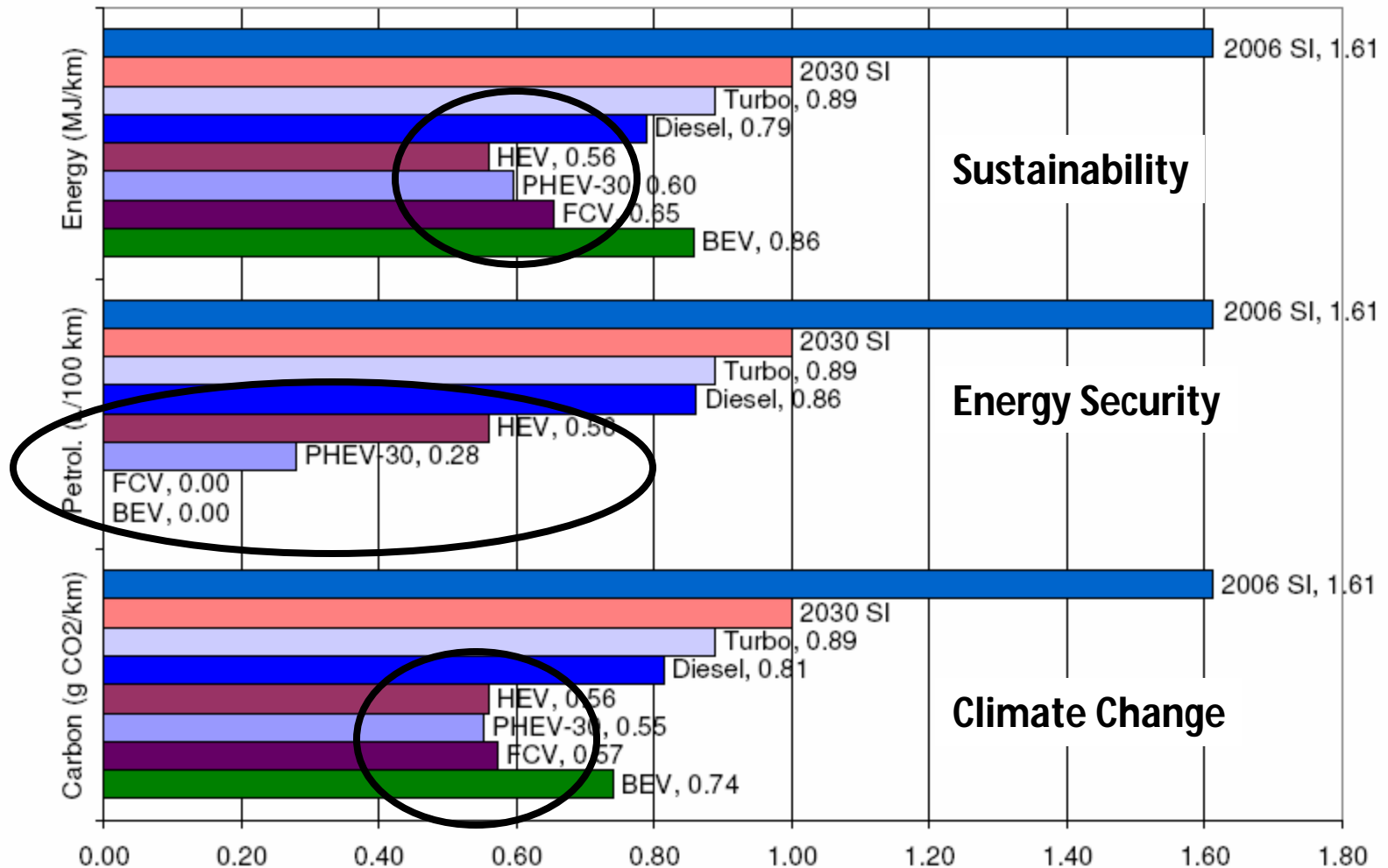
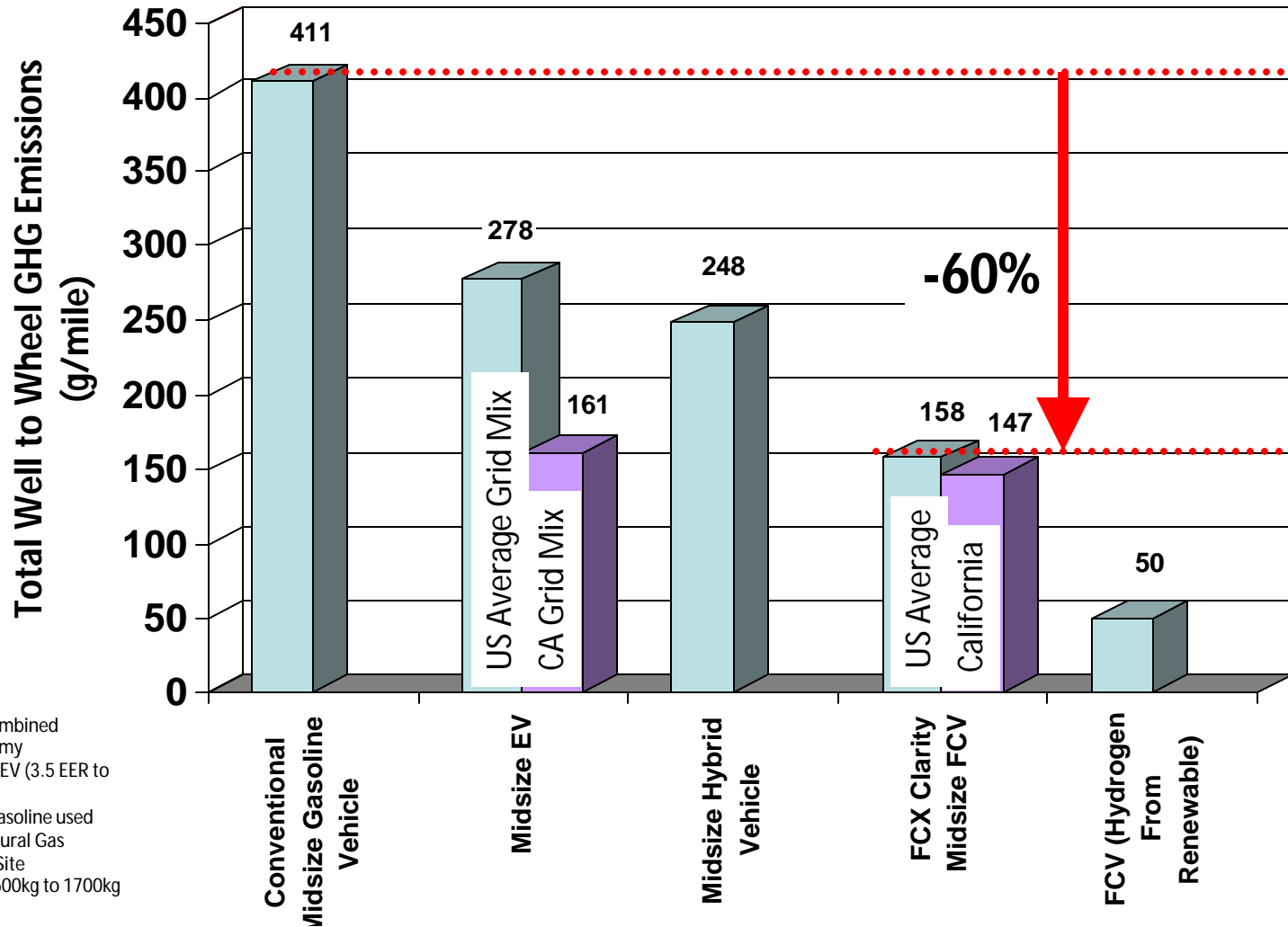


Figure 55: Relative Energy, Petroleum (in Gasoline Equivalent), and GHG Emissions of vehicle options, compared to a 2030 NA-SI

Hydrogen Fuel Cell Vehicles

FCV is a “full function” vehicle, but lacks infrastructure.
Even with SMR, Clarity is a 60% Reduction from conventional ICE



Assumptions:

- Unadjusted EPA Combined City/Hwy fuel economy
- GREET Defaults for EV (3.5 EER to gasoline vehicle)
- US Reformulated Gasoline used
- Hydrogen from Natural Gas Produced at Station Site
- Midsize Vehicle - 1600kg to 1700kg

FCX Clarity in California

First Customers

- First deliveries in July, 2008 (nine to-date)
- Customers include: H.S. Principal, D.A., Actress, etc.
- Selection process: diversity, community, driving patterns, involvement



First Fuel Cell Vehicle Dealership Network

- Three Official Clarity/FCX dealerships: Santa Monica, Torrance, and Costa Mesa
- Clarity dealership responsibilities:
 - Sales, Service, Parts, Customer Relations

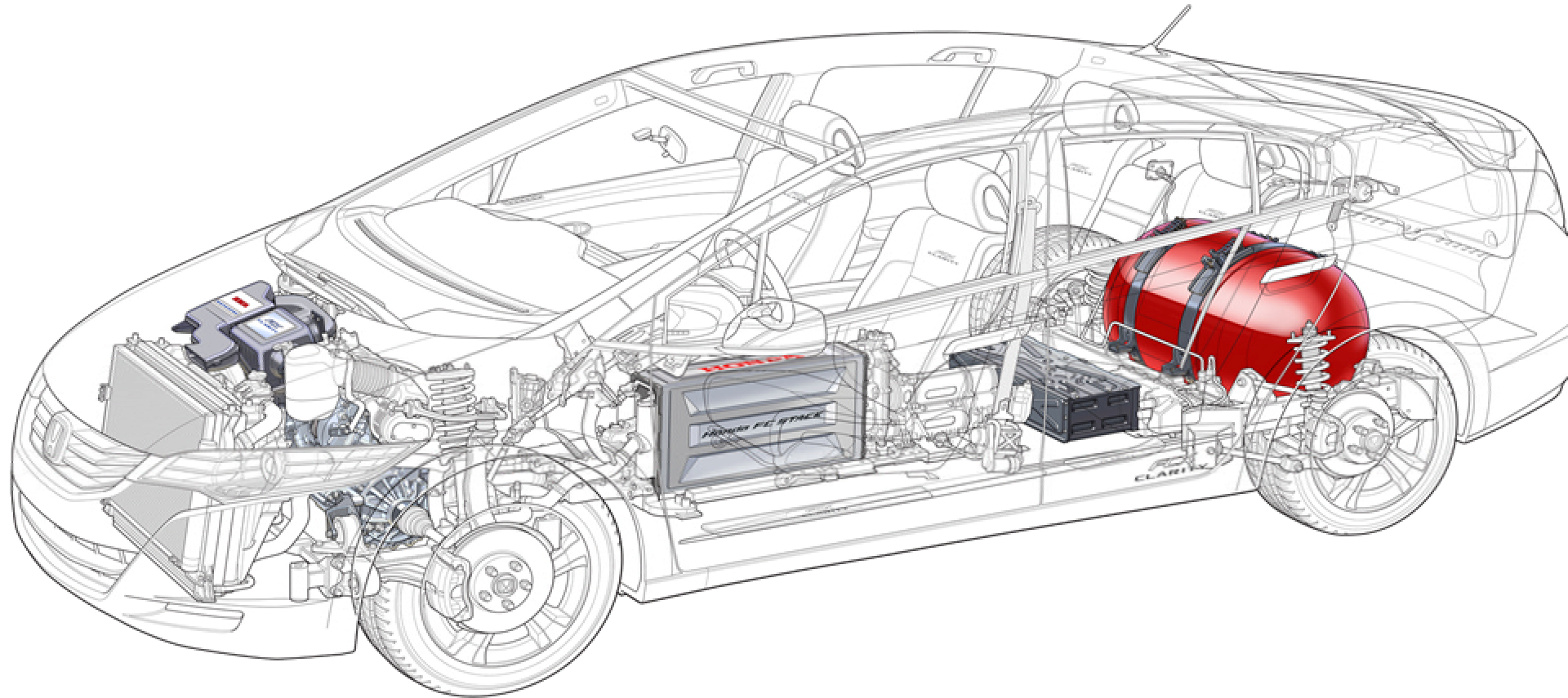


Fuel Cell Production

- Dedicated FC Production: Exclusive Clarity factory
- Dedicated FC stack production, with Honda-unique manufacturing equipment



Fuel Cell Safety



Fuel Cell Safety



- Car totaled
- Driver walked away
- No tank rupture
- No tank leak
- Inspector credited driver's life to the strength of the CNG tank.

Home Refueling



Advanced Vehicle Technologies

Path	Social Values				Marketability			
	Air Quality	GHG	Energy Sustain.	Energy Security	Infra-structure	Cost	Full Function	Appeal
Bio Fuels (Current)	Good	Poor	Poor	Fair	Poor	Good	Very Good	Less Range
Bio Fuels 2 nd Gen	Good	tbd	Very Good	Very Good?	Poor	Good	Very Good	Less Range
Diesel	Fair	Fair ~ Good	Poor	Fair	Good	Fair ~ Good	Very Good	Negative Image
CNG	Very Good	Fair ~ Good	Fair	Very Good	Poor ~ Fair	Fair	Very Good	Good
Down Sizing	Very Good	Good	Fair	Good	Very Good	Very Good	Good	Fair
Improved ICE	Very Good	Fair	Poor	Poor	Very Good	tbd	Very Good	Very Good
HEV	Very Good	Good	Fair	Fair	Very Good	Fair ~ Good	Good	Very Good
PHEV	(tbd)	Fair ~ Good	Good	Good	Fair	Poor	Fair ~ Good	Very Good
EV	Very Good	Fair ~ Good	Very Good	Very Good	Poor	Poor	Poor	Very Good
FC	Very Good	Very Good	Very Good	Very Good	Poor	Poor	Very Good	Very Good

We should be humble...

Policy “favorites” create disruptions

- 25 years ago Methanol**
- 15 years ago Electric vehicles**
- 10 years ago Hybrid/electric vehicles**
- 5 years ago Fuel cell vehicles**
- 2 years ago Ethanol**
- 1 year ago Plug-in hybrid vehicles**
- What’s next?**

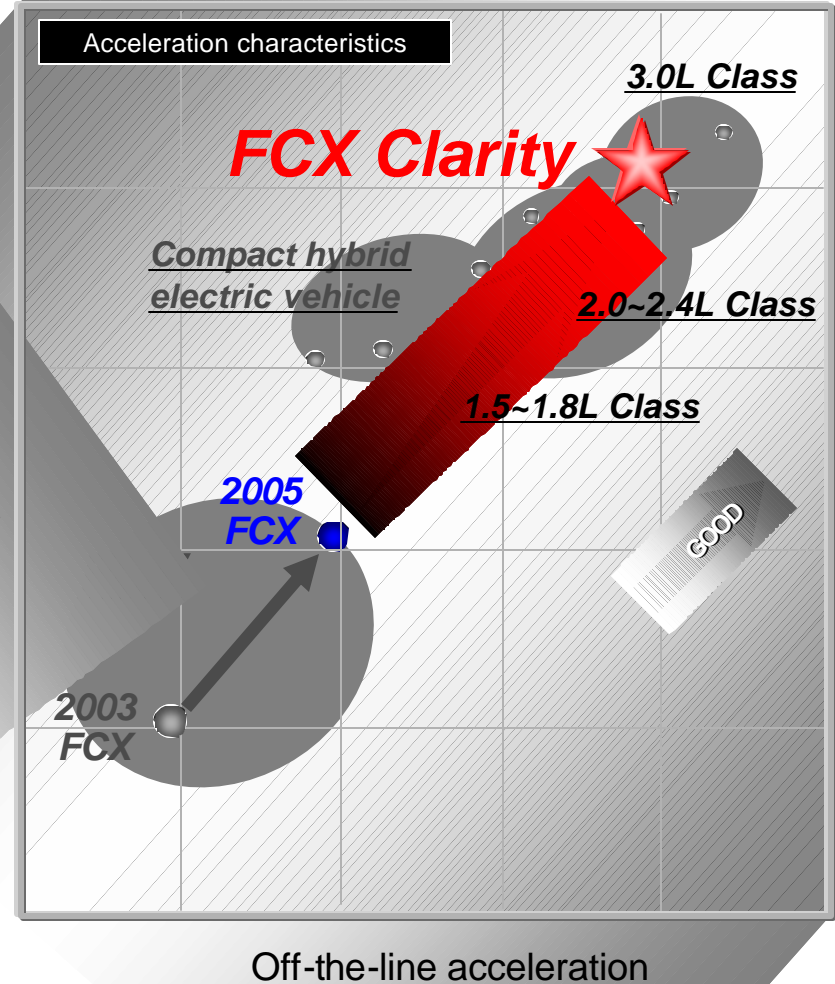
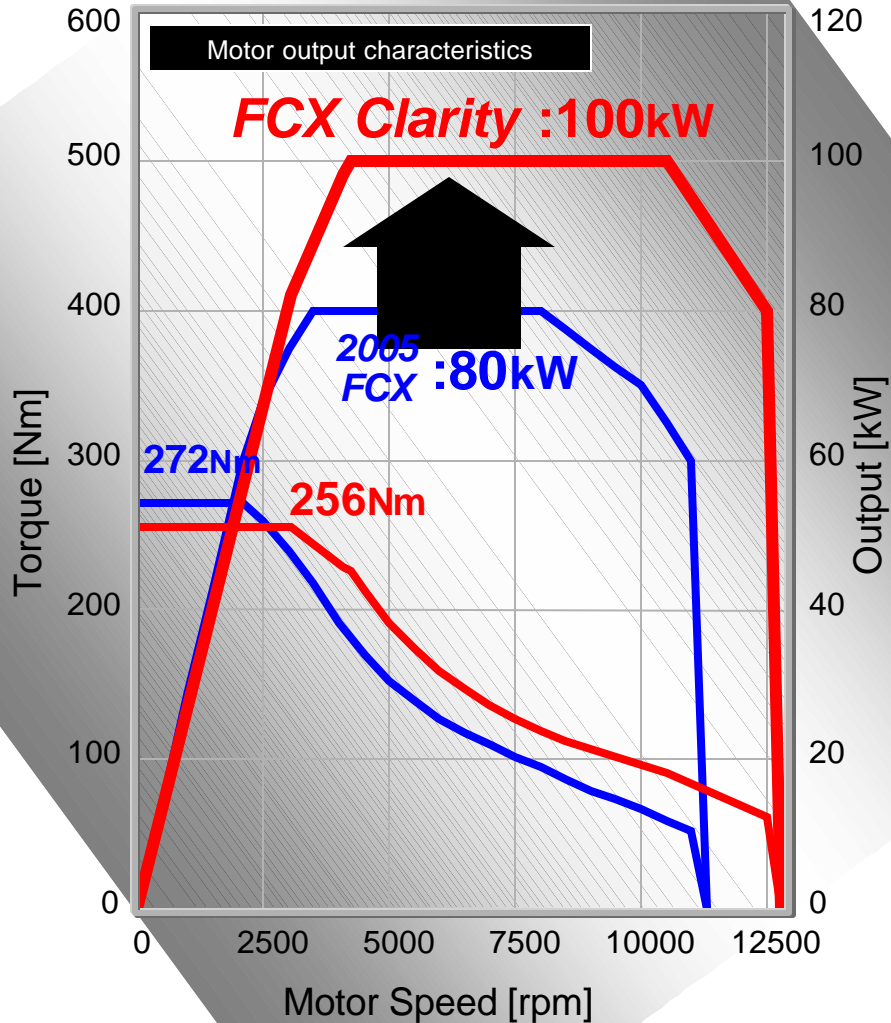
HONDA

The Power of Dreams

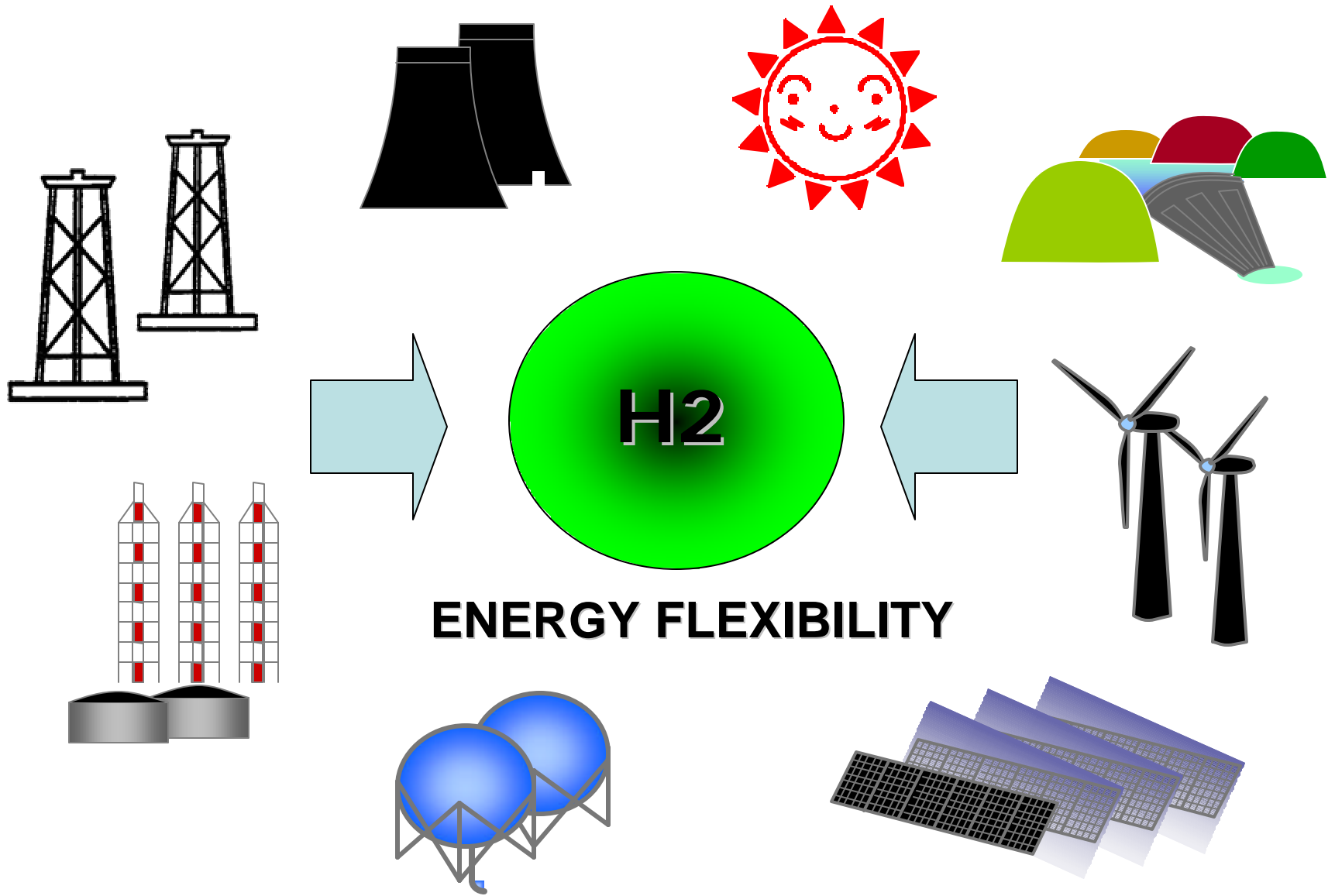
FCX Clarity Perform

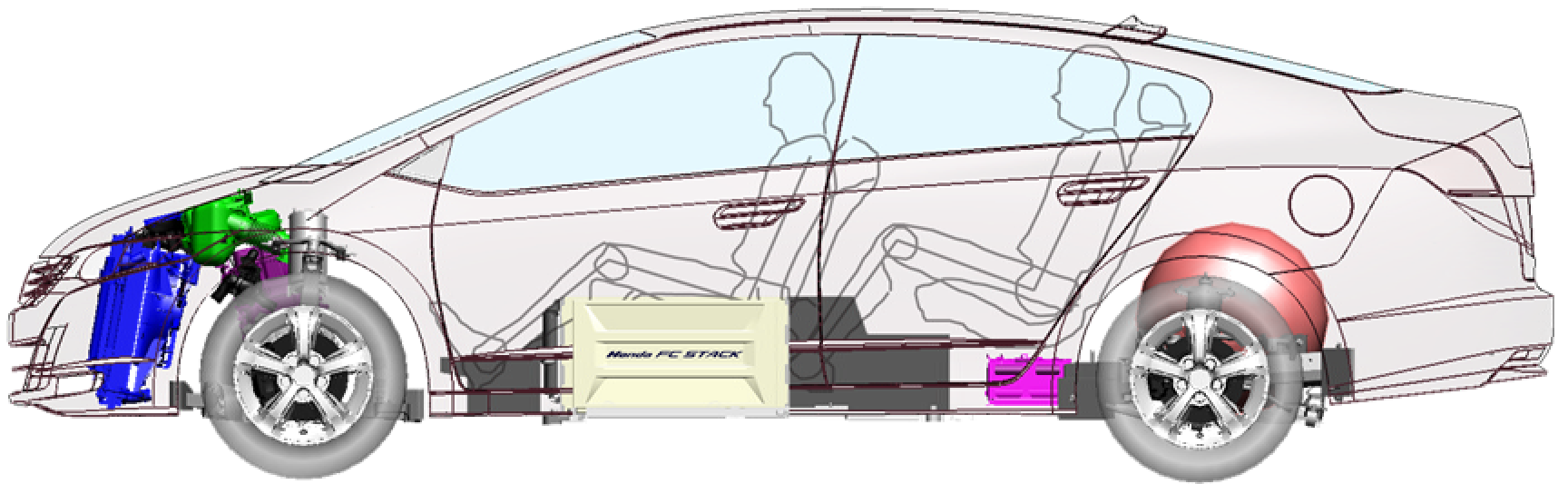
A power for acceleration that feels limitless

Excellent off-the-line acceleration of the 2005 FCX,
Improved acceleration in the mid- and high-speed ranges

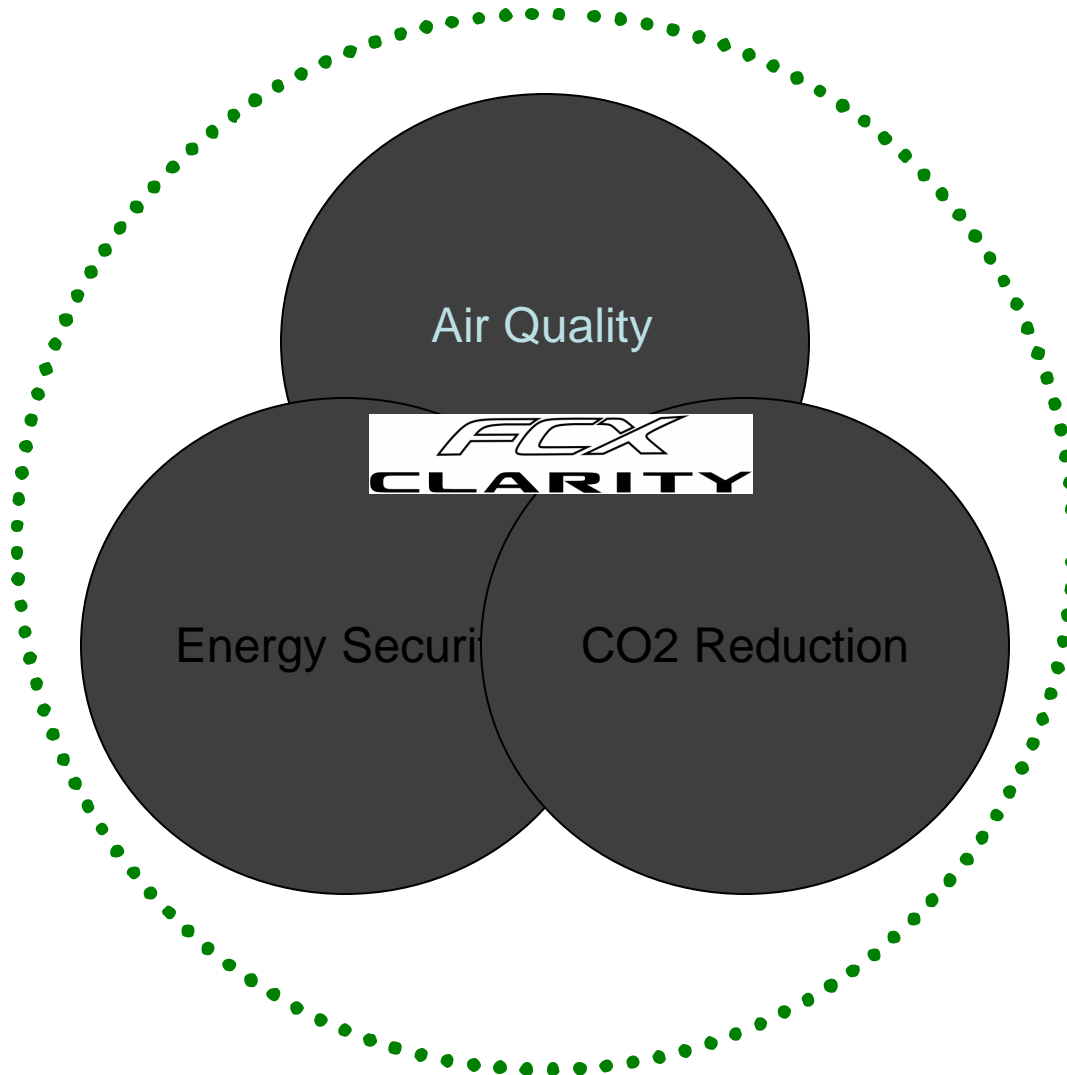


H2 Energy Base





FCX Clarity Responsibilities For Society



FCX addresses all of these continually evolving issues

