Denver's Solution to Congestion

TransTeq's EcoMark Hybrid Electric Mall Shuttle

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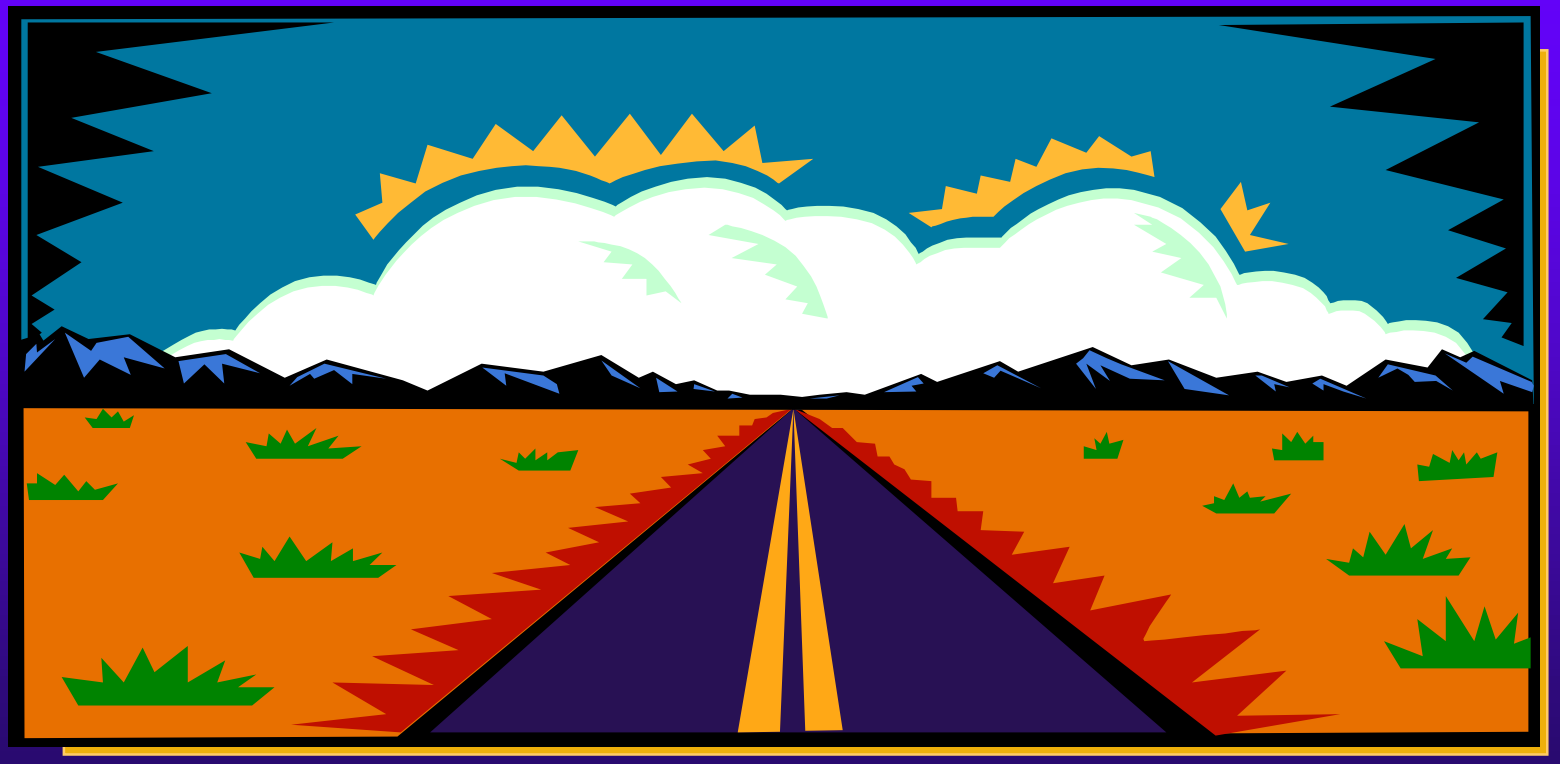
Leading the Transportation Industry "Outside the Box"



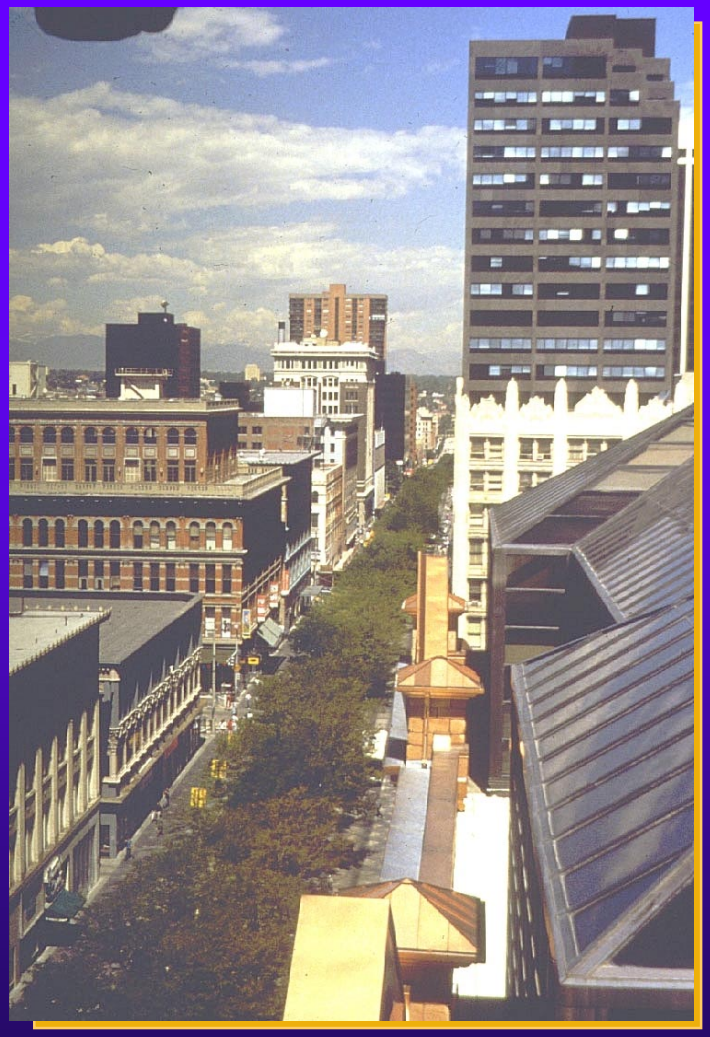
Denver's 16th Street Mall

In the 1980's development of the 16th St. Mall, Denver RTD with support from local businesses and community leaders was years ahead of the planners for the U.S. transportation industry in that they identified and dealt with the challenges that are just now being undertaken at the national level.

Why Build the 16th St. Mall?

- **The economic and social effects of sharply increased gasoline and diesel prices when world oil production peaks and the demand for oil by a burgeoning global production continues to grow.**
- **Urban air pollution resulting largely from the emissions of pollutants by single-occupancy gasoline and diesel vehicles.**
- **Traffic congestion and gridlock in high-growth and metropolitan areas, particularly during rush hours.**

History of the 16th St. Mall



Mall concept originated to solve two issues

- **Address Denver's transit needs**
- **Help Denver recover from worst recession since 1920s**

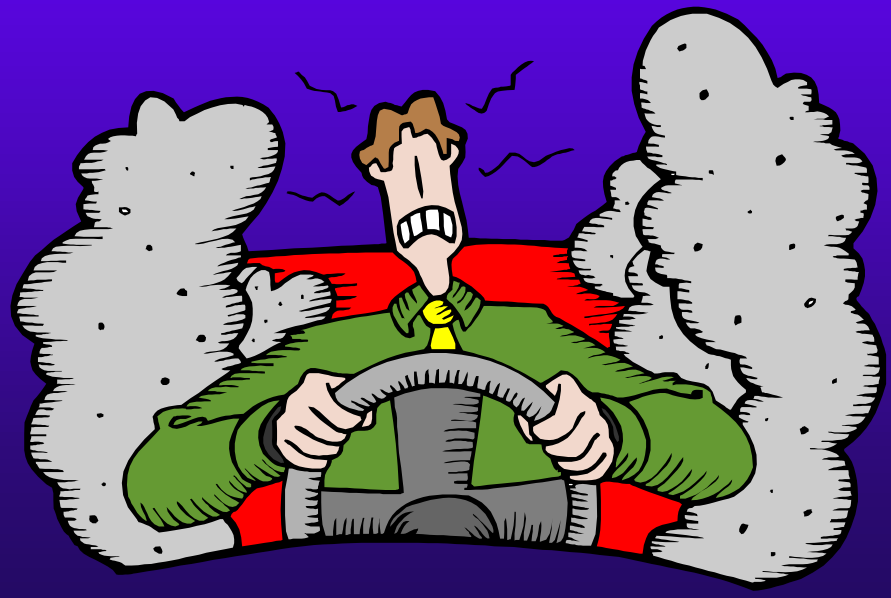
16th St. Mall construction: 80% of funding provided by UMTA, 20% provided by RTD

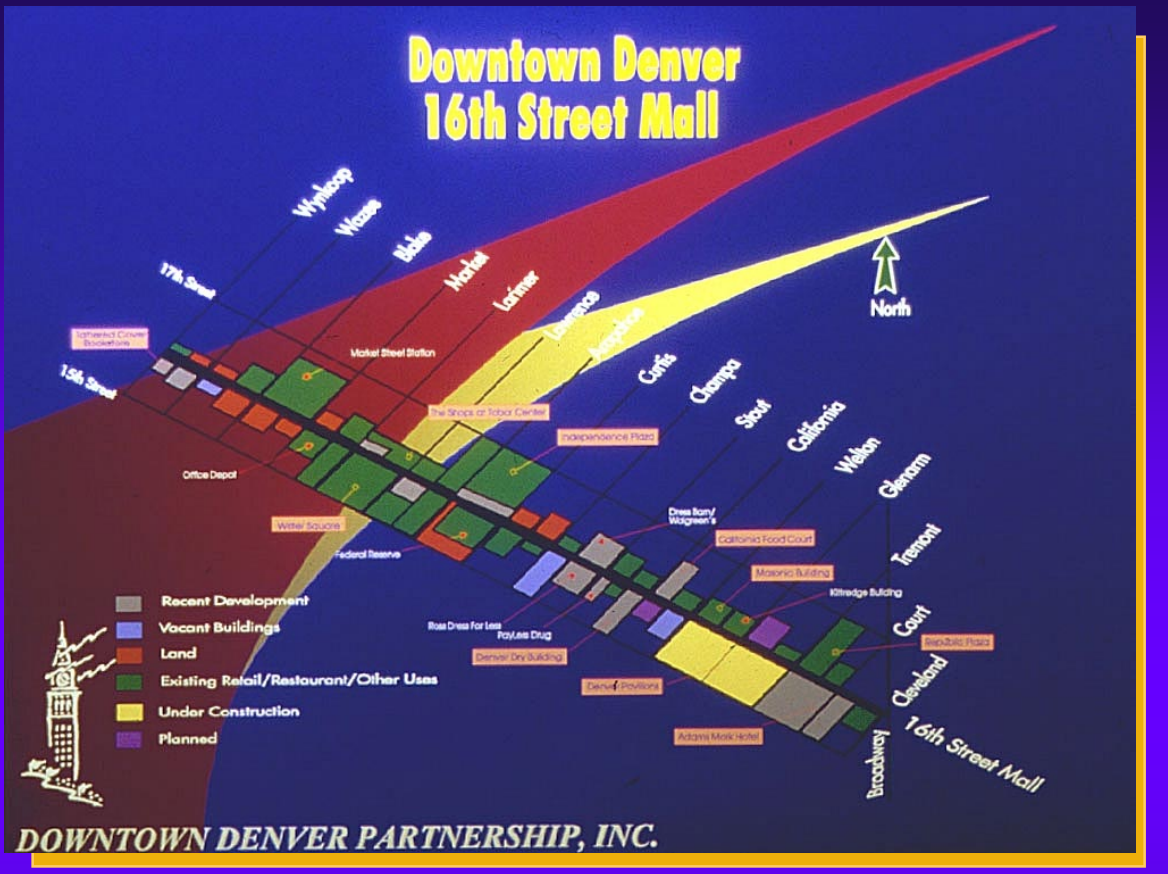
16th St. Mall: Once a 'down-and-out' area, now Denver's leading tourist attraction

Mall Built on These Concepts:

- Transit system designed to remove as many routes as possible
- Unique buses must carry maximum passengers with minumum number of drivers

- Public transit reduces pollutants, including NOx, particulate matter, CO2, and CO by 50%
- Public must be motivated to use system





- Utilize street which most efficiently dissects business district
- Transit terminals at each end of the Mall
- Buses distribute 55,000 people each day
- Eliminates 300 daily downtown bus routes

Free MallRide

- Buses travel on 75 second intervals during rush hour
- Mall traffic lights synchronized
- 20 sec. board/deboard
- Travel Mall in 7 minutes

Ease the Pain

Make public transit less painful than using personal autos

- **Park n Ride facilities need to be adequately distributed to encourage use**

Downtown Light Rail

- **RTD Light Rail – designed to cross the 16th St. Mall at its midpoint**

Unique Vehicle for Mall

- 75 passenger
- Low, no-step floor
- 3 doors for rapid boarding
- Right-hand steer
- Environmentally friendly

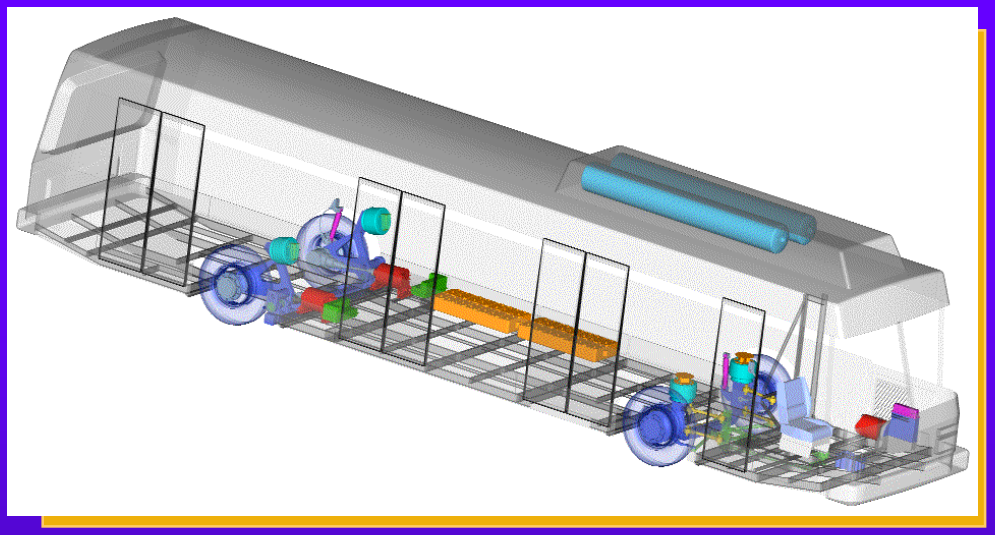
The Next Generation Design Criteria

- **Minimize maintenance**
- **Low floor, front-to-rear**
- **Justify added expense**
- **Move 50% more people**
- **Minimize pollution**
- **Design**

Move 50% More People In Same Time-Frame

- Make bus 5 ft. longer
- Utilize floor more efficiently
- Add fourth door
- Design fast-acting ADA ramp

Minimize Pollution



Develop CNG fueled hybrid electric drive

- **Two 220 HP electric motors**

  powered by:

- **26 lead-acid batteries**

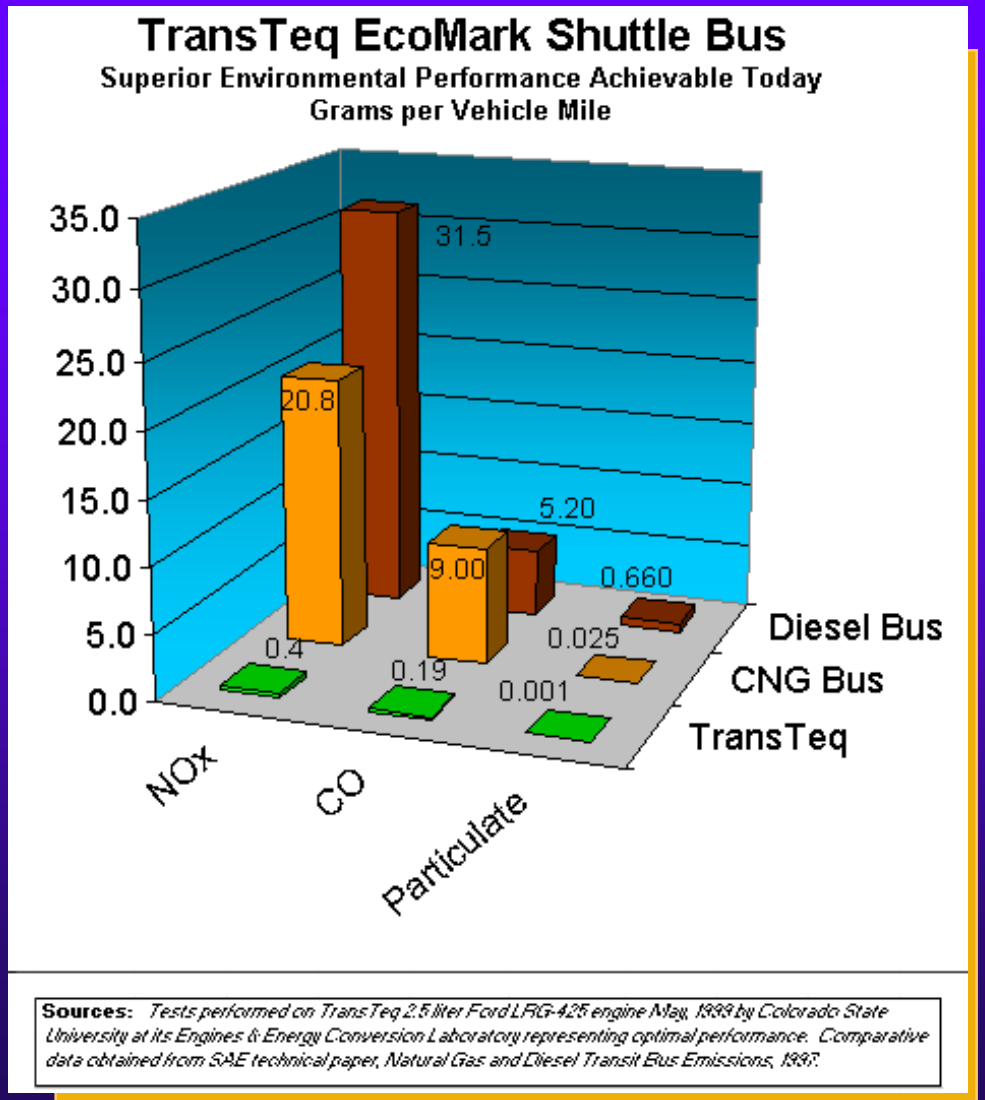
  continuously charged by:

- **Genset powered by four cylinder, 2.5 L industrial engine**

  fueled by:

- **CNG**

Minimize Pollution (cont.)



In Perspective

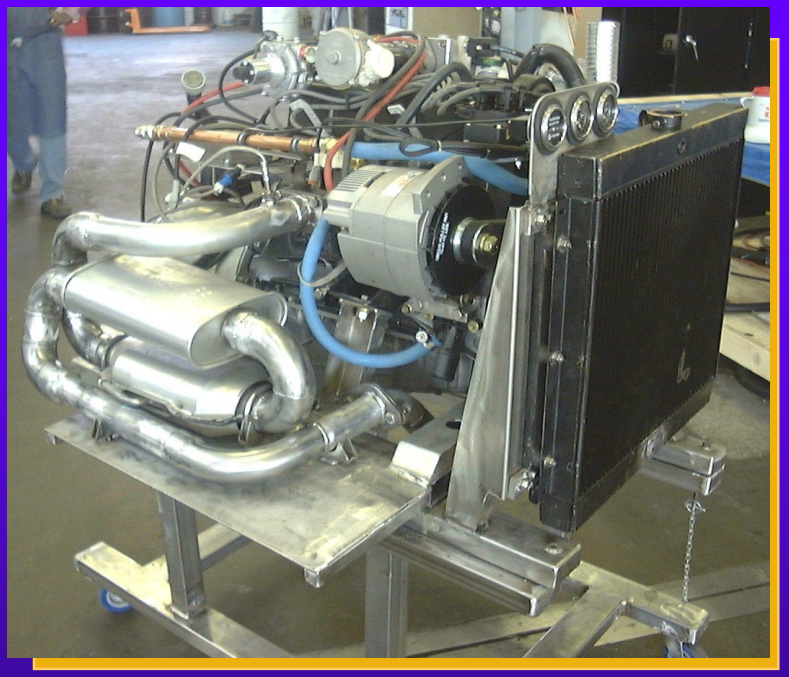
- 24,000 lbs. bus
- Can carry 17, 000 lbs. of passengers
- Generates less pollution than one new car carrying one passenger

TransTeq - Leadership In Hybrid Electric Technology

The EcoMark Bus Carries 116 Passengers using only a 70 HP Engine			
	Toyota Prius	Honda Insight	TransTeq EcoMark
Engine Power	70 HP	68 HP	70 HP
Hybrid Type	Parallel - Gas	Parallel - Gas	Series - CNG
Curb Weight	2,765 lbs	1,847 lbs	25,300 lbs
Gross Weight	3,650 lbs	2,200 lbs	42,700 lbs
Passengers	5	2	116

Minimize Maintenance

- Use smaller, less expensive engine
- Genset exchange – one man, one hour
- Hybrid technology eliminates need for transmission
- Stainless frame
- High-impact plastic body

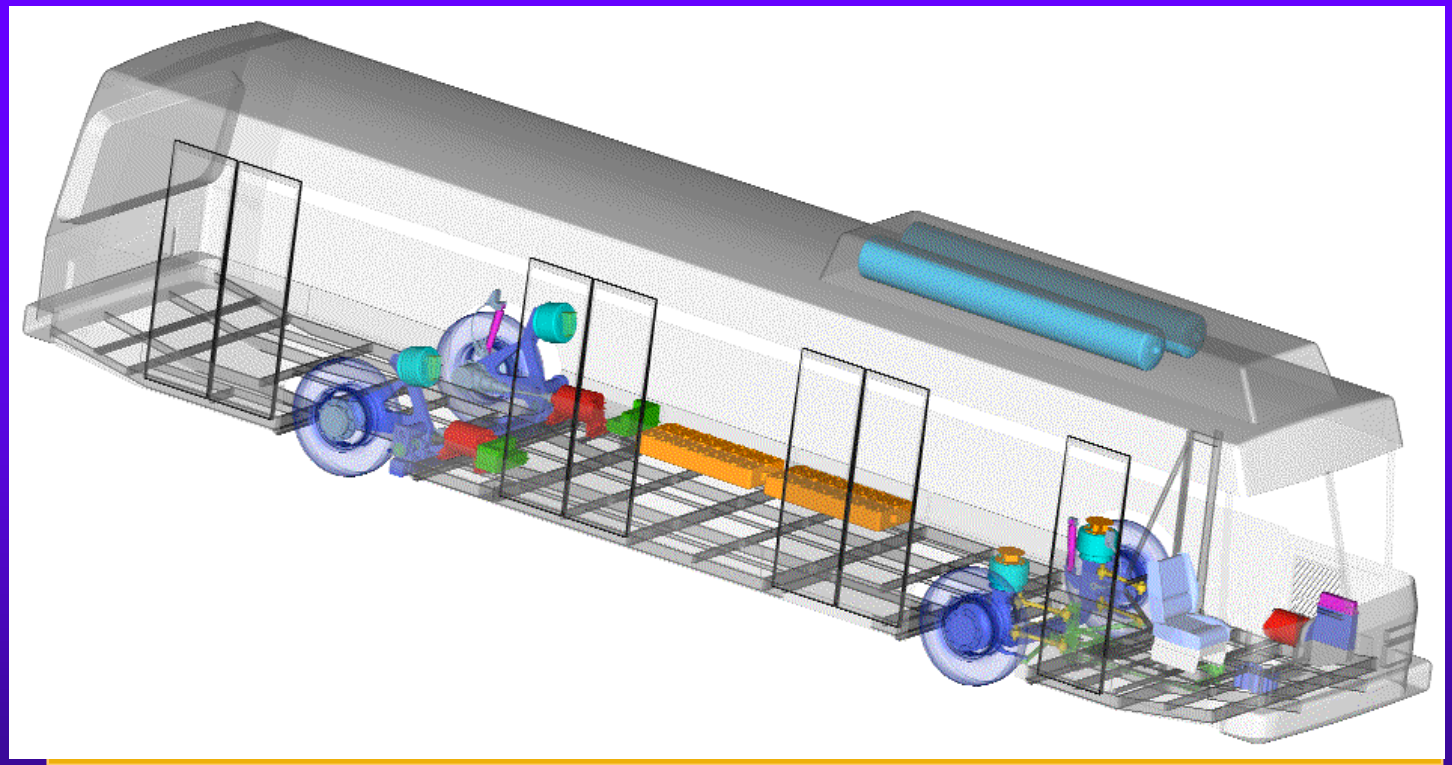


Low Floor, Front to Rear

- **Design independent rear suspension with electric motor in each rear wheel**

Justify Added Expense of a New Technology Bus

Design Bus to Accept Fuel Cell



- **Requires only substitution of fuel cell for genset**

Funding Requirement – Bus Must Complete FTA-STURAA Testing

- **EcoMark is the first hybrid electric bus to successfully complete required FTA Altoona testing for maintainability, reliability, safety, performance, structural integrity, noise, and fuel economy**

Recognition for Success

Transportation Sec. Slater

Energy Sec. Richardson

Governor Owens

Mayor Webb

Government and Private Industry – Partners in Success