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HYBRID BUSES IN THE REAL WORLD

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Hybrid Buses in the Real World

□ Background

- In the fall of 2009, the University at Albany received a grant to purchase hybrid buses.
- Submitted as part of the Capital District Clean Cities Coalition via NYSERDA under the ARRA (stimulus) funding.
- The University received approximately \$400,000 to cover the incremental cost of purchasing 5 hybrid vehicles as well as funding for administrative and training costs.



Hybrid Buses in the Real World

▣ Bus design

- The buses were designed from the ground up by Mathews Bus using Thomas C2 engines.
- The University chose to go with school bus type hybrids rather than transit type hybrids due to capacity needs and cost factors. We also requested buses with wheelchair lifts.
- To our knowledge, only 6 buses of this type are operating in New York, 5 on the UAlbany campus and 1 in the Monroe Central School District.



Hybrid Buses in the Real World

□ Bus deployment

- The buses were deployed in two phases.
- The first two buses began their runs in December, 2010.
- The remaining three buses began operating in June, 2011.



Hybrid Buses in the Real World

▣ Mileage performance:

- The hybrids are currently averaging 7 mpg.
- This is an improvement from the average of 5 mpg for comparable diesel buses.
- This equates to a savings of over 3,000 gallons of diesel, 67,540 pounds of CO₂ (almost 34 tons) and \$10,160 in cost savings to date.
- The preliminary data shows that mpg decreased significantly during the summer months of operation.

Hybrid Buses in the Real World

Hybrid fleet mpg:

Date	3/11	6/11	9/11	12/11
Ave MPG in the quarter	7.28	8.03	5.77	8.16
Ave MPG, cumulative	7.28	7.7	6.2	7.1
Number of buses deployed	2	2	5	5

Hybrid Buses in the Real World

▣ Advantages of hybrids:

- Better fuel performance.
- Reduced emissions.
- Meet EPA emission standards.
- Larger capacity.
- Air conditioning works wonderful in the summer.
- Runs are conducive to hybrids, a low speed; stop and start run.



Hybrid Buses in the Real World

▣ Advantages of hybrids:

- Aesthetic appeal; nice, sleek look, signage indicating it as a clean vehicle, does not leak random fluids.
- Consumer appeal, some charters that have specifically requested the hybrid for their trip.
- Hybrids do run quieter but in our models there is only a subtle difference. Since our models are a school bus design with a front engine and air brakes, they don't go totally silent at a light like a hybrid car might.



Hybrid Buses in the Real World

▣ **Disadvantages of hybrids:**

- ▣ Heating in the winter. The engine block does not generate heat like the diesel buses; a supplemental heating element is a desired improvement.
- ▣ Reliability issues due to problems with the mechanical systems. None of these problems are the result of the hybrid piece but rather due to multiplexing.
- ▣ Replacement batteries costly.

Hybrid Buses in the Real World

- ▣ **Disadvantages of hybrids:**
 - Training of drivers and mechanics required.
 - Acceleration differences. Hybrids will not accelerate quickly when gunning the engine but will pause. Hybrids are not scheduled on runs where quick acceleration across high traffic lanes is necessary.
 - Deployment was such that the hybrid fleet is similar in age and will need to be replaced around the same time (consequence of the terms of the grant).

Hybrid Buses in the Real World

- ▣ **Alternative to hybrids:**
 - Propane
 - Compressed natural gas
- ▣ **Why these were not an option:**
 - Lack of fueling stations near the campus.
 - Cost and administrative requirements to establish a fueling station on site.
 - Since the time of the grant, these obstacles have somewhat diminished. Some fuel providers will now provide infrastructure at a greatly reduced cost or with little upfront capital and stations may not need to be made available to the public.
 - Other Clean Cities Coalition members who bought either propane or CNG vehicles have reported good results in terms of their operation, environmental and economic benefits. The University is still considering a CNG bus in the future.

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- ▣ **Use of Clean Cities Coalition:**
 - Funding for this project would not have been possible without the presence of the Clean Cities Coalition.
 - The Capital District Clean Cities Coalition maintains an active branch with quarterly meetings, access to resource and networking information and partners with NYSERDA to facilitate grant opportunities.
 - There are several Clean Cities Coalition groups throughout the country. We would recommend any college and university to join their local branch.
 - More information on these can be found at: <http://www1.eere.energy.gov/cleancities>.



Hybrid Buses in the Real World

▣ Questions?



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