



Air Quality Briefing Note

Date: March 2012
Agency: The Beckett Family
Subject: Family Vehicle Becomes Teaching Tool for Electric-only Conversion

Lara Beckett has long been interested in owning an electric vehicle. Beckett's interest took the form of a project in the fall of 2006 when she bought a do-it-yourself kit to convert a small pickup truck to an electric-only vehicle that would meet her day-to-day travel needs. The goal was to eliminate one more ICE-age (internal combustion engine) vehicle from the road, thereby reducing GHG emissions and improving air quality. An additional goal was to prove to skeptics that electric-only vehicles could be successful in a northern climate.

There are several options available to would-be owners of an electric vehicle. Such a vehicle can be purchased new, though this is typically an expensive option. An electric vehicle can also be purchased from owners who have converted it themselves, but few owners who have done this work want to part with their electric vehicle. With both of these purchasing options unavailable to Beckett, her remaining options were to convert a vehicle by doing the work herself or find someone with the knowledge to do it for her.



Beckett's research on electric vehicles led her to discover the Vancouver Electric Vehicle Association (VEVA), an organization of passionate electric vehicle advocates who shared their knowledge and advice. VEVA led her to find Canadian Electric Vehicles, a Vancouver Island company that supplies do-it-yourself kits to convert high-emission gas-powered vehicles to zero-emission electric vehicles. If she could source an appropriate vehicle, the kit would provide all the parts and manuals needed as well as provide access to an expert for advice and support. This option would sidestep any costly errors from starting the project from scratch. Beckett purchased a conversion kit and set about finding someone to do the work of converting a 1991 GMC Sonoma.

She asked Randy Petrovic, an automotive teacher at College Heights Secondary School, to lead the conversion project by using it as a teaching tool in the classroom. This approach had multiple benefits. It offered the opportunity to introduce

students to this technology, perhaps even inspiring them in their future vehicle choices. Several classes of students worked on or saw work being done on the vehicle. It also kept labour costs down while having a knowledgeable professional overseeing the project. The down side of the approach was how long it took. When completed by a professional outside of a classroom learning environment, such a project would take only about three weeks; the school could only work on it as a side project, which took three years.

A potential barrier for the project was the issue of winter weather and cold affecting the performance of the batteries and the ultimate range of the vehicle. Beckett lives a ways outside of town, and there is little or no public infrastructure for recharging vehicle batteries away from home. Additionally, battery performance must allow the vehicle to reach 100 km/hour on the highway as quickly as possible from a side road in order to be safe while driving among other non-electric vehicles.

The truck was converted to drive with lead-acid batteries in July 2009. The project revealed that lead-acid batteries are cost effective, but limited in colder weather for achieving highway speed. The Beckett family parked the converted truck during the next two winters. Lead-acid batteries would be an option if the vehicle owner lived within a city and did not have to go more than 60 km/hour. In the spring of 2011 the truck was switched to lithium-ion batteries, making the electric-only vehicle a viable year-round option. The only limiting factor with lithium-ion batteries is that temperatures of -20C and colder affect the operation of the controller.

The converted truck has since become Beckett's family's first-choice vehicle. They continue to bring the truck into the school at the request of the teacher to show it to new classes of students.

Additional information:

- Vancouver Electric Vehicle Association website: www.veva.bc.ca
- Canadian Electric Vehicles website: www.canev.com
- College Heights Secondary School website: www.chss.sd57.bc.ca