

HYBRIDRIVE SERIES PROPULSION SYSTEM

HYBRID POWER FOR TODAY AND TOMORROW

More and more cities are saving on operational costs, improving fleet performance and reducing the adverse environmental impact of their transit fleets with BAE Systems' HybriDrive® series propulsion system. The robust, simple series hybrid system design offers transit agencies greater efficiency, higher performance, and more options than any other hybrid system configuration, and provides the only true path to an all electric vehicle.

“Our passengers recognize how much quieter and smoother the ride is...many find out how green the bus is and how much quieter it is when it passes them by, and how Metro is trying to do the right thing for both the riding public and the environment. When you have a happy passenger, you have a happy operator.”

– Andrew Skabowski, associate vice president of operations, Houston Metro



Did you know?

The BAE Systems series hybrid system is the only hybrid solution compatible with future zero emission technology, like trolleys, battery-powered and fuel cell vehicles.



GREEN YOUR FLEET. GREEN YOUR SAVINGS.

SIMPLIFY

- Series equals simple, simple equals less maintenance, less maintenance equals lower cost
- Eliminate vehicle transmission for a smooth, shift-free ride
- Lose belts, alternators and starters with optional electrically powered accessories

SAVE

- Realize significantly better fuel economy and lower operational costs with HybriDrive propulsion
- Achieve less brake pad wear through regenerative braking

PERFORM

- Optimize fleet performance and availability through customized service and support
- Increase torque for faster starts and better performance on hills
- Reduce noise pollution with quiet hybrid propulsion
- Maximize engine efficiency by utilizing the energy storage system to limit the rate at which engine power and speed are ramped
- Deliver power to the fleet with long-life, high-performance, lightweight, lithium-ion energy storage

ASK US TO CALCULATE YOUR OPERATIONAL SAVINGS!

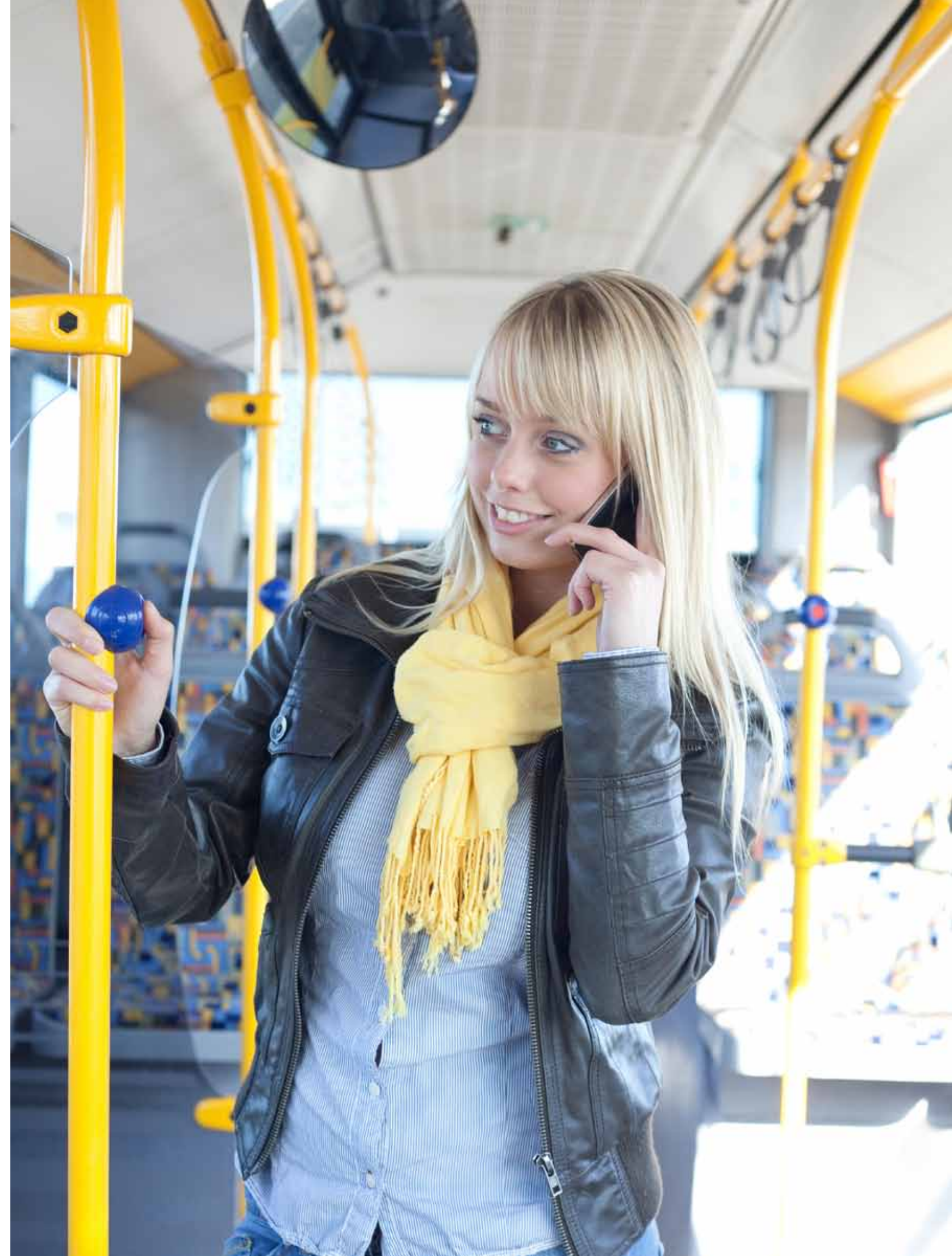
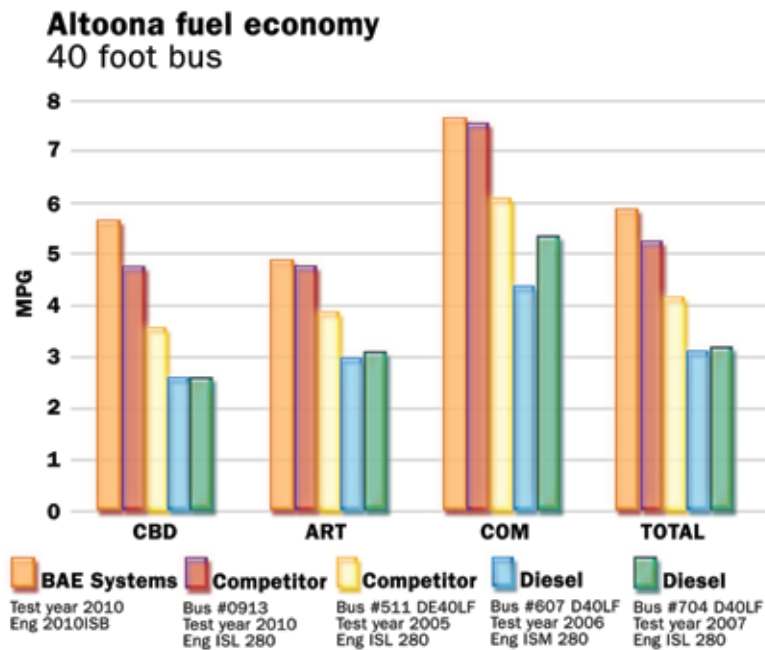
Did you know?
Altoona Bus Research and Testing Center study results show that HybriDrive fuel economy is noticeably better than alternative electric drive propulsion systems, making HybriDrive the best source of hybrid electric savings.

CHOOSE

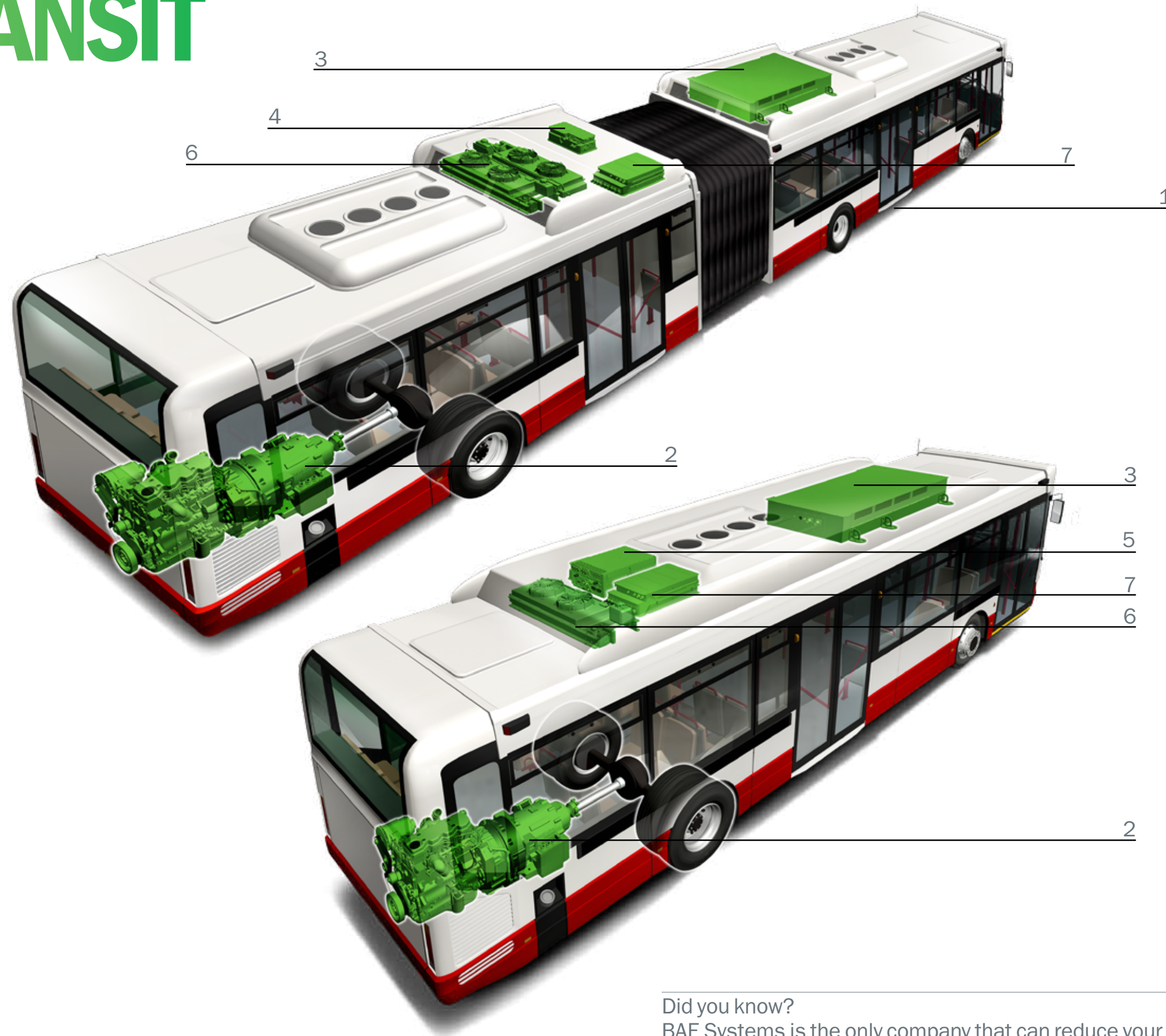
- Further improve efficiency and savings, and reduce maintenance with the new HybriDrive propulsion optional accessory power system
- Get hybrid power for even the largest articulated buses in the fleet while maintaining almost identical hardware to existing HybriDrive systems
- Available from a wide selection of vehicle manufacturers

GREEN

- Shut off the engine during operation at the depot to dramatically reduce noise for the whole neighborhood, with optional electrically powered accessories
- Drive the fleet further down the road to zero emissions with the only hybrid system designed to take it there



SIMPLY DESIGNED FOR TRANSIT



The unique design of the HybriDrive series propulsion system pairs simple functionality with state-of-the-art electronics controls. The series configuration eliminates the mechanical connection between the primary power source (traditionally a diesel engine) and the wheels. The traditional combustion engine turns a generator and the power flows in series from the generator to power control electronics, to batteries, to electric traction motors, and finally then to the wheels. The Power Control System (PCS) and System Control Unit (SCU) act as the brains of this fundamentally simple system design, optimizing energy flow to provide the highest level of propulsion efficiency and performance possible for the stop-and-go duty cycle of transit vehicles.

1.) BAE Systems HybriDrive articulated bus solution uses a higher powered motor/generator, the HDS 300, to accommodate the increased power demand of propelling a 60 foot vehicle. An upgraded propulsion control system manages the increased energy demand to support a sustained top speed of 65 mph on level road surfaces.

2.) The HDS 200 and HDS 300 propulsion systems are comprised of a Modular Traction System that can connect to a diesel engine. The generator supplies power to the electric drive motor and electric accessories. The electric motor powers the bus by turning the wheels, just like in a subway car. That means the bus accelerates smoothly; when the bus slows, the motor acts like a generator to recapture energy for later use.

3.) The Energy Storage System (ESS) uses a long-life lithium-ion battery to provide power during acceleration and store power during regenerative braking, making the bus more fuel efficient.

4.) The HybriDrive Accessory Power System (APS) Level 1 unit functions as an electronic alternator, completely replacing the conventional belt driven alternator. This electronic alternator provides more than enough electrical capacity to power all conventional electric loads, such as cooling fans and pumps, plus all hybrid cooling systems.

5.) HybriDrive Accessory Power System (APS) Level 2, supports full electrification of vehicle accessories. This unit provides all the benefits of APS Level 1 while also supplying enough power for the electrification of larger accessory loads (e.g. air compressors, power steering, and air conditioning) and enabling engine stop/start and electric vehicle (EV) modes.

6.) The optional HybriDrive Cooling Package (HCP) provides integrated, self-contained thermal management for the entire hybrid system and particularly supports the efficient use of APS Level 1 and Level 2.

7.) The Propulsion Control System (PCS) directs the power flow to the right place at the right time for increased efficiency and enables the use of electrically powered accessories.

Did you know?

BAE Systems is the only company that can reduce your fleet's fuel consumption by an additional 10 to 20 percent by utilizing electrically powered accessories. That's on top of the already significant fuel saving provided with a hybrid system!

MORE OEMS. MORE OPTIONS.

BAE Systems works with leading bus manufacturers across all types of heavy-duty transit platforms to offer customers maximum flexibility and commonality in hybrid electric propulsion and power management.

The family of HybriDrive propulsion platforms is growing and now offers customers more options, including:

- HybriDrive Daimler Orion buses,
- HybriDrive New Flyer buses,
- HybriDrive Gillig buses,
- HybriDrive Alexander Dennis Limited buses,
- HybriDrive Novabus buses,
- HybriDrive Irisbus Iveco buses.

BAE Systems offers more options and flexibility to customers by customizing the HybriDrive system for specific regional requirements as well. In New York City, HybriDrive propulsion was configured for exact acceleration needs specific to the curves of the routes. In San Francisco, a unique hill hold feature for better control on vertical terrain was added to the standard hybrid system. In London, the system was adapted to the double decker bus platform. In Houston, an auto-shutdown feature was designed to allow for better fuel economy in very hot weather. BAE

Systems has also adjusted its hybrid propulsion system in a number of cities to meet specific fuel economy goals.

Every transit property is different, possessing unique geographic, political, and social challenges. BAE Systems works with its OEM partners to design the perfect system for any customer in any city.



Did you know?

BAE Systems is the only company within the industry that allows each customer to shape their own service plan around their own specific needs.

SERVICE THAT FITS THE FLEET

BAE Systems service package is as unique as the fleets it supports. Flexible service offers transit agencies a range of options that can be deployed to match each customer's maintenance profile.

Fleet maintenance is made as convenient as possible through three flexible options:

- BAE Systems customer service technicians are deployed regionally to be available at any transit agency site whenever a service need might arise.
- Affiliated service centers exist throughout the country to accommodate HybriDrive propulsion service and repair, coordinated by BAE Systems service technicians.
- Training programs offered allowing customers to perform in-house maintenance, as well as providing technical support and aftermarket spares where needed.

Preferred service providers can also be readily accommodated.

And our HybriDrive flexible service provides the tools to improve overall fleet performance

- Service network
- Technical support
- Training
- Diagnostics
- Service contracts

Did you know?

BAE Systems is partnering with more OEMs to power more fleets in more cities with HybriDrive series propulsion.

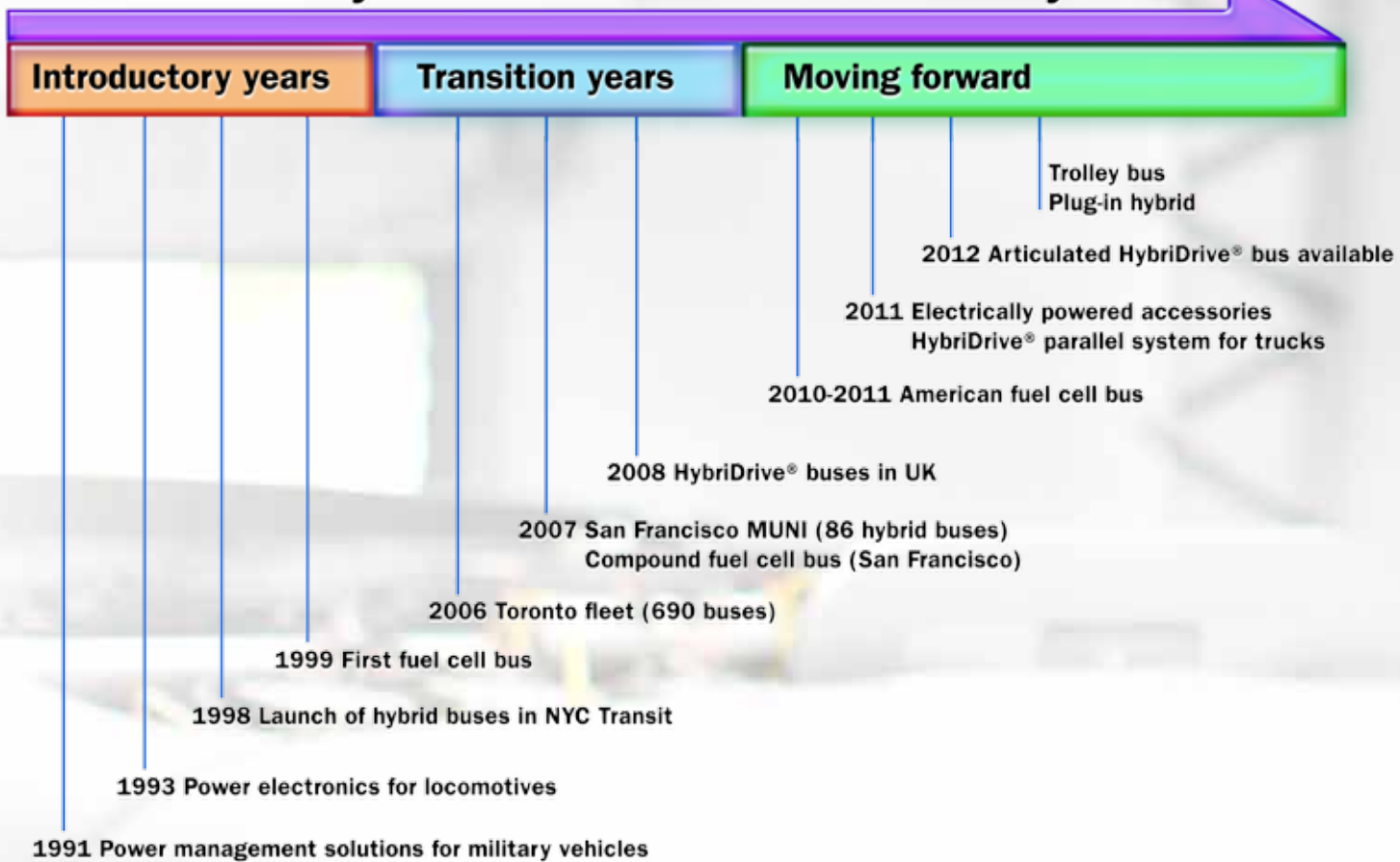


POWERING INTO THE FUTURE

BAE Systems has led the hybrid transit industry in innovative propulsion solutions for over 10 years, and is currently designing systems that will propel its fleet customers into the future of clean transit.

From hybrid-electric, to fuel cell propulsion, to fully electric power, BAE Systems is driving it.


Evolution of HybriDrive® Products at BAE Systems



"... We wanted a true bridge to fuel cell/cleaner technologies and this lets us make those changes when they are available."

- Marty Mollera, chief of climate action and greening, San Francisco MUNI





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