Presentation to Metropolitan Washington Air Quality Committee

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GREATER WASHINGTON REGION
Clean Cities Coalition

one of approximately 100 Clean Cities designated by the US Department of Energy

primary objective is to promote the use of domestic transportation fuels other than gasoline and diesel fuel

GWRCCC is a public-private partnership (501 (c) 3 organization) housed in the offices of the DC Department of Public Works

Key Stakeholders include:

- **MWCOG**
- **DC Department of Public Works**
- **Natural Gas Vehicles of America**
- **Propane Education and Research Council**
- **Electric Drive Transportation Association**
- **National Biodiesel Board**
- **Washington Gas**
- **PEPCO**
- **DC Water**
- **Washington Area New Automobile Dealers Association (WANADA)**
- **County/Local Governments**
- **Public and Private Companies**

2017 Initiatives

working with MWCOG on the F4F (Fleets for the Future) program to lower the cost of alternative fuel vehicles through aggregate purchasing

working on the Federal Highway Administration's Alternative Fuels Corridor Project to increase the number of EV, natural gas and propane stations along the region's major interstate highways

taking advantage of project opportunities through the availability of VW Settlement Funds

promoting the use of biodiesel, biofuels and ethanol

National Electric Vehicle Charging and Hydrogen, Propane, and Natural Gas Fueling Corridors

2017 Initiatives

regional school district initiative to educate districts about availability of new propane school buses, their environmental benefits and incentives available; also the merits of using biodiesel in diesel buses

Workplace EV initiative – expanding the footprint of EV chargers in the region

events to commemorate the opening of new charging and fueling stations

Special Transformational Projects for DC Area

Renewable Natural Gas (Biomethane) Production

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A proposal to maximize DC Water's biomethane value – both environmentally and monetarily

dc water is life®

This groundbreaking project is the **first to employ thermal hydrolysis technology** in North America, and the **largest such facility in the world**. The project efficiently provides clean, green renewable power by **converting collected sewage solids into methane**, which is cleaned and then sent through turbines for the production of electric power and recoverable heat.

Combustion Turbines Three 5 Megawatt (MW) turbines onsite convert digester gas into power, producing enough power to run one third of Blue Plains, the largest advanced wastewater treatment plant in the world. In addition, heat is recovered and converted to steam, which is used to heat the thermal hydrolysis process, so that there is no external energy needed for the project.

Special Transformational Projects for the DC Area

Renewable Natural Gas (Biomethane) Production

Re-purposing the biomethane (RNG) by injecting the RNG into the Washington Gas pipeline system and utilizing it for general transportation use and other purposes.

dc water is life®

Taking full advantage of renewable natural gas' (RNG) value as a transportation fuel through **renewable identification numbers (RINs)** – part of the **Renewable Fuel Standard (RFS) Program**

RNG from wastewater is classified as a cellulosic pathway and therefore generates D3 RINs.

The cost of electric generation, when combining the wholesale price of electricity plus the Renewable Energy Certificate (REC), is approximately $40/MWh or **$3.50/MMBtu.**

As a transportation fuel, the RNG value increases tenfold -- **$30-$35/MMBtu.**

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Special Transformational Projects for the DC Area

Potomac River
Compressed Natural Gas
Passenger Ferry

Finding a funding source for environmentally-friendly passenger ferry boat service:

Fast, quiet, ultra-low emissions, low wake, low draft, 150-passenger capacity

nvrc
Northern Virginia Regional Commission

Market Analysis Finds Commuter Ferry Service Viable

(July 14, 2015 – Merrifield, Virginia) A market analysis performed for the Northern Virginia Regional Commission has found that commuter ferry services on the Occoquan, Potomac and Anacostia Rivers has a sustainable market and, through earlier studies is feasible. The study was conducted by Nelson/Nygaard Consulting Associates.

"I am excited about the results of the market analysis", said NVRC Executive Director Mark Gibb. "Funding is available to establish adequate shore-side facilities and assist in service startup. Several of these routes have strong long-term, viable markets that could add depth to the greater metropolitan Washington, DC multi-modal transportation options."

We have seen it work in other cities," said Prince William Supervisor Frank Principi (D-Woodbridge District). "Fast ferry service gets cars off the road and doubles as a draw for tourists who want to experience all that the region has to offer, from the Smithsonian Museums in D.C. to the National Museum of the Marine Corps in Prince William. Adding fast ferry service to our transportation options would be an economic boon for the entire National Capital Region."

The market analysis revealed the following:

- Four corridors were found to have financially sustainable market demand.
- One corridor was found to be a viable market for access to a military installation.
- One corridor was found to have potential, but is not financially sustainable under today's conditions.

The six corridors selected were based on market size and travel time, they include:

- SE and SW Washington, DC to the City of Alexandria
- National Airport/Crystal City to SE and SW Washington, DC
- Joint Base Anacostia/Bolling and Department of Homeland Security HQ to City of Alexandria
- Woodbridge (Eastern Prince William County) to SE Washington, DC

The shorter connections between Alexandria and Washington, DC including Joint Base Anacostia-Bolling and Reagan National Airport and Washington, DC have the market potential that could be pursued and are likely, in the long-term, to be commercially viable and operate without a public subsidy.

The key issues for the next implementation steps include: governance, environmental review, finance and operations planning.

Special Transformational Projects for the DC Area

Utilizing the same engine technology proposed for the near-zero locomotive demonstration project in Southern California…

Introducing the VeRail VR21C-z Locomotive Near-Zero Emissions Demonstration at Port of Los Angeles/Port of Long Beach

Funded by SCAQMD and EPA

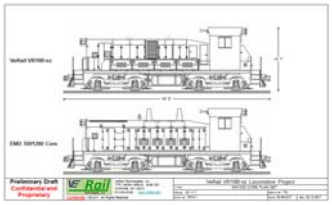
Locomotive Highlights:

- 2,100 Horsepower 6-axle Locomotive
- Over 1,200 diesel gallon equivalents (DGE) of CNG onboard
- 23% to 81% GHG reduction using pipeline or *renewable* natural gas
- Can be combined with existing diesel locomotives on trains to lower the train's overall emissions footprint

Special Transformational Projects for the DC Area

to power the proposed high-speed Potomac River commuter passenger ferry

Introducing the VeRail VR10B-nz Locomotive Near-Zero Emissions Switcher Locomotive



Locomotive Highlights:

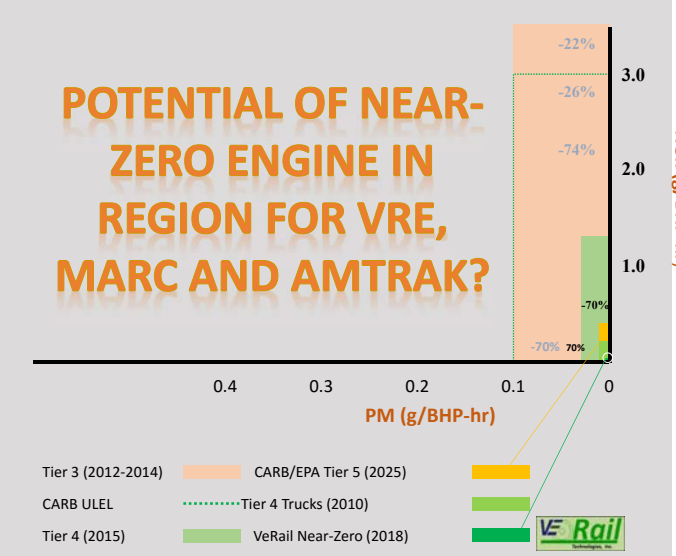
- **800-1200 Horsepower 4-axle Locomotive (same requirement as ferry)**
- Over 400 diesel gallon equivalents (DGE) of CNG onboard
- Near-zero emissions straight natural gas
- Can be combined with existing diesel locomotives on trains to lower the train's overall emissions footprint

Tier 4 Truck Engines are Significantly Cleaner than Tier 4 HHP (locomotive/marine) Engines

Train 4.2 ton miles/gal	NOx grams/ bhp-hr	Grams NOx per Gallon	Truck 105 ton-miles/gal	Train 455 ton- miles/gal
Tier 4 Truck	0.2	0.2 x 18.5 = 3.7	3.7 / 3.7 = **1.0**	
Tier 4 Line Haul Locomotive	1.3	1.3 x 20.8 = 27.0		27.0 / 3.7 = 7.3 7.3 / 4.33 = **1.7 times dirtier**
Tier 2 Switcher Locomotive	5.0	5.0 x 15.2 = 76.0		76.0 / 3.7 = 20.5 20.5 / 4.33 = **4.7 times dirtier**
Pre-Tier 0 Switcher Loco	17.4	7.4 x 15.2 = 254.0		254.0 / 3.7 = 71.5 71.5 / 4.33 = **16.5 times dirtier**

Locomotive and Marine Emissions – Plenty of Room for Improvement

- Only ~2.7% of fleet was Tier 4 by end of 2016
- 33.8% of 2015-2016 orders were Tier 3
- Locomotives Average emissions = 2.7 g/bhp-hr = 2.1 times more than Tier 4



Thank you!

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