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Vermont
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Driving Toward a Sustainable Transportation Future

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Plagued by crumbling infrastructure and increasingly tight state and federal budgets, forward thinking investments for the transportation sector can seem impossible in the current funding climate. It is not a zero sum game, though, and goals of financial and environmental sustainability can no doubt be achieved together. A new approach to transportation planning and management is needed: one that achieves greater sustainability through increased efficiency and a systems-approach. Chronic transportation funding gaps provide a unique opportunity to reconsider our historic sources of infrastructure funding. Increasing and stabilizing revenue is key to ensuring optimal management of transportation projects, especially at a time when there is little political will to raise fuel taxes.

To address these budget shortfalls, we suggest an entirely different approach to transportation finance: a Transportation Efficiency Utility (TEU), modeled after successful Energy Efficiency Utilities (EEU). In the EEU model, a system benefit charge is assessed on each rate payers' electric bill. This money is then pooled into a common fund for the entire utility service area. These funds are used to implement energy efficiency and weatherization programs developed through least-cost procurement practices. In fact, the city of Austin, Texas, already assesses a transportation user fee on buildings in the city. Residents and businesses are billed for their use of the system, similar to other utility fees, such as those for water and electricity.

In the US, transportation energy use is second only to energy used for electric power generation. Yet the programs, policies and tools from electric energy efficiency utilities are rarely known or understood by transportation professionals. The parallels between these two industries are great and with the emergence of electric powered vehicles the need for transportation professionals to understand the history and guiding principles of this industry become relevant. A TEU will help to quantify and standardize accounting of transportation costs and facilitate long term least cost planning. Such planning is not possible in the current system, a maze of subsidies that grossly undervalues externalities. Where energy efficiency programs are well regulated and mature, significant savings have been achieved. Vermont has turned underlying electric load growth negative and the state's EEU *Efficiency Vermont* saved ratepayers $314 million between 2009 and 2011.

A TEU can be financed through a system benefit charge on regulated sources of energy: electricity and natural gas. Although current penetration rates of motor vehicles using these fuels are low, the foundation for a system to develop over the next 10 to 20 years can be put in place now. With highway infrastructure at risk, an excellent window of opportunity now exists to identify appropriate TEU funding mechanisms. The bulk of this transportation system benefit charge would be directed to state and federal DOTs to contribute to overall maintenance and infrastructure projects, and the remainder would go to a state or locally operated TEU. Similar to an Energy Efficiency Utility, a Transportation Efficiency Utility would assess and implement transportation efficiency programs, improving the overall system functionality and efficiency for all users.

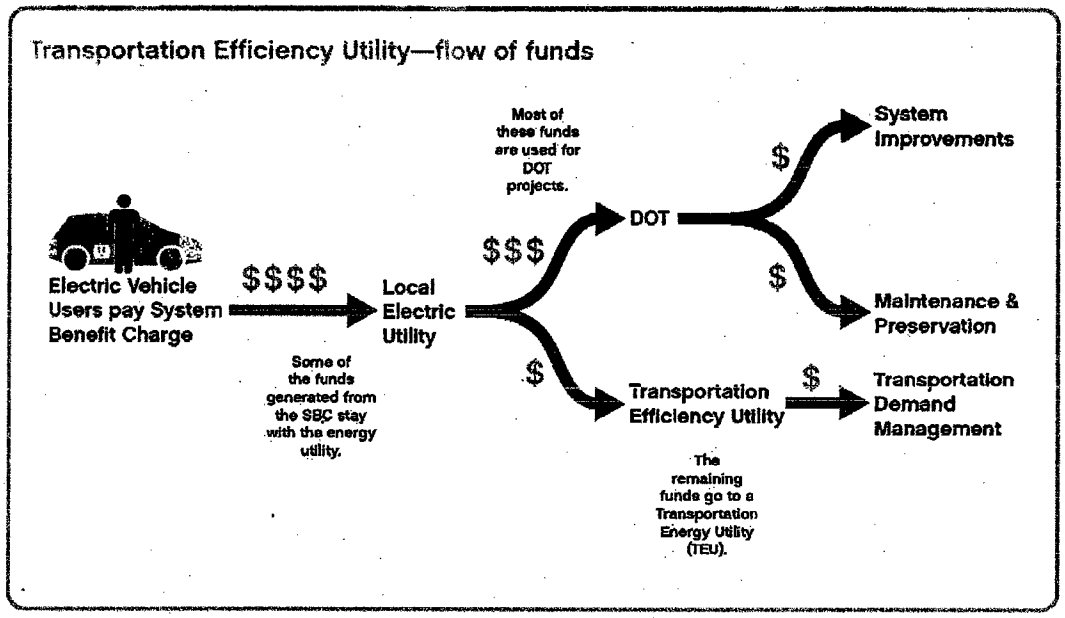

Figure 1. Proposed Transportation Efficiency Utility Process. Arrows indicate potential flow of funds.

Like the electric sector, much of transportation planning is driven by demand management and infrastructure is generally built to accommodate peak demand. However, unlike transportation, the electric utility industry is regulated, meaning that energy prices, service reliability, and, in the case of privately held utility companies, profits, are negotiated between utilities and state and federal regulators. Once removed from the political realm, true long term, least-cost planning is possible, much to the benefit of society.

While the meaning of *transportation efficiency* is still evolving, *efficiency* generally refers to performing the same amount of work (or providing the same level of service) with less energy. Within transportation, possible efficiency measures include behavioral changes such as a mode shift away from single occupancy vehicles, and technological factors, such as increased vehicle fuel efficiency, and fuel switching from conventional fuels to compressed natural gas, electricity, and biofuels. An important aspect of transportation efficiency is reducing energy use and environmental impact while maintaining mobility for all users.

With the emergence of viable electric vehicle technology and the growing presence of charging stations, the blending of the transportation and electric sectors is already happening. Bringing electric efficiency practices to travel behavior and consumer purchase decisions will help us understand how this large new mobile appliance can be incorporated into energy portfolios. There are many Travel Demand Management, Transportation Systems Management, and modal programs that provide single-occupancy alternatives and improve vehicle efficiency, but there is no systems-based approach that combines that body of technical work to behavioral economics, consumer marketing, and utility scale program delivery.

In addition, a TEU will address long-term funding issues by providing a stable and equitable funding source through a system benefit charge assessed to the energy used within the transportation sector. Due to the relatively low cost of electricity and the high efficiency of EVs, energy costs can be dramatically reduced for users of these vehicles. Revenue for transportation agencies derived from user fees can actually be increased while maintaining affordability for consumers. According to the Federal Highway Administration, approximately $481 billion was spent in 2010 nationwide on taxable motor

fuel. To accomplish the same level of travel powered by electricity would have cost less than one-quarter: $112 billion at average 2010 residential electric rates ($0.11 / kWh) and an electric vehicle efficiency of 0.34 kWh / mile.

The nation's reliance on federal, state, and local motor fuel taxes to support transportation systems has changed very little in the past century. Fuel taxes make significant contributions to infrastructure funding, but they have not kept pace with the rate of inflation. As more efficient vehicle technologies reduce customer costs at the pump, infrastructure revenues have slowed. The Congressional Budget Office estimates that Corporate Average Fuel Economy (CAFE) standards will reduce fuel tax revenues by 21% by 2040. Several comprehensive national and state studies have concluded that these expected funding shortfalls must be addressed if transportation systems are to continue providing for the movement of people and goods. As EVs and compressed natural gas vehicles become more widespread, transportation-specific tariffs or system benefit charges could become an important source of transportation sector revenue. Longer-term refinements could take advantage of time-of-use rates and / or utility smart grid infrastructure as a means of encouraging better economic and transportation system efficiency through peak demand or peak travel demand adjustments to tariffs.

As of October, 2014 the 430 plug-in electric passenger vehicles registered in Vermont are estimated to be generating over $7,000 in EEU charge annually. As the numbers of plug-in vehicles increases the amount of EEU charge generated by this big mobile appliance will continue to increase. In jurisdictions that have system benefit or EEU charges, EVs are already generating revenue for electrical efficiency programs, although not transportation. We are suggesting using this existing revenue mechanism to direct funds to DOTs.

Pricing strategies and principles can encourage best practices and ensure optimal system operation. A TEU is well poised to implement such practices which are largely absent in the current transportation system. Electric utility rates are often constructed considering several key principles. These principles attempt to balance multiple interests (investors, rate payers, utilities) and goals (efficiency, fairness, public interest) while ensuring a reliable and affordable energy supply. Adapted for transportation, a potential list of funding or fee-setting principles includes:

- Raises adequate and stable revenue for transportation funds
- Captures all costs of the transportation system (long term revenue adequacy)
- Practical to implement and easy for drivers to interpret
- Encourages energy conservation (static resource efficiency)
- Encourages innovation in responding to demand-supply imbalances such as congestion or new development (dynamic resource efficiency)
- Fairly allocates the cost of maintaining transportation infrastructure

We estimate that a national TEU system benefit charge of 2.4¢ / kWh could generate enough revenue to make up for the lost gasoline tax resulting from this switch in vehicle type (Table 1). Even with this proposed system benefit charge added to current electric rates, annual fuel costs to electric vehicle users would come to less than half of those required for operation of the average conventional fuel vehicle: $457 for electricity vs. $1,300 for gasoline[1].

[1] Calculations assume an annual VMT of 11,000 for both vehicles, electricity prices of 11.55¢ / kWh (national average from EIA) + a transportation system benefit charge of 2.4 ¢, an electric vehicle efficiency of 0.34 kWh / mile, gas price of $2.83 / gallon and a conventional vehicle fuel efficiency of 23.8 mpg (national averages from RITA).