

ZEB and NZEB Program Progress plus.. Comments on ZEB Program Plan

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ISE is a supplier of hydrogen fueled buses



The first Hybrid Electric Fuel Cell Bus



2005 Hybrid Electric Fuel Cell Bus



'HHICE' (Hybrid Hydrogen Internal Combustion Engine) Bus

First Public Demonstration
United Nations World Environment Day



San Francisco June 2, 2005

40' Hybrid Electric Fuel Cell Bus
With UTC 120kw FC



ISE CORPORATION
TRANSPORTATION FOR A CLEAN PLANET

HHICE (or FCB) + Wind Hydrogen = Carbon Free Transport!



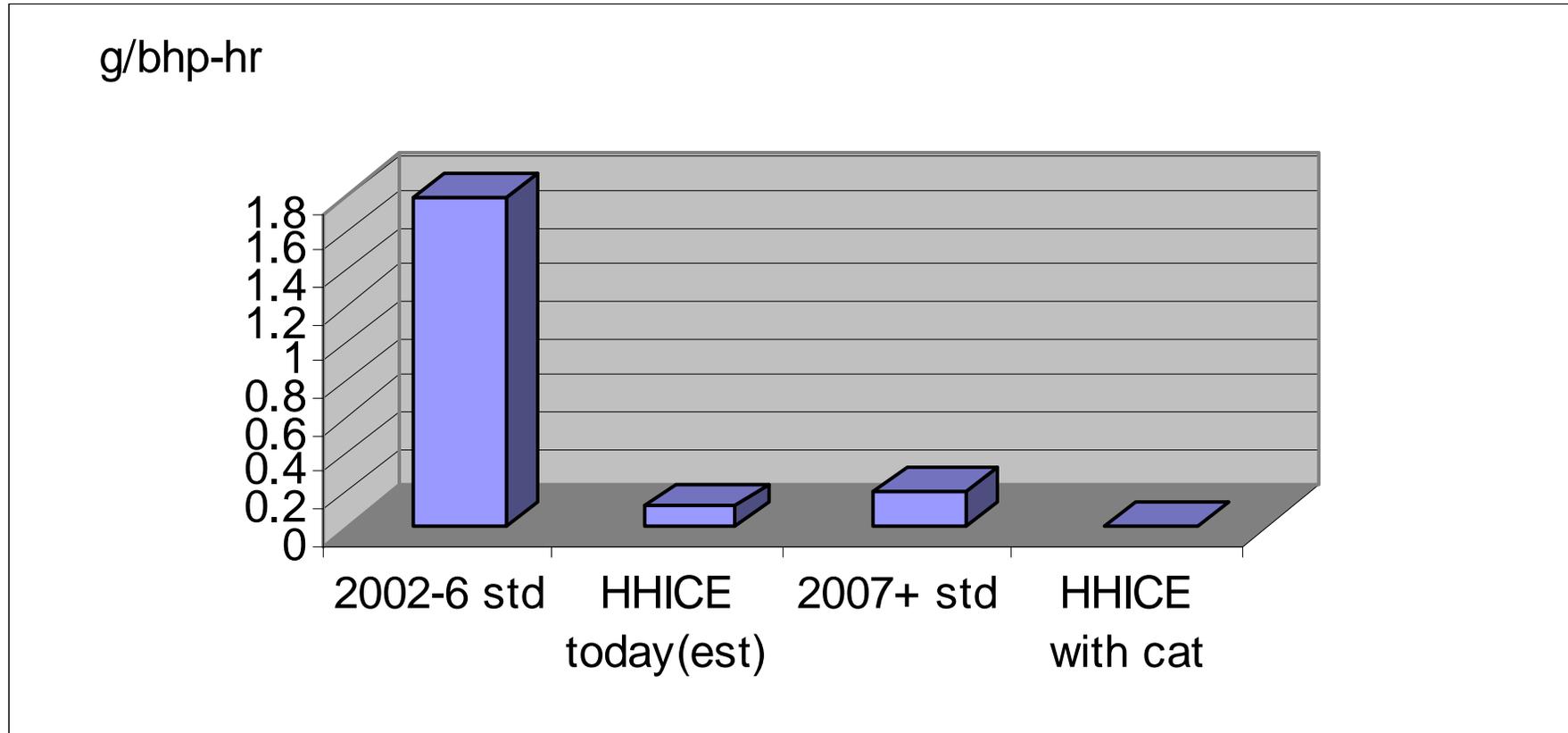
Hybrid Hydrogen Bus *Progress Report:*

- AC Transit, 3 hybrid FC buses, 10,000+ miles cumulative (for the 3 buses)
- SunLine Transit – 1 hybrid FC bus with 11,250 miles (12 April, 4 mos service), 1 HHICE bus with 23,850 miles, main problem of late has been occasional fuel shortage
- FC buses averaging 8 m/kg, HHICE 4-4.5 m/kg hydrogen

HHICE as a NZEV

- With no exhaust gas treatment (as operating at SunLine) NO_x typically 20-30 ppm (estimated 0.1 gm/bhp-hr)
- Recent measurements with exhaust gas treatment suggest HHICE2 goal of 0.2 ppm NO_x, expect g/mi similar to automotive SULEV levels (0.02 g/km)

Comparing NOx emissions



Plea to Continue ZEB Incentives!

- New Second Generation Hybrid FCBs are greatly improved, showing capability of 3000 mi/mo, 8 mi/kg hydrogen
- Essential to “keep the momentum”, provide firm incentives for continued development and testing
- National FCB Program (FTA/DOT) and Canadian “Olympics” bus build will assure increased production and lower cost, increased interest from abroad too

Why not enrich the program with NZEBs?

- Introducing two HHICE buses into service results in near double the emissions reduction of a single FCB! - (and, at this time at least) with a cost savings.
- Proposed option to the present ZEB proposal: that properties that prefer can choose NZEV HHICE (Hydrogen Hybrid Internal Combustion Engine) buses, receive credit for a FCB for every two HHICE buses in service.