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During the past 18 months, your campaign and now administration has repeatedly highlighted the goals of:

- 1) preserving the American manufacturing base,
- 2) striving for energy independence, and
- 3) protecting the environment.

As the economy has further deteriorated, bold stimulus measures have been taken with the aim to revive not only the American economy, but also indirectly support our trading partners around the world. With the funds approved by Congress, the challenge has become directing this money to ensure priorities are met while stimulating economic recovery. Any number of proposals could aim to further progress in one of the key areas your administration has targeted; however, successful programs should span all areas. Furthermore, there has been growing discontent with supporting the banking sector, as many Americans feel money is being poured into a black hole. As a consequence optimal measures should also be highly visible to ordinary citizens.

In an effort to achieve this combination of goals in a tangible way, consideration should be given to this proposal to replace all school buses in the country with more environmentally friendly and energy efficient models. This effort would result in demand being placed on the American manufacturing base, ensuring its future in the country. Additionally, moving away from fossil fuels would lessen America's dependence on foreign oil. Lastly, the environmental benefits of such a move would be difficult to replicate through any other means.

There are currently around 480,000 school buses on the roads in the US¹, providing over 50 million passenger trips per day², making the student transport system more than 2.5x the size of all other forms of mass transportation. Of these school buses, an estimated 75,000 were built before 1990³ - the age of the fleet is significant because as updated pollution and safety regulations have been enacted, they have allowed for older models to be grand-fathered in, avoiding the need for compliance with rising standards. It is estimated that 95% of the US school bus fleet is powered by diesel⁴, and in total the fleet releases an estimated 11 million tons of greenhouse gases⁵ per year. These emissions are not only harmful to the children riding on the buses, but also contribute to global warming. The environmental impact of the American school bus fleet is undeniable, however up until now little consideration has been given to what steps can be taken to alleviate the situation.

Although, there have been significant advances in car propulsion systems, ranging from electric, and hybrid, to hydrogen fuel cell, the progress for larger vehicles has proven slower. While American manufacturing companies are largely playing catch-up with eco-friendly cars, a concerted push in the bus and truck category could establish leadership in this vital sector⁶. It has been proposed that hydrogen fuel cell technology be the preferred method of powering buses⁷ in an environmentally friendly manner. However, this brings with it a variety of challenges, such as a hydrogen distribution system⁸. While the implementation of such a distribution system could further stimulate economic activity, that is out of scope for this proposal. Instead, funding should be made available on an equal opportunity basis to any technology, which meets the basic criteria of low emissions, suitability in large vehicles, and ease of implementation.

Through ensuring that the best suited technology is taken forward, America has an opportunity to lessen its dependence on foreign oil. Currently, the average school bus achieves 8 – 11 miles per gallon⁹, and drives an estimated 12,000 miles per year¹⁰. This results in an oil consumption of 960m barrels per year, equating to 15.4% of the nations finished motor gasoline imports¹¹. By switching these buses to alternative fuel sources, the dependence on foreign oil could be significantly lessened. This achieves not only a policy agenda item, but also aids in ensuring America's ability to thrive in a world where oil is becoming an ever scarcer resource.

Although a variety of propulsion systems must be considered and investigated, already existing natural gas technology could prove suitable in this application. It can be used to determine an appropriate level of government investment for this proposal. Currently, natural gas buses cost an average of \$35,000 more than a diesel equivalent¹². This implies that to upgrade the fleet to the best in class available technology would cost \$16.8bn more than simply replacing buses with their diesel equivalents when they are retired in the normal course of their life. As such, through making \$16.8bn available to local governments, they would have the funding to replace their buses with these natural gas models. Additionally, by stipulating a set of requirements for these new buses, which would be technology neutral but targeted on the objectives outlined, this \$35,000 premium per bus would spur research into other alternatives, as well as manufacturing efficiencies that lead to lower prices.

This raises the question of whether there is \$16.8bn available to support such an effort. Currently, the National Science Foundation receives a research budget of \$6.5bn in 2009¹³, while the Department of Energy's Office of Science – responsible for basic research in the physical sciences – requested \$4.7bn for FY 2009¹⁴. 1.5x their combined research budgets would fund this proposal; alternatively just 2% of TARP funds would also suffice¹⁵. Either way, this is well within the ability of the US Government to fund.

After identifying preferred platforms through research and determining the size of the government's investment, the very real problem becomes scaling up the production of new buses. As a historical reference point, during World War Two GM built trucks for the military. Starting in 1941, the company built 43,000 trucks, ramping up to 130,000 by 1943¹⁶. Further, GM has eliminated roughly 100,000 jobs since 2002¹⁷. Comparatively, MAN Truck & Bus Company employees 36,251 people in its MAN Nutzfahrzeuge subsidiary, producing 9,130 trucks and buses annually¹⁸. Assuming a level of management overhead, it seems reasonable to estimate that the 100,000 unemployed GM workers could build 40,000 buses annually. Adding to this idle capacity at Ford and Chrysler, as well as process enhancements from large scale production, the idle capacity in the US auto industry could be put to work building 100,000 environmentally friendly buses per year within 24 to 36 months.

Beyond merely providing work for Americans, this effort would have measurable benefits for the economy. The average auto worker earns approximately \$54,000 per year¹⁹, across the estimated 200,000 employees that would be engaged in the enhancement of the school bus fleet, this equates to \$10.8bn in wages annually. Assuming that government funds are spent equally over a seven year period as the upgrade to the fleet takes place, a 350% IRR would result for the country from an investment of \$16.8bn²⁰ – a rare achievement for a government program.

This ramp up in manufacturing would preserve the American manufacturing base, and provide job stability for many workers throughout the country. The replacement of the entire school bus fleet would take approximately five to seven years. Importantly, the new buses on American streets would be evidence of the feasibility of the respective technology applied, and serve as a tangible demonstration of how taxpayer money is being spent. Not only are there 45 million public school students and their parents who would see the economic stimulus working for them, at the same time, people from other parts of the world would be able to witness the fruits of this effort. By demonstrating achievability of affordable,

environmentally friendly, transportation many others will take note. This technology could readily be adapted for public transit buses, or possibly even trucks. It will be these additional applications of the new technologies, pioneered in America, that lead to the largest benefits of this proposal.

In conclusion, the replacement of all school buses in America would aid in the administration's agenda. First and foremost, the ramp up of the manufacturing base would stimulate the economy. This is clearly a priority in the current economic climate. Furthermore, through moving away from diesel powered transit, the Nation's dependence on imported oil can be measurably reduced. Lastly, a generation of children will enjoy safer and cleaner buses, and the benefits to the environment cannot be underestimated. Combined, this will re-establish the US as a technological leader, and provide the country with a way to not only set an example for other nations on crucial environmental issues, but also create a market for American goods abroad.

¹ <http://americanschoolbuscouncil.org/index.php?page=fuel-calculator>

² <http://www.stnonline.com/stn/contractors/thomas.htm>

³ <http://www.epa.gov/oms/schoolbus/replacement.htm>

⁴ <http://articles.latimes.com/2006/may/25/nation/na-schoolbus25>

⁵ http://www.ucsusa.org/clean_vehicles/vehicle_impacts/diesel/clean-school-bus-pollution-1.html

⁶ <http://www.communitysolution.org/blog/?cat=6>

⁷ http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VPB-424M680-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4baa9b839dfce3a082f15d1555c2b16a

⁸ http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TH1-3WH67HF-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=51960ac1110eded11757687edd3a86f0

⁹ <http://www.stnonline.com/stn/contractors/thomas.htm>

¹⁰ <http://americanschoolbuscouncil.org/index.php?page=fuel-calculator>

¹¹ 42 gallons = 1 barrel, 5.5bn barrels oil consumed in the US annually

(<http://tonto.eia.doe.gov/dnav/pet/hist/MGFIMUS2A.htm>)

¹² http://www.ucsusa.org/clean_vehicles/vehicle_impacts/diesel/clean-school-bus-pollution-1.html

¹³ http://www.nsf.gov/about/congress/111/highlights/cu09_0310.jsp

¹⁴ <http://www.aip.org/fyi/2008/019.html>

¹⁵ <http://www.cbo.gov/ftpdocs/99xx/doc9961/01-16-TARP.pdf>

¹⁶ <http://www.communitysolution.org/blog/?cat=6>

¹⁷ <http://www.autoblog.com/2009/02/13/gm-ford-job-cuts-closing-in-on-50-in-u-s-chrysler-not-far-b/>

¹⁸ [http://www.man.eu/MAN-](http://www.man.eu/MAN-Downloadgalleries/All/2Presse/Publikationen/Geschaeftsberichte/2008/MAN_GB_08_E.pdf)

[Downloadgalleries/All/2Presse/Publikationen/Geschaeftsberichte/2008/MAN_GB_08_E.pdf](http://www.man.eu/MAN-Downloadgalleries/All/2Presse/Publikationen/Geschaeftsberichte/2008/MAN_GB_08_E.pdf)

¹⁹ <http://www.portfolio.com/views/blogs/market-movers/2008/11/18/the-return-of-the-70-per-hour-meme>

²⁰ \$2.4bn spent per year, offset by \$10.8bn in wages starting in year two for seven years