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von Stefan Hofstetter (SP)
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Der Stadtrat wird gebeten zu prüfen, wie er seinen Einfluss dahingehend geltend machen kann, dass bei der Beschaffung von Motorfahrzeugen künftig sauberere Hybridfahrzeuge neuester Technologie berücksichtigt werden statt der heute üblichen Diesel- bzw. Ottobetriebenen Busse und PWs.

Begründung

Die Entwicklung von Hybridfahrzeugen hat heute einen Stand erreicht, dass sich der Einsatz auch ökonomisch rechtfertigt. Es ist an der Zeit, dass die grossen Betreiber von Busnetzen diese Technologie födern und Vorreiter sind für mehr saubere Luft. Die wesentlichen Vorteile von Hybridfahrzeugen sind kurz zusammengefasst: (a) der Verbrennungsmotor arbeitet bei konstanter Last und Drehzahl, d.h. bei optimalem Wirkungsgrad, ist konstant weniger Laut, usw. (b) durch den Wegfall der mechanischen Transmission wird die Gesamtstruktur einfacher, die Wartung und der Unterhalt sind einfacher, die Abgase lassen sich besser filtern etc.

Vor kürzerem wurden neueste Busse mit Hybridantrieb auch hierzulande präsentiert und die Presse hat davon berichtet. Umstehend kopierter Artikel aus "IEEE SPECTRUM SEPTEMBER 2000" schildert den Einsatz von solchen Bussen in New York City. *Originally developed to reduce air pollution, hybrid diesel-electric buses are turning out to have an additional advantage over conventional vehicles: they are less expensive to operate.*

Die Stadt Zürich könnte durch den Einsatz fortschrittlicher Technologien das Bild einer zukunftsgerichteten, innnovativen Komune unterstreichen, einen wichtigen Beitrag für bessere Luftqualität leisten und gleichzeitig auch finanziell profitieren.

New York wants more hybrid buses on the city's streets

Originally developed to reduce air pollution, hybrid diesel-electric buses are turning out to have an additional advantage over conventional vehicles: they are less expensive to operate. At any rate, that's been the experience of New York City's Metropolitan Transit Authority (MTA), which has been operating five of the buses in an experimental program for over two years now. The savings have persuaded the MTA to put 125 more hybrid-electric buses into service by the end of 2001 and to budget for another 250 in its next five-year capital plan.

It looks like an ordinary New York City transit bus, and carries just as many passsengers, but this one is powered by a diesel-electric unit. Its HybriDrive power train, from Lockheed Martin Control Systems Inc., of Johnson City, N.Y., relies on a diesel engine driving an electric generator, which, in turn, powers ac motors in its wheels.

Besides lower operating costs, the bus also emits half the nitrogen oxides and only 1 percent as much total hydrocarbons as the city's conventional diesels.

In the words of Al O'Leary, the Transit Authority's vice president of public affairs, "We got these buses to reduce the emissions coming from our bus fleet, but once we got them on the road, we realized that they could save a lot of money—especially compared with compressed natural gas." (For safety reasons, it costs US $10–20 million to retrofit a diesel fueling station to accommodate gas-powered buses, which the MTA is also testing.)

The hybrids cost less than conventional diesel buses to operate for several reasons: fuel economy is 50 percent greater, resulting in lower fuel costs; the direct-drive system has no transmission to go bad, so that maintenance costs less; and regenerative braking means less wear on brake shoes, further cutting maintenance.

The full-sized (12.2-meter-long) transit buses can accommodate 40 passengers sitting and 37 standing. They rely on HybriDrive propulsion technology from Lockheed Martin Control Systems Inc., Johnson City, N.Y. The system includes an engine/generator set, an ac motor coupled directly to the wheels, and a traction-control system to both deliver energy to the wheel motors and recover energy on braking.

The buses are driven entirely by their electric motors—the diesel engine itself never drives the wheels. A battery, which is charged by the generator, provides extra power for acceleration and hill climbing, in effect confining the engine to a fairly narrow operating range where its efficiency is high and its emissions minimal. The battery also accepts energy from regenerative braking.

Output from the generator, which is directly coupled to the diesel engine, is 187 kW. During deceleration, the traction control system takes energy from the motor, causing it to act as a generator and exert a negative torque on the wheels.

Coupling the propulsion motor directly to the wheels makes a rear-axle transmission unnecessary. With that bulky component gone, the floor of the bus can be as much as half a meter lower than it is on conventional buses, making it much easier for small children and the elderly to get on and off.

ALL-ELECTRIC BUSES AREN'T DEAD YET

Meanwhile, testing has begun on a full-sized transit bus powered entirely by a battery. Built by Nova BUS Corp.'s Transit Bus Division, St. Eustache, Québec, the bus is driven by a motor from General Electric Co., Schenectady, N.Y., which also provided the controllers, inverters, hardware and software interfaces, and the energy-management system. The battery is a 320-kWh zinc-air pack made by Electric Fuel Corp., of Iselin, N.J., and Beit Shemesh, Israel. What makes it noteworthy, boasts Electric Fuel, is that 320 kWh "is enough energy for the bus to run all day, even while operating with air-conditioning and a full load of passengers."

The development of the bus was funded jointly by the United States Federal Transit Administration and the Binational Industrial Research and Development (BIRD) Foundation, which is a cooperative venture of the United States and Israel.

Support also came from the Regional Transportation Commission of Clark County, Nevada, where further testing will be conducted under field conditions.

The battery has a specific energy of nearly 200 Wh/kg. Unlike most electric vehicle batteries, it is not rechargeable in the usual sense. Rather, it is "refuelable," meaning that once it has been discharged, its spent zinc electrodes can be recycled [see "German Postal Service begins field test of zinc-air batteries," EV Watch, *IEEE Spectrum*, March 1996, p. 16]. In point of fact, this is an advantage for fleets, since swapping out a cassette of spent electrodes and replacing it with a fresh set takes much less time than recharging would. On the other hand, the technology is a poor match for the needs of individual vehicle owners because it requires special equipment.

Because the battery cannot accept high currents, it is not by itself compatible with regenerative braking systems. For that reason, the bus carries an auxiliary 20-kWh nickel-cadmium battery, which can accept the generated power. The Ni-Cad battery also provides extra power for passing and climbing hills. In the next version of the bus, Electric Fuel hopes to replace the Ni-Cad battery with ultracapacitors—units with hundreds or thousands of farads of capacitance.

MICHAEL J. RIEZENMAN, *Editor*
With reporting by WILLIE D. JONES
Consultant: Victor Wouk
Victor Wouk Associates