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The Greening of Transportation 2: Sustainability via Alternative Fuels

Executive Summary

On October 5, 2010, the Northwestern University Transportation Center presented the second in a series of workshops investigating the efforts of making transportation more environmentally focused. Considering that a variety of alternative fuels are beginning to penetrate all transportation modes, this workshop focused on the market realities of providing these alternatives in a viable form, the underlying economics, financial risks, and challenges moving forward.

Opening with an informal survey to gauge the audience's prediction of the market penetration of hybrids and electric vehicles, **Donald Hillebrand (Argonne National Laboratory, US Dept. of Energy)** elaborated on world expert opinion regarding the increasing need for alternative fuels to replace oil as a primary energy source for transportation. He presented formalized survey results showing slightly more promise than the audience response figures. However Hillebrand's recent experience interacting with industry experts in vehicle manufacturing indicates that alternative fuel vehicles will have very little market penetration.

Pointing to examples from the Argonne NL transportation sector work program, the laboratory has invested in assessing both alternative-energy vehicle life cycle and infrastructure needs. These efforts illustrate the fact that the current state of technology is limiting, but there is optimism in budding technology

Keshav Sondhi from FedEx Trucking Division provided some additional optimism discussing the flexible approach that FedEx is using for approaching the environmental footprint issue.

FedEx has an overall goal of reducing its carbon footprint. In the past five years, the proportion of alternative fuel vehicles within their fleet has grown significantly. They are currently evaluating various technologies that suit their optimal circumstances such as battery-electric vehicle deployment in urban environment and hybrid-electric vehicles for suburban use. However, the market segment encompassing the largest portion of their carbon footprint is the extended distance or rural routes. To date, no adequate alternative fuel technology exists to meet these needs.

Bob Sturtz from United Airlines discussed the market potential of bio-fuels in the aviation sector. Considering that the top four US airlines consume well more than half of the US jet fuel, a large market potential exists for competitive bio-fuels. However, alternative fuels need to maintain high operational reliability, stable source availability, and competitive cost structure for a switch to occur. Additionally, bio-fuels need to be readily substitutable with little to no engine modification required. Lastly, these fuels must demonstrate a measurable environmental benefit.

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Recent flight tests by United Airlines (originally flown as Continental Airlines) indicate that algae-based fuel may perform better than conventional fuel.

Sturtz also pointed to a variety of activities that are focused on the development of alternative aviation fuels. Partnering with military and civilian aviation stakeholders, United Airlines as well as many others, is actively included on numerous organizations, working groups and international agreements working toward all levels of fuel deployment.

Mike Ellis, of EA Logistics, followed that presentation with a discussion of the performance, drawbacks, and misconceptions associated with a variety of bio-diesel blends in trucking applications. Results from road tests indicate that there is very similar performance between both conventional diesel and bio-diesel fuels with some very minor negative effects. Engines that are transitioned from conventional diesel experience deposits, whereas new engines that burn only bio-diesel do not.

Drawbacks and risks of bio-fuel usage include the diversion of land that would otherwise be used for other purposes, the subsequent effects on prices of food products that are displaced, and the potential for deforestation to clear land for fuel production. However Ellis maintained that these costs are associated with the benefits of reduction in greenhouse gases and dependence on foreign oil. With increased use, the market viability will increase the innovation associated with the production of such fuels. Finally, the land use, crop diversion, and deforestation issues will need to be managed to mitigate risks.

Speaking to meeting alternative fuel infrastructure needs, **Josh Milberg, First Deputy Commissioner of the City of Chicago, Department of Environment** presented a positive message of the City's commitment to increasing environmental standards of living. The environmental policy of the Daley administration resulted in reporting the recent strategy, the Chicago Climate Action Plan. This work surveys and documents the sources of emissions throughout the city and identifies a set of strategies and actions to address needs for reduction.

Additionally, Milberg presented the City of Chicago's transportation energy and environmental policy that focuses on developing infrastructure that supports low emission vehicles including the electric-vehicle charging stations across the city. The current plan is to invest in a combination of independent charging stations (analogous to current gas stations) and charging stations co-located with major shopping centers and grocery stores. A secondary goal is to ensure social equity in the deployment of electric vehicle support infrastructure.

Summary / Conclusions

The general overall message indicated that in whatever mode of transportation, adaptation to alternative fuel sources is challenging, but progressing. Current fossil fuels are an incredibly portable, safe, inexpensive, and effective. Any alternative fuel that attempts to provide a sustainable energy source that reduces the carbon footprint will need to be competitive on all of these aspects by demonstrating the source stability, operational reliability and market viability.

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