Technologies to Achieve Emission Reductions

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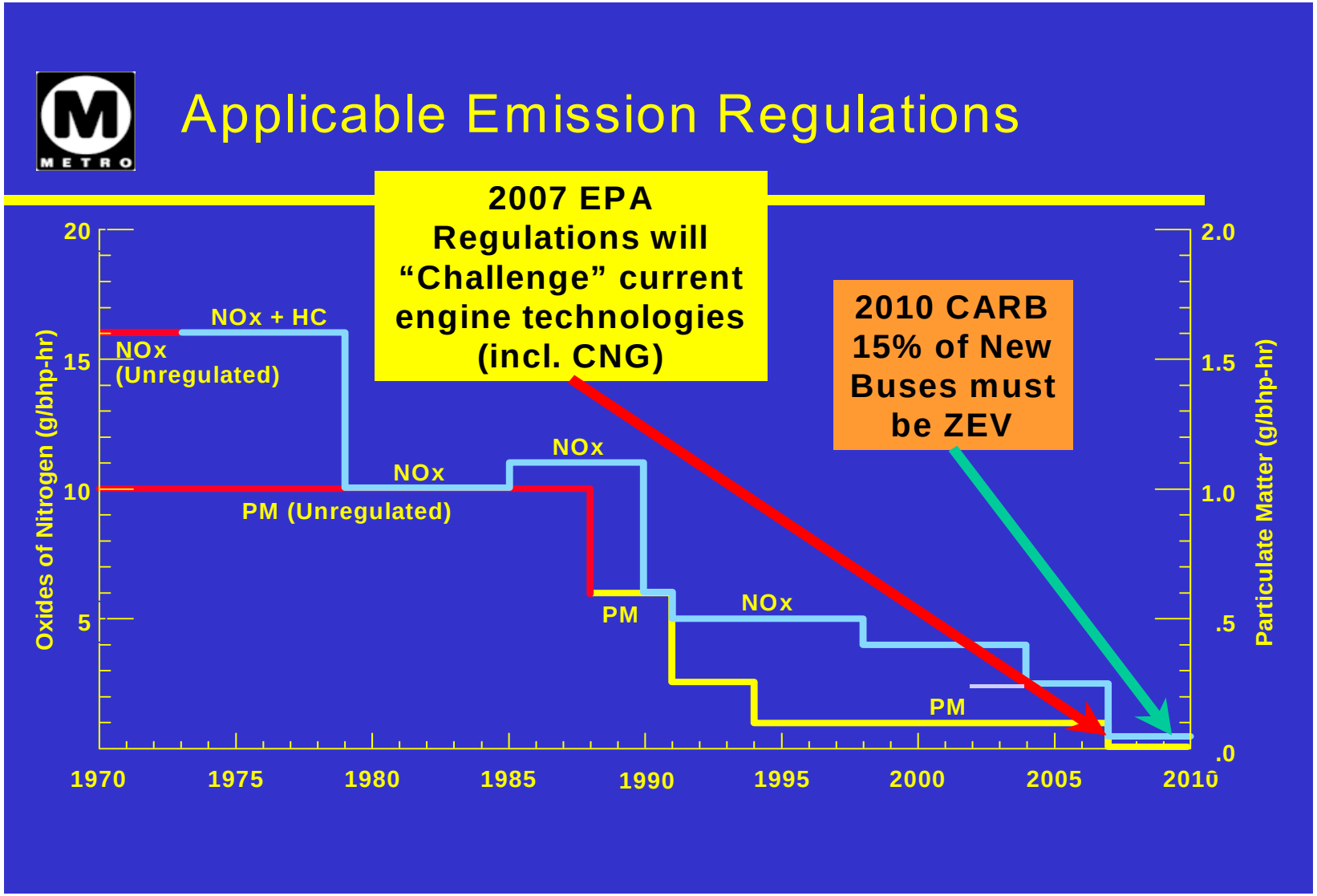
Metro Faces Challenges to Meet 2007/2010 Emission Regulations

- 2007 - Particulate Matter (PM) drops to 0.01 g/bhp and NOX drops to 0.2 g/bhp.
- 2010 – 15% of new vehicle orders must be zero emissions for fleets larger than 200 vehicles.
- Metro has been aware of these regulations since the 1990's, previously they were addressed in the 30 year plan then later dropped.

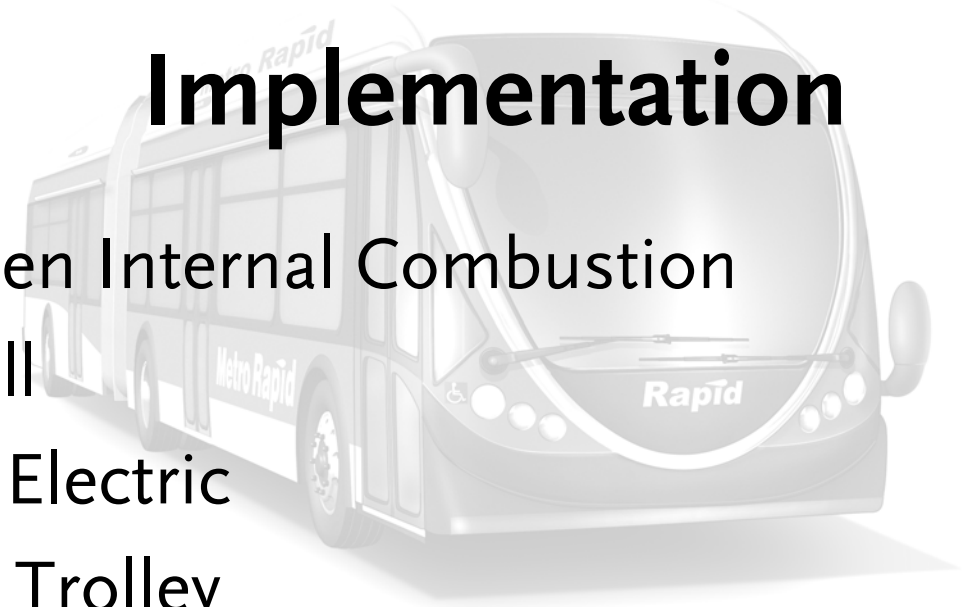
Applicable Emission Regulations



Possible Paths to Effect Changes In Emissions Profiles

- Propulsion Systems - Alternative fuel hybrid electric high capacity vehicles.
- Fuel Chemistry – HCNG hydrogen enriched CNG.

Other Technologies to Evaluate and Monitor for Possible Implementation

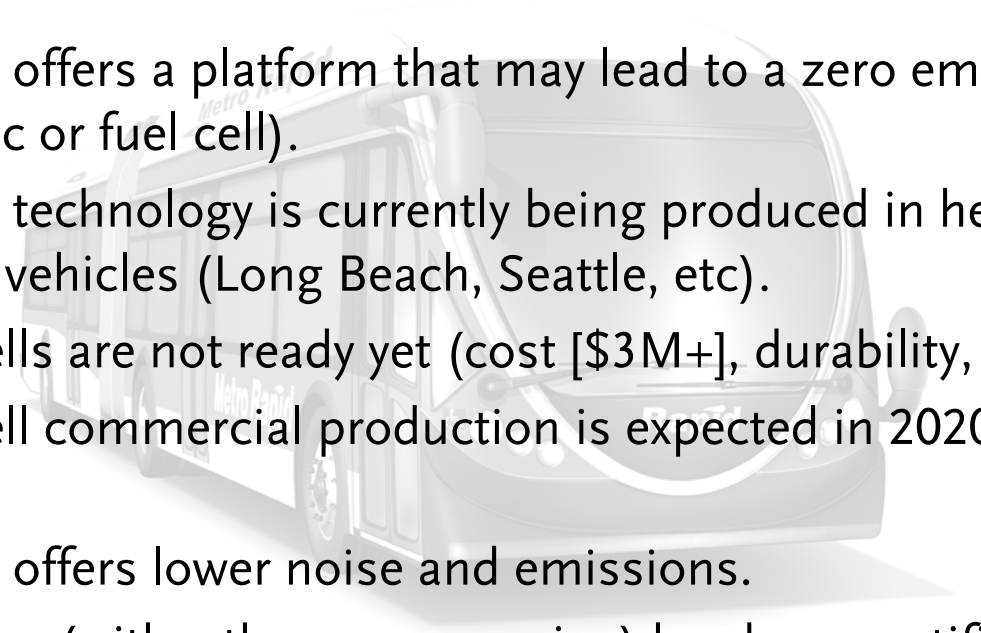


- Hydrogen Internal Combustion
- Fuel Cell
- Battery Electric
- Electric Trolley

Risk and Benefits

- Hybrid – revolutionary and expensive, though it may lead to fuel cell and or full electric vehicles.
- HCNG – evolutionary with moderate cost of implementation and is the end of the line for existing the CNG technology.
- Both technologies may be needed to manage the risk of non compliance of 2007/2010 regulations.

Why Test A Hybrid?



- Hybrid offers a platform that may lead to a zero emission vehicle (electric or fuel cell).
- Hybrid technology is currently being produced in heavy duty transit vehicles (Long Beach, Seattle, etc).
- Fuel cells are not ready yet (cost [$3M+], durability, and power).
- Fuel cell commercial production is expected in 2020-2025 at best.
- Hybrid offers lower noise and emissions.
- Gasoline (with a throwaway engine) has been certified by CARB.
- Hybrid is the “next” step in the technology ladder.

With the upcoming 2007 and 2010 emissions goals, procuring hybrid powered articulated vehicles using a sole source negotiated procurement will:

- Let Metro take the next logical and technological step toward meeting future emission requirements
- Offer a platform that may lead to Fuel Cell or electric, zero emission vehicles
- Follow the strategic plan and demonstrate Metro as leading the nation by implementing innovative technologies through the purchase of state-of-the-art high capacity vehicles

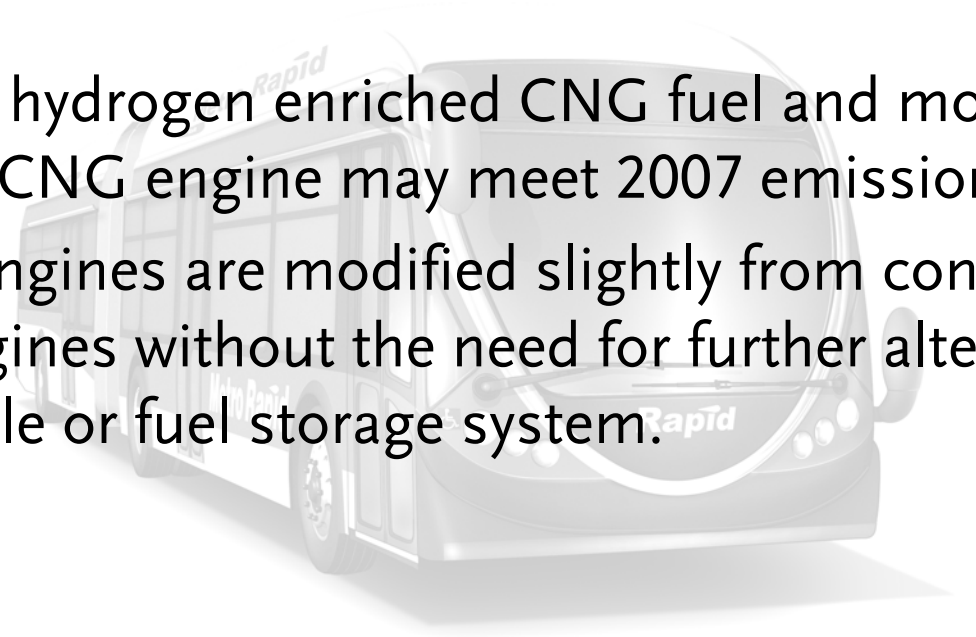
ATVC Hybrid Project Summary

- March 2004, the ATVC Board authorized the solicitation for up to 5 hybrid articulated vehicles.
- March 2004, letters of interest were sent to both NABI and New Flyer seeking proposals.
- NABI declined to participate in a hybrid project.
- August 2004, New Flyer sent a letter of interest and indicated they would submit formal proposal in the near future.
- December 2004, New Flyer submitted formal proposal with a 60 day evaluation limit.
- February 2005 MTA executive staff recommended deferral of projects with local funding to mitigate FY05 budget shortfall, ATV project identified and deferred to FY06.
- April 2005 ATV project deferred from FY06 budget request to FY07.

ATVC Hybrid Project Summary

- Seek authorization from ATVC and Metro boards to enter into negotiated contract with New Flyer for the purchase of 3 articulated hybrid vehicles.
- Local funds necessary for grant matching requirements on this project will be identified by the Vehicle Technology department and Metro Operations from existing vehicle procurement projects.

HCNG Engine Technology



- HCNG – hydrogen enriched CNG fuel and modified Daewoo CNG engine may meet 2007 emission targets.
- HCNG engines are modified slightly from conventional CNG engines without the need for further alterations to the vehicle or fuel storage system.

HCNG Engine Technology
Next Steps

- Due to restrictions in the grant funding provisions, we do not have the funds available in our work plan to proceed with the HCNG program at this time.
- Continue to seek sources of funding to initiate the HCNG program.
- When suitable funding is secured or becomes available, seek authorization from ATVC and Metro Boards to enter into negotiated contract.
- Evaluate Daewoo CNG engines as a possible candidate to replace Detroit Diesel engines needing to be overhauled or replaced during mid life overhaul.

Recommendations

- Proceed with executing contract with New Flyer for 3 articulated gasoline hybrid vehicles.
  - Local funds necessary for matching requirements on the grant will be identified by the Vehicle Technology department and Metro Operations from existing vehicle procurement projects.
- Work with City Engines and partners in receiving a proposal to retrofit an existing Metro bus, to evaluate the suitability of the Daewoo CNG engine as a replacement engine for DDC Series 50 equipped vehicles.