From:	Carmen Legato
To:	LNGStudy
Cc:	clegato@carbonxeco.com
Subject:	2012 LNG Export Study
Date:	Thursday, January 24, 2013 3:52:21 PM
Attachments:	Comments on LNG Study_final.pdf

Dear Sir or Madam:

Attached please find the Comments of CarbonX Energy Company, Inc. in response to the invitation to comment on the 2012 LNG Export Study.

Sincerely,

/s/Carmen D. Legato,
President

UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL FUELS

In Re: Invitation To Comment On LNG Export Study	)	Pursuant to the Notice, Comments to be incorporated in all dockets for Applications to Export LNG; Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC FE, Docket No. 10-161-LNG, et. al

COMMENTS ON LNG EXPORT STUDY OF CARBONX ENERGY COMPANY, INC.

Pursuant to the Request for Comments on the LNG Export Study, 77 Fed. Reg. 73627 (Dec. 11, 2012, Notices), CarbonX Energy Company, Inc. ("CarbonX") respectfully submits these comments and requests that they be incorporated into the record in each of the dockets in which applications are pending for consideration of authorization to export LNG. CarbonX states as follows:

I. COMMUNICATIONS

Any communication regarding these comments should be addressed to:

Carmen D. Legato,
President
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II. STATEMENT OF INTEREST

CarbonX Energy Company, Inc. is a privately held Delaware corporation with its principal place of business in Arlington, Virginia. It was founded to provide risk-adjusted energy solutions to government and industry and to participate in energy projects when its experience can add value. It has, on its own behalf, conducted a detailed investigation preparatory to making investments in CNG fueling. Carmen D. Legato, its President and founder, has participated in natural gas markets in the U.S. and in much of the world as an attorney representing natural gas companies and governmental institutions in the conceptualization, development and execution of business strategies in a variety of transactions for over 30 years in the U.S., Europe, Asia, Australia and North and South America. He has lectured and published articles on the LNG trade and financing for GHG reduction projects in Asia, Europe and North America.

The interest of CarbonX in the U.S. market for motor fuel was prompted by the new supply availability of natural gas following technological advances permitting the recovery of gas from shale formations at dramatically reduced costs. This downward shift of the supply curve creates the potential for natural gas to be utilized in additional applications and quantities. The nature of energy markets, however, is that new demand called forth by the price signals now emanating from production markets requires time for investigation, financing and construction of the equipment needed to utilize the resource. These requirements are no different and no more lengthy than those of the applicants which require several years to arrange long-term supply contracts, financing and construction of liquefaction trains, and in many cases, for their receiving customers

to construct regasification facilities and expand the fleet of cryogenic tankers necessary for transport.

Based upon its investigation, CarbonX believes that the greatest value to the vital strategic interests of the U.S. with respect to economic security, energy independence, military response readiness, balance of trade payments, reduction of GHGs, and reduction of local criteria and non-criteria pollutants (and reduction of associated health costs affecting Medicare, Medicaid and private insurance) is to utilize North America's natural gas as a substitute for gasoline and diesel motor fuels in transportation. Our investigation concluded that CNG vehicles are readily available, require no new technology and that the consumer acceptance of this fuel has been demonstrated in a variety of countries and commercial contexts. The only impediment to the substitution potential of CNG is the lack of CNG filling stations. Given the price signals now being transmitted from production markets, we do not see how this could interfere with the use of natural gas as a motor fuel.

Pakistan's GDP is about 3.2 percent that of the U.S.,[1] yet Pakistan has 2 million CNG vehicles, almost 20 times the number in the U.S. In Pakistan, 77 percent of private passenger vehicles use CNG because the Government of Pakistan solved the issue of CNG filling stations in a few years.[2] Our investigation concluded that fleet vehicle managers are clamoring for CNG vehicles and auto manufacturers are interested in filling

[1] According to the Central Intelligence Agency, the year 2011 GDP of Pakistan is (U.S.) $488.4 billion compared with the U.S. GDP of $15.08 trillion based on purchasing power parity exchange rates. www.cis.gov./library/publications/the-world-factbook/rankorder/2001rank.html

[2] Pakistan's investment of USD 1 billion, half of which was made in the past two years, has resulted in more than two million NGVs and 3,000 CNG stations. Michael Nijboer, International Energy Agency, "*The Contribution of Natural Gas Vehicles to Sustainable Transport*" (Working Paper 2010) at 13 (estimating 11 million vehicles worldwide). www.iea.org/publications/natural_gas_vehicles.pdf. at 53. The 77% penetration rate was obtained from a consumer survey as reported in The International News, Dec. 29, 2010. www.thenews.com.pk/TodaysPrintDetail.aspx?lD=22811&Cat=2

the demand. It is incomprehensible that the U.S. would forgo the opportunity to back out imported oil and substantially reduce its trade deficit (by 5 times more than that associated with LNG exports) because the U.S. can't build filling stations. This is not a Manhattan Project scale problem. If CNG fuel stations could be built in Pakistan why not the U.S.? Ironically, the Department of Defense is spending U.S. tax dollars to help build CNG stations in Afghanistan so as to reduce the Afghani trade deficit by backing out higher-priced oil and to reduce the effects of oil shocks on its economy at the same time that FE is considering applications to export gas that would reduce U.S. energy independence and worsen the U.S. balance of trade payments and expose the U.S. economy to oil-price shocks.[3] These are benefits that FE should not ignore—but which the Export Study does ignore—in considering the place of natural gas in U.S. energy policy.

These comments discuss in part IV, infra, the overwhelming problems with the Long Run Equilibrium Model (hereinafter "LREM") used in the Export Study as a vehicle by which to consider the issues that FE is required to assess under the Natural Gas Act's public interest standard. In order to provide perspective on how that Study and its LREM falls short, it is necessary first to address the policy interests that FE is obliged by law to consider prior to authorizing exports to countries with which the U.S. does not have a free trade agreement (hereinafter non-FTA applications").

[3] Schirach Report, Nov. 28, 2012; http://schirachreport.com/index.php/2012/11/28/1n-afghanistan-the-pentagon-invested-in-compressed-natural-gas-projects-in-order-to-help-energy-independence; www.online.wsj.com/article/SB10001424127887324439804578115023494349946.html

III. THE RESPONSIBILITIES OF FE UNDER THE NATURAL GAS ACT TAKE THEIR DIRECTION FROM THE POLICIES IN U.S. LAW.

Section 3 of the NGA requires that the advisability of exports be considered under a public interest standard. Courts have indicated that the standard is indeed broad and flexible, but nevertheless takes its contours and limits from the purposes for which the NGA was passed. DOE was given decision-making authority under Section 3 in recognition of its role in creating and executing the policies of the U.S. on energy policy. It requires no citation to authority to state that the raison d' tre of the DOE and the central purpose of every energy act following the Arab Oil Embargo of 1974 have been to free the U.S. of its reliance on petroleum. In addition to the signal importance of this policy objective, it must continue to protect consumers of natural gas and promote the public interest as it has been articulated as national policy in the laws of the U.S. These laws and policies include the requirements to reduce certain pollutants that affect health, and the policy to reduce GHG's. Courts also have required antitrust and competition policy to be considered in decision-making under the NGA. The relevance and utility of any study to aid decision-making regarding exports must be measured against its robustness in addressing each of these objectives. As shown below, however, the Study relying on the LREM fails to consider any valid policy objective but one—and is clearly wrong on that one.

A. Backing Out Petroleum Is The Central Purpose of National Energy Policy.

For over four decades, eight American presidents have warned the nation of the perils of its addiction to oil.[4] Recall the harm to the economy from such dependence: renowned economist Nouriel Roubini, writing in 2004, found that an oil price shock caused or contributed to every recession in the prior 30 years.[5] Each sustained price shock wreaks havoc with our economy, closing factories and throwing millions of Americans out of work. In such recessions the economy suffers as does the U.S. budget which faces declining revenue and ballooning costs to assist the unemployed.[6] The Arab Spring, Iran's nuclear ambitions and the rapid increase of demand for oil of developing nations, increase the geopolitical risks[7] (such as insurrection, war and civil unrest) with potential to affect oil supply and to create an oil price shock.[8] Yet, significant additions to domestic oil production hold no significance to prevent the economic harm arising

[4] Presidents Nixon, Ford, Carter, Reagan, Bush, Clinton, Bush and Obama each forcefully argued that achieving energy independence is a preeminent national goal and policy. Much of the impetus for the creation of the Department of Energy was to better coordinate federal efforts to achieve that goal.

[5] Nouriel Roubini, Stern School of Business, NYU and Brad Sester, Research Associate, University College, Oxford, "*The effects of the recent oil price shock on the U.S. and global economy*," August 2004. *See also*, James D. Hamilton, USC, Dan Diego, "*Historical Oil Shocks*," (rev. Feb. 1, 2011) at 26 ("All but one of the 11 postwar (WWII) recessions were associated with an increase in the price of oil. . . " www.dss.ucsd.edu.

[6] *See* Congressional Budget Office, "*Unemployment Insurance in the Wake of the Recent Recession*" (Nov. 2012) at 10, Fig. 2, "Spending on Unemployment Insurance by Fiscal Year."

[7] See Testimony of Daniel Yergin: "Two things are different. One is of grave concern and the other is one of some reassurance. One difference is geopolitics. Geopolitics was not a strong factor last time when we saw the prices that we're seeing today. It certainly is today. It began with the Libyan disruption, the Arab spring. But it's clearly focused right now on the Iran's nuclear program. A sense that a clock is ticking between now and the end of June when various sanctions go into place. I think you could say that it's really a new phase, not only on Iran. But Iran's impact on the oil market began at the end of November when the United Nations came out with its report on Iran's nuclear program saying that it was putting together the capabilities for a nuclear device. Then you look what's happened to price since then. Since mid December world oil prices are up about 20 percent. U.S. gasoline prices are up about 20 percent." *Hearing Before the Comm. on Energy and Natural Resources, U.S. Senate 112th Cong. 2d Sess. to receive testimony on current and near-term future price expectations and trends for motor gasoline and other refined petroleum fuels* (March 29, 2012).

[8] Thirty-six percent of energy executives surveyed by Forbes expect an oil price shock within two years. Twenty-seven percent predicted that oil would increase by more than 20 percent over 2011 average price of $95/bbl. Forbes/Insights at 3. www.forbes.com/forbesinsights.

from such events.[9] After each oil price shock, oil company profits have skyrocketed[10] and oil company executives have appeared before Congress to explain that there is nothing they can do: They have repeatedly testified that the price for domestically produced oil is set by a world market and when oil prices rise, domestically produced oil must rise in tandem.[11] Therefore the fact that in 2011, 45 percent of our oil was produced domestically[12] has no effect on the price Americans pay at the pump. The percentage of domestic production relative to domestic consumption has no bearing on price and no effect in preventing recession because—as the oil companies have repeatedly stated—the price at the pump is set by the world oil market. In addition to the harm caused by volatility arising from geopolitical risks, reliance on oil harms America's economy by exposing it to pricing that is not necessarily reflective of the real resource cost to produce it. The Federal Trade Commission Staff recently stated:

> "Over 70% of the world's proven oil reserves are in Organization of Petroleum Exporting Countries (OPEC) member countries. OPEC attempts to maintain the price of oil by limiting output and assigning

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[9] *See, e.g.*, Christopher R. Knittel, The Hamilton Project, Brookings Institution "*Leveling the Playing Field For Natural Gas in Transportation*," (June 2012) at 23 n. 6 (Concluding that even if the U.S. were to consume only domestically produced petroleum, the price-shocks would be identical because oil is a fungible commodity priced on the world oil market).

[10] *See ,e.g.*, "*Pumped and Quartered*," a Center for American Progress regression analysis of gasoline prices and Big Oil company profits, found that every 1 cent increase in gasoline prices generated $200 million in profits for the big five companies, quoted in testimony of Daniel J. Weiss, Senior Fellow Center for American Progress Action Fund, *Hearings Before The House Committee on Natural Resources, "Harnessing American Resources to Create Jobs and Address Rising Gasoline Prices: Family Vacations and U.S. Tourism Industry*," 112th Cong. 2d. Sess., March 27, 2012. He further testified: "These high gasoline prices enrich oil companies. Last year's high prices boosted Big Oil profits. The big five oil companies—BP, Chevron, ConocoPhillips, ExxonMobil, and Shell—made a combined record profit of $137 billion in 2011. These companies had nearly $60 billion in cash reserves, too. Together they made more than $1 trillion in profits from 2001 through 2011."

[11] For example, see the testimony of Marvin E. Odum, President Shell Oil Company, before the Senate Finance Committee, "Hearings on Oil and Gas Tax Incentives and Rising Energy Prices," May 12, 2011: "Stated simply, oil is a global commodity," Shell Oil Co. President Marvin E. Odum said. "With worldwide economic recovery underway, demand is on the rise, sending prices upward. . . . No one person, organization or industry can set the price for crude oil."

[12] Energy Information Administration, Annual Energy Review, Sept., 2012 at 120 (domestic production was 52.4% of consumption in 2011). www.eia.gov/aer.

> quotas. These actions by OPEC would be a criminal price fixing violation of the U.S. antitrust laws if done by private firms." [13]

Although OPEC's ability to affect price might be limited, as some have argued, this does not mean that those price effects are not substantial, particularly their cumulative effect over longer time periods. Indeed, as oil supply tightens due to rising demand, OPEC's power increases and the consequences of geopolitical events affecting markets is magnified.

To summarize, threats to the economy will continue to be dominated by OPEC's growing power, geopolitical risks resulting in periodic oil price shocks and resulting recessions—regardless of the amount of U.S. oil the U.S. produces as a percentage of U.S. consumption.

B. Any Study Must Answer The Question Which Proposed Course Of Action Has The Greatest Likelihood To Reduce America's Vulnerability To Oil Price-Shocks By Reducing Dependence On Petroleum.

EIA reported that in 2011, the U.S. depended on foreign sources of petroleum for about 45 percent of its petroleum consumption.[14] EIA forecasts that in 2035, the U.S. will be dependent on imported petroleum for 36 percent of its liquid fuels consumption (which includes non-petroleum alternatives).[15] As noted previously, however, what counts as energy independence is the extent to which the U.S. economy is freed from petroleum usage and its susceptibility to recession inducing oil price-shocks. By that relevant measure, the situation is far worse. EIA forecasts that in 2035, reliance on liquid

[13] Federal Trade Commission, Bureau of Economics Staff Study, "Gasoline Price Changes and the Petroleum Industry: An Update" (September 2011) at Executive Summary. www.ftc.gov/os/2011/09/11091gasolinepricereport.pdf.
[14] EIA, note 12, *supra*.
[15] EIA, AEO 2012. Fig. 1.

fuels will be 104 percent of the level in 2010.[16] It appears that EIA has conceded that operating over the next 22 years to 2035, DOE will not only not make substantial progress, but may actually go backwards in the goal to substantially eliminate the dependence of the U.S. economy on petroleum—the very reason for its creation. Notably, the EIA forecast also shows a substantial role for exports of natural gas during the next 22 years but very little increased role for natural gas to substitute for petroleum.[17]

Petroleum makes up 36 percent of our energy consumption but this consumption is highly concentrated in transportation. The figure reproduced from the EIA, AER 2011, tells the story in one graph: 71 percent of our petroleum consumption is to fuel transportation.[18] If we wish to become energy independent—that is, to become relatively immune to oil price shocks—energy policy must adopt a laser-like focus on transportation: **if we can substantially reduce petroleum in transportation we will essentially become energy independent and if we do not—we cannot.** Today we can now accomplish this by substituting domestically produced natural gas for gasoline and diesel fuel in U.S. transportation. The combined effect of the technological advances permitting natural gas to be recovered from shale formations at a lower cost and the long-term increase in oil prices due to global demand now make it possible to substitute

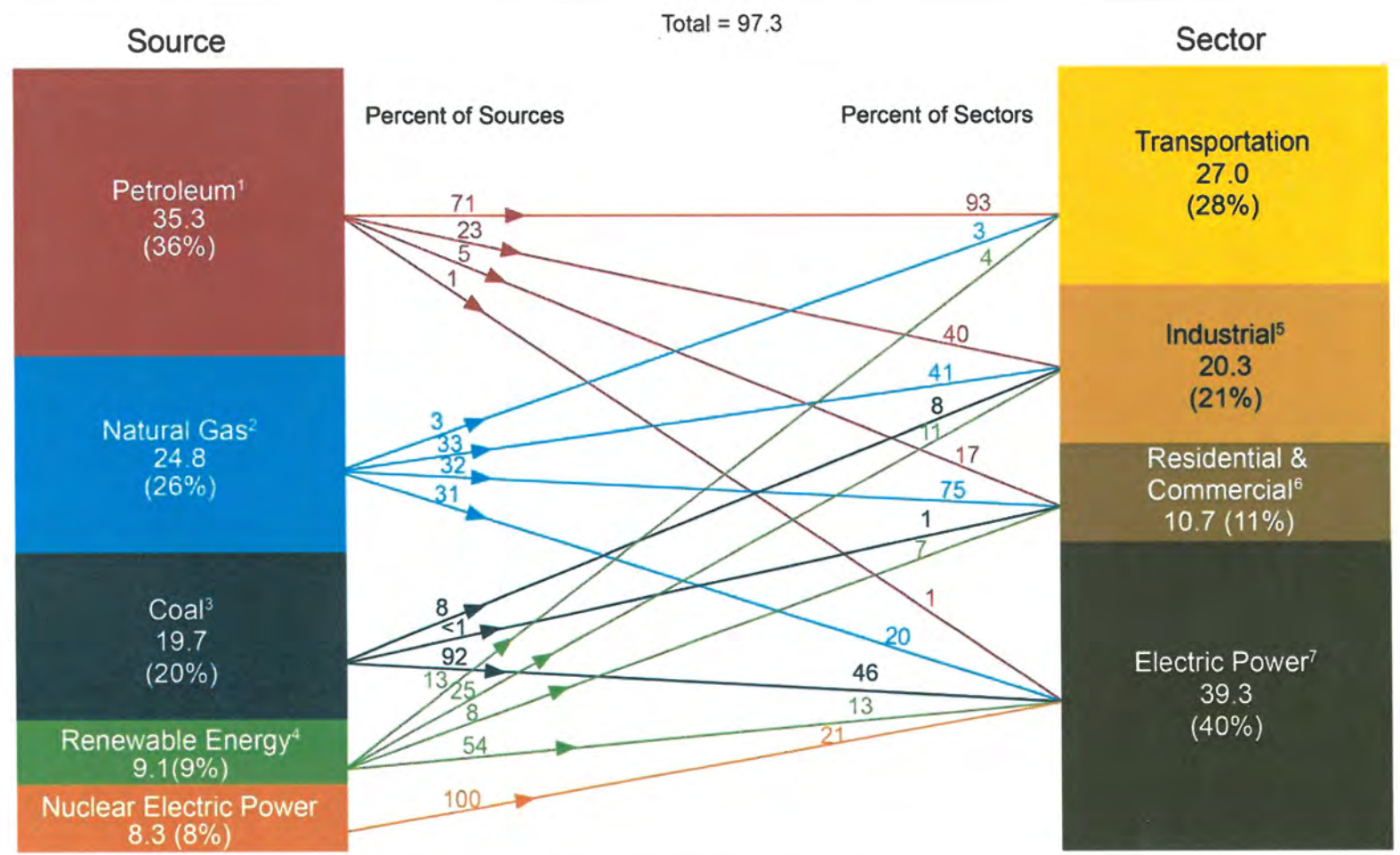
[16] EIA, AEO p. 12, Table 1 comparison of actual 2010 liquid fuels and forecast liquid fuels for 2035. It is remarkable that instead of making petroleum intensity a primary measure given its prominence as the principal policy goal, it is buried in a combined statistic of total liquid fuels. Nevertheless, this category which contains cellulosic ethanol was reported to be declining from earlier projections and was not a significant percentage of liquid fuel use.

[17] EIA, AEO, DOE?EIA-0383 (2012), June 24 2012 forecastong in 2035 naatural gas as less than 9 percent of the highway vehicle fuel mix.

[18] EIA, Annual Energy Review 2011, Fig. 2.0 at p. 37 reproduced here.

Figure 2.0 Primary Energy Consumption by Source and Sector, 2011

(Quadrillion Btu)



[1] Does not include biofuels that have been blended with petroleum—biofuels are included in "Renewable Energy."

[2] Excludes supplemental gaseous fuels.

[3] Includes less than 0.1 quadrillion Btu of coal coke net imports.

[4] Conventional hydroelectric power, geothermal, solar/photovoltaic, wind, and biomass.

[5] Includes industrial combined-heat-and-power (CHP) and industrial electricity-only plants.

[6] Includes commercial combined-heat-and-power (CHP) and commercial electricity-only plants.

[7] Electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Includes 0.1 quadrillion Btu of electricity net imports not shown under "Source."

Notes: Primary energy in the form that it is first accounted for in a statistical energy balance, before any transformation to secondary or tertiary forms of energy (for example, coal is used to generate electricity). • Sum of components may not equal total due to independent rounding.

Sources: U.S. Energy Information Administration, *Annual Energy Review 2011*, Tables 1.3, 2.1b-2.1f , 10.3, and 10.4.

domestic natural gas for oil in nearly all transportation thereby eliminating 71 percent of our reliance on petroleum.[19]

Why use natural gas for transportation? U.S. natural gas prices are now, historically have nearly always have been and are likely to remain below the world oil price and are not linked to it.[20] The price for natural gas in the U.S. is affected only by the supply and demand for natural gas in the U.S. **For this reason, substituting natural gas in transportation would render the U.S. economy immune from oil price shocks and prevent the recessions following in their aftermath.** Furthermore the additions to reserves in the U.S. arising from technological changes to recovery methods have resulted in oil prices at 5 times the price of natural gas.[21]

Within transportation there are three primary uses. Natural gas using existing technology can substitute for petroleum in the two largest with positive environmental benefits. The largest use is for motor gasoline—about 66%; diesel is approximately 23% and jet fuel is 11%.[22] Liquefied natural gas ("LNG") [23] and compressed natural gas ("CNG") are increasingly being used in fleets of on and off-road heavy-duty vehicles

[19] DOE, Argonne National Laboratory, "*Natural Gas Vehicles: Status, Barriers, and Opportunities*" (August 2010) at 10 (hereinafter referred to as "Argonne Lab Report." www.osti.gov/bridge; Congressional Research Service, "*Natural Gas in the U.S. Economy, Opportunities for Growth*," (Nov. 6, 2012) at 7 (hereinafter CRS Report").

[20] CRS Report, *supra* note 19 at 4-6; Knittel, *supra* note 9 at 4, Fig.1 (This graph shows the historical ratio of oil to natural gas prices. This graph shows that natural gas prices seldom and only for very brief time periods have approached oil prices and typically oil prices are 3 to 4 times the price of natural gas.

[21] See, e.g., Knittel, *supra* note 9 at 4, fig. 1 and accompanying text.

[22] U.S. Energy Information Administration, Annual Energy Review 2011 at 117. Figure 5.0 reproduced here. Distillate fuel oil at 3.85 MMbbl/day comprises both transportation and industrial uses. The percentage here allocated to transportation was derived as the difference between transportation fuel of 13.22 MMbbl/day and the combined total of jet fuel, 1.43 MMbbl/day, and motor gasoline of 8.74 MMbbl/day.

[23] In larger, heavy duty vehicles, natural gas is used in liquefied form. This LNG is more energy dense but requires that it be very cold (-260 degrees F) and under much greater pressure than necessary for CNG. These factors limit the use of natural gas in liquefied form to larger vehicles. This paper applies to both the use of CNG and LNG for transport but for simplicity we will refer only to CNG.

substituting for diesel.[24] Cities are converting trash trucks, buses and other municipal vehicles to CNG.[25] The largest potential use –66%— to substitute CNG for gasoline in private passenger cars faces the largest hurdle—but one that is ridiculously low contrasted to the benefits of surmounting it. In many parts of the world CNG is used in private passenger vehicles.[26] CNG is safer than gasoline,[27] the autos are essentially the same and no special engines are required.[28] In fact, even existing autos can be retrofitted to burn CNG at modest cost.[29] CNG sedans can be equipped to also use gasoline as a back-up and to instantly (either automatically or manually at the driver's discretion) switch between them on the fly.[30] CNG burns cleaner, increases engine life and reduces maintenance costs.[31] The only negative is that CNG is less energy dense than gasoline, requiring more frequent fill-ups (which take no longer than filling up with gas).[32] Experience in New Zealand shows, however, that consumers will choose CNG despite

[24] *See*, CRS Report, *supra* note 19 at 18-19.
[25] Argonne Lab Report *supra* note 19 at 3.
[26] Michael Nijboer, International Energy Agency, "*The Contribution of Natural Gas Vehicles to Sustainable Transport*" (Working Paper 2010) at 13 (estimating 11 million vehicles worldwide). www.iea.org/publications/natural_gas_vehicles.pdf.
[27] CNG has a higher ignition temperature than gasoline, is less volatile (because it is lighter than air, it disperses readily) and less flammable in comparable concentrations. Finally, the CNG storage tank is built stronger and is more crash-worthy than gasoline tanks. The safety record of CNG is superior. *See, e.g.,* Clean Vehicle Education Foundation, Technology Committee Bulletin (Sept. 17, 2010) based on Michael J. Murphy, "*Properties of Alternative Fuels*," Federal Transit Administration, 1994. www.cleanvehicle.org/Committtee/technical/PDF/Wev-TC-TechBul2-Safety.pdf
[28] *See, e.g.*, DOE website: "Qualified retrofitters can economically and reliably convert many light-duty vehicles for natural gas operation." www.afdc.energy.gov/vehiclesw/natural_gas_conversions.html
[29] *See id*.; Argonne Lab Report, *supra* note 19 at 6;
[30] According to the manufacturer specifications: "The system automatically and seamlessly switches from CNG to gasoline when the CNG tank has been depleted. It also provides the flexibility to manually switch between the two fuels at any time." www.gmffleet.com/content/dam/gmfleet/globalmaster/.nscwebsite/en/Home/Shared-Resources/PDFs/GMC1-FCO-12-06422-438%20Bifuel%20HeroCardV3_v4_nocrops.pdf
[31] EPA, Clean Alternative Fuels Fact Sheet EPA420-F-00-033 (March 2002). Available at: www.afdc.energy.gov/pdfs/epa_cng.pdf
[32] Argonne Lab Report *supra* note 19 at 6.

that inconvenience if it is priced substantially below gasoline. [33] Today, of course, gasoline is 5 times the cost of natural gas at wholesale. By the time it is pumped in one's auto, the cost of CNG on a gallon of gasoline equivalent basis ("GGE") is about 40 percent of the cost of gasoline.[34]

Price, current or prospective, is not the problem impeding conversion of the private auto fleet to CNG. Rather, it is what economists call a network externality—essentially a chicken and egg problem of coordinating the roll-out of CNG stations and autos equipped to use primarily CNG. The Honda Civic GX[35] and Volkswagen Passat sedans and the Chevy Silverado and the GMC Sierra 2500HD pick-up trucks are OEM CNG vehicles sold in the U.S. but non-fleet sales are hampered by the lack of filling stations. The automakers want to see the stations built and the prospective station owners want to see a commitment to produce cars equipped to use CNG. There are 157,000 gasoline filling stations[36] in the U.S. to about 800 CNG stations most of them serving fleets with central refueling and not open to the public.[37] There are 14.8 million CNG vehicles in the world today but only 112,000 in the U.S. [38] Pakistan's GDP is about 3.2% that of the U.S.,[39] yet Pakistan has 2 million CNG vehicles, almost 20 times the number in the U.S. In Pakistan, 77% of private passenger vehicles use CNG because the

[33] GAO Report to the Chairman, U.S. H. Rep., Subcomm. On Environment, Energy and Natural Resources of the Comm. On Gov't Operations, "*Alternative Fuels, Experiences of Brazil, Canada and New Zealand in Using Alternative Motor Fuels*" (May 7, 1992), Ch. 4 at p. 39.
[34] *See* Knittel, *supra* note 9 at 7; Argonne Lab Report, supra note 18 at 8.
[35] The Honda Civic GX places the CNG tank in the trunk sacrificing storage while recent European models have it mounted under the trunk freeing trunk space for storage. Argonne Lab Report, *supra* note 18 at 2.
[36] American Petroleum Institute, www.api.org/oil-and-natural-gasoverview/consumer-information/service%20station%20faqs.aspx
[37] Argonne Lab Report, *supra*, note 19 at 6.
[38] DOE Alternative fuels data center website. www.afdc.energy.gov/fuels/natural_gas.html ("Natural Gas Vehicles")
[39] *See* note 1, *supra*.

Government of Pakistan solved the externality issue in a few years.[40] Right now the Department of Defense is spending U.S. tax dollars to help build CNG stations in Afghanistan so as to reduce the Afghani trade deficit by backing out higher- priced oil and to reduce the effects of oil shocks on its economy.[41]

Let us reprise this simple yet enormously important issue. The U.S. confronts economically crippling recessions due to oil price shocks which can be averted only by substituting domestic natural gas for gasoline. To do so, it must solve the network problem of coordinating the roll-out of CNG stations and autos (using off-the shelf technology already installed in autos marketed in the U.S. and throughout the world). The Government of Pakistan solved that problem in a few years. Is the FE now to say that while Pakistan could build CNG stations, the U.S. lacks the vision, ingenuity or persistence to accomplish this—Is this why in 2035 the EIA forecast exports of natural gas, continued near exclusive reliance on petroleum, including 36 percent of that being imported, and not significantly more use of natural gas in transport than today's small market share?

C. Exports Would Displace Substitution Of Natural Gas For Petroleum On A One-to-One Basis.

It is important to recognize that exporting LNG and achieving energy independence are mutually exclusive goals. The amount of natural gas needed to substitute just for gasoline would be about 17 trillion cubic feet (Tcf) per year at current consumption levels.[42] Diesel Fuel used in motor transport requires an additional 7 Tcf.[43]

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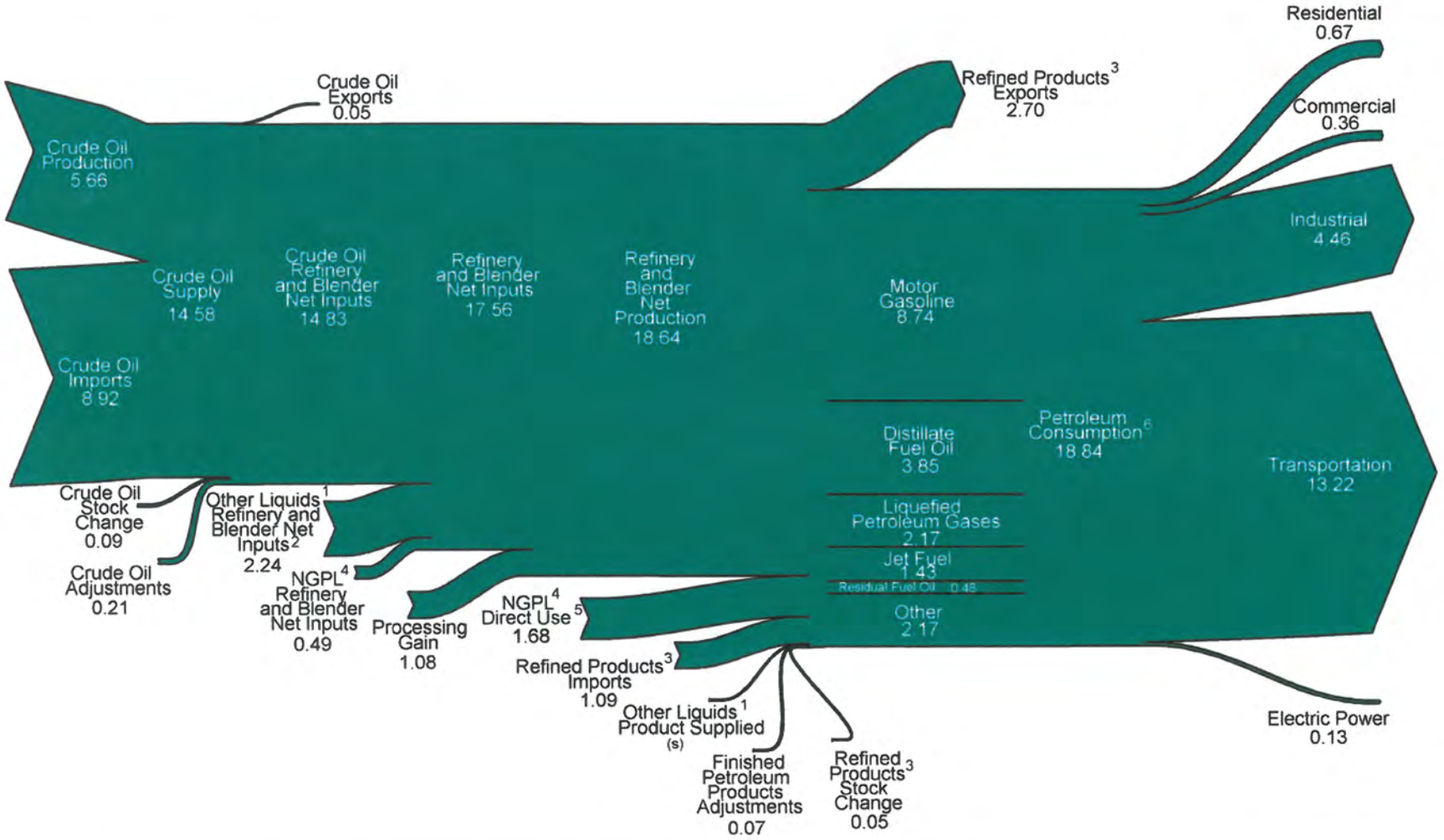
[40] *See* note 2, *supra*.
[41] *See* note 3, *supra*.
[42] The figure of 16.97378 Tcf. was rounded to 17 Tcf. The EIA reported consumption for gasoline usage in 2011 (134 billion gallons) was converted to natural gas using a gasoline gallons equivalent of 126.67 cu. ft.

Figure 5.0. Petroleum Flow, 2011
(Million Barrels per Day)



[1] Unfinished oils, hydrogen/oxygenates/renewables/other hydrocarbons, and motor gasoline and aviation gasoline blending components.
[2] Renewable fuels and oxygenate plant net production (0.972), net imports (1.164) and adjustments (0.122) minus stock change (0.019) and product supplied (0.001).
[3] Finished petroleum products, liquefied petroleum gases, and pentanes plus.
[4] Natural gas plant liquids.
[5] Field production (2.183) and renewable fuels and oxygenate plant net production (-.019) minus refinery and blender net inputs (0.489).
[6] Petroleum products supplied.
(s)=Less than 0.005.

Notes: • Data are preliminary. • Values are derived from source data prior to rounding for publication. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 5.1b, 5.3, 5.5, 5.8, 5.11, 5.13a-5.13d, 5.16; U.S. Energy Information Administration, *Petroleum Supply Monthly* (February 2012), Table 4; and revisions to crude oil production and adjustments (see sources for Table 5.1b).

Domestic production in 2011 and imports from Canada were 24 Tcf.[44] EIA forecasts that the increase in domestic production associated with new recovery methods would boost annual production to 28 Tcf by 2035.[45] The combination of current consumption of 24 Tcf and potential demand for natural gas and diesel as a substitute for gasoline of 24 Tcf is approximately 48 Tcf per year. Therefore existing demands for natural gas coupled with the substitution of natural gas for gasoline and diesel fuel would utilize 171 percent of expected U.S. gas production at the current consumption level of gasoline **Obviously, U.S. production under any scenario cannot come close to satisfying all domestic demands even if no LNG were exported.** According to DOE, there were pending (as of January 4, 2013) 24.80 Bcf/day of export authorizations to non-Free Trade Agreement countries.[46] This equates to an annual export of 9 Tcf. As explained earlier, these exports would be pursuant to 25-year firm supply commitments. Therefore they would be satisfied first before short-term domestic arrangements as is explained more fully in part IV.1, *infra*. The effect as shown on the graph below (Fig. 1) is to eliminate the U.S. ability to use gas to back out oil because gas would not be available to use as motor fuel. In fact just to meet current levels of demand for current uses of 24 Tcf (which EIA

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natural gas per gallon of gasoline. This measure is used by the IRS and states to determine fuel taxes. *See, e.g.,* IRS Form 720, line 120. www.irs.gov/pub/irs-pdf/f720pdf. Gasoline consumption in 2011 reported at Fig. 5.0, p. 117 of the Annual Energy Review 2011 in bbl. reproduced here and also in gallons at www.eia.gov under FAQ.

[43] EIA, Annual Energy Review 2011 at figure 5, p. 117 shows total distillate oil use of 3.85 million bbl./day. Of that amount, 3.02 million bbl. / day attributable to motor fuel is derived by subtracting from the 13.22 Mbbl. /day for transportation, the sum of motor gasoline (8.74) and jet fuel (1.74). The daily barrels are annualized and converted to gallons (42 gallons/bbl.). Then the gallons are multiplied by 145.1 cu. ft. to arrive at Gallons of Diesel Equivalent ("GDE") of gas. That computation produces an annual requirement of 6.8 Tcf, rounded to 7 Tcf. The conversion to cubic feet for the GDE is available at www.cecleanenergy.net/docs/fuelcost.pdf.

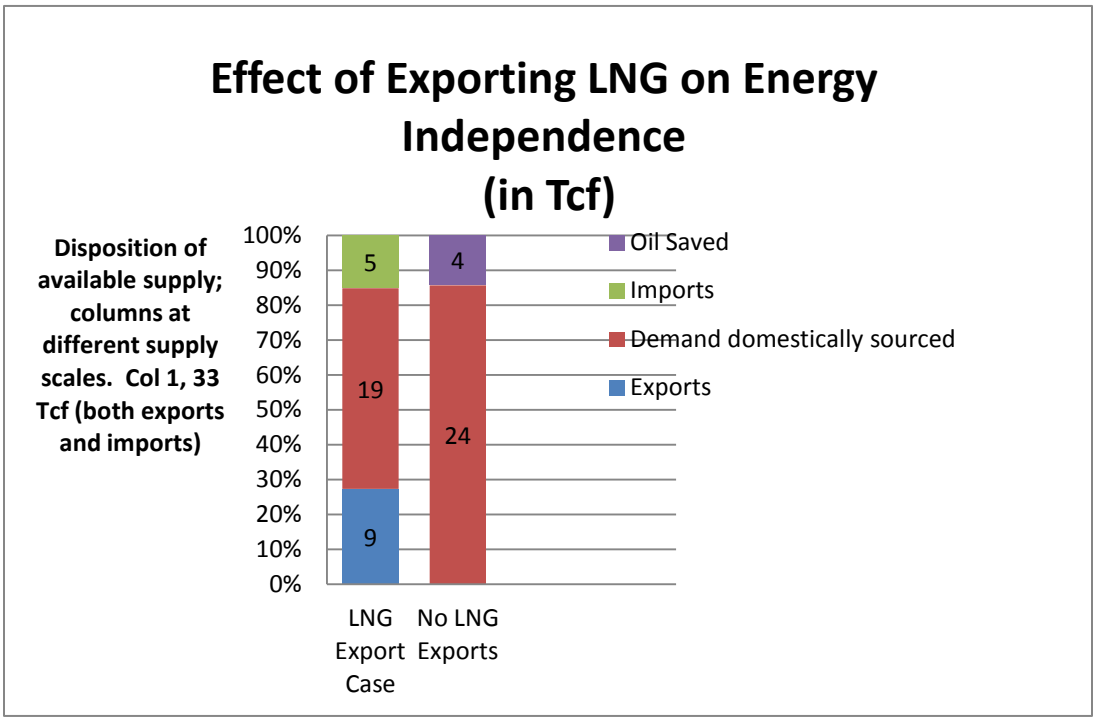
[44] EIA, Natural Gas Review for 2011 shows marketed production at 66.2 Bcf/day which equates to 24 Tcf. www.eia.gov/naturalgas/review.

[45] EIA, Annual Energy Outlook 2012, Tables, Supply, disposition and price, 2035. www.eia.gov

[46] Summary: Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of January 4, 2013), available at: http://fossil.energy.gov/programs/gasegulation/reports/summary_lng_applications.pdf.

forecasts to increase to 26 Tcf by 2035) imports of 5 Tcf would be needed. The U.S. would simultaneously be exporting 9 Tcf of LNG and importing 5 Tcf of LNG, consuming in the process vast quantities of gas for liquefaction and transoceanic shipping (boil off) in both directions and increasing GHG by 30 percent in each direction (see note 56, infra), in addition to the 30 percent that would have been saved by backing out gasoline! The additional 90 percent of GHG's is a virtual Rube Goldberg GHG production machine.[47] Although it might seem far fetched to think that the U.S. would simultaneously export and import LNG, the nature of a governmental authorization for companies to undertake a 25-year export supply commitments is why this will occur.

Figure 1



It is therefore clear that every cubic foot of natural gas exported necessarily would prevent backing out petroleum. Even with shale gas, it is not likely that the U.S. will

[47] Rube Goldberg, an engineer by training was a cartoonist whose "machines" depicted elaborate, convoluted and overly complex gadgets to solve simple problems.

produce sufficient quantities to support current uses plus an additional 24 Tcf/year needed for use as a motor fuel to completely back-out gasoline and diesel fuel. Indeed, should we face a shortage of natural gas to meet that need, it probably would be prudent to meet that shortfall by importing natural gas ("LNG") at a price below and not linked to oil. The choice for FE is clear: allow the natural gas to remain in the U.S. where the market will use natural gas to back out more expensive and risky oil or export it, because there is not under any foreseeable circumstance enough to do both.

D. FE IS REQUIRED TO CONSIDER THAT USING NATURAL GAS FOR VEHICLES WOULD CREATE SIGNIFICANT ENVIRONMENTAL BENEFITS AND REDUCE HEALTH CARE COSTS

1. CNG Provides Significant Reductions of Greenhouse Gas (GHG)

In addition to the crucial economic security importance to do so, substituting natural gas for gasoline would cut life-cycle greenhouse gases ("GHGs") by 30 percent according to a 2007 California Energy Commission Report (hereinafter "CEC Report").[48] No other gasoline substitute appreciably reduces GHG more. An analysis of data by Professor Christopher Knittel, shows that the Volkswagen Passat CNG sedan emitted less carbon per mile than the Nissan Leaf and either the all-electric or electric/gas Chevy Volt. The Honda Civic CNG sedan emitted 28 percent more carbon than the Nissan Leaf but not much more than the Chevy Volt 50/50 gas/electric sedan.[49] But the

[48] TIAX, LLC, "*Full Fuel Cycle Assessment: Well-To-Wheels Energy Inputs, Emissions, and Water Impacts prepared for the California Energy Commission* (June 2007) at 19 (CNG case); Note that LNG in transport reduces GHGs by 20% , a third lower reduction than CNG, because of the energy used to power liquefaction.

[49] Christopher Knittel, *supra* note 9 at 20-21 (Appendix Tables 1 and 2). (Note that Professor Knittel used a 25 percent life-cycle reduction of GHGs based upon a DOE Argonne Laboratories study from 1997 which, unlike the California study, was based on CNG auto models that were a less efficient version than those tested in the later CEC study and which contained older values (since improved) for transmission losses of methane).

all-electric vehicles perform worse than CNG vehicles in regions in which coal plants are part of the power generating mix.[50] Even if one believes that EVs offer a marginally better potential to reduce GHGs than CNG, the life cycle reduction of up to 30 percent for CNG compared to gasoline provides an important hedge and means to reduce carbon given the potential problems with EVs arising from the cost to replace batteries. According to an analysis by physicist Richard A. Muller, taking into account the limited number of charge cycles for the batteries used in electric vehicles and their very high replacement cost,[51] the cost per mile of electric vehicles is 44 cents compared to 10 cents for gasoline and 4 cents for CNG.

Because of the unfavorable economics of EV cars and the fact that they are not appreciably different in environmental benefit, as a matter of environmental policy it would be reckless to put all of the GHG reduction eggs in the all-electric basket at this early date. Professor Muller notes that the hybrid models do not suffer from the same difficulty regarding battery replacement and resulting high costs per mile driven, but, here again, CNG could replace gasoline as the back-up fuel in hybrids compounding the GHG reduction and other pollution benefits of the hybrid vehicles.

The NRDC has argued that part of the exported LNG might find its way to China and India and displace coal in power generation, thereby increasing GHG reduction benefits compared to substituting it for gasoline in the U.S.[52] This view is mistaken. Vast quantities of natural gas recoverable at prices below those of the marginal supply in

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[50] *Id*. at 9-10.
[51] Richard A. Muller, "*Energy For Future Presidents*," (Norton 2012). Professor Muller concluded that the batteries would accept 500 charging cycles—about 20,000 miles worth—before needing replacement at a cost of $15-20,000. *Id*. at 252-53.
[52] Comments of Ralph Cavanagh, Natural Resources Defense Council, reported by Matthew Phillips, Bloomberg Business Week, Aug. 22, 2012 "*Strange Bedfellows Debate Exporting Natural Gas*." www.businessweek.com/articles/2012-08-22/strange-bedfellows-debate-exporting-natural-gas

the U.S. lie more proximate to Asian markets.[53] The proven reserves in the U.S. are only 8 percent of those available from just 5 countries that could deliver gas to China by pipeline and for each of those countries the ratio of domestic demand to proven reserves is far lower than it is for the U.S.[54] China has already begun constructing gas pipelines to its gas-rich neighbors.[55] The reality is that exporting LNG would merely substitute for lower-cost natural gas that is proximate to Asian markets. Moreover, due to the GHGs released in transporting LNG from the U.S. to distant Asian markets, GHG emissions would actually increase by about 30 percent compared with using natural gas in the U.S.[56]

The position also neglects to balance the enormous value to the U.S. health of reducing emissions of criteria and air toxic pollutants from tailpipes as discussed below should, due to unfavorable economics of battery replacement, the electric vehicle option not substantially reduce gasoline-fueled vehicles

2. The Reduction of Local Pollutants Arising from CNG is of Great Value.

[53] All volumes in trillions of cubic meters of proved reserves: Russia 44.8, Qatar 25.4, Turkmenistan 7.5, Saudi Arabia 7.8, UAE 6.5, (total proved reserves proximate to market 92 Tcm.). U.S. 7.7 Tcm. U.S. Central Intelligence Agency, CIA World Factbook. www.cia.gov/library/publications/the-world-factbook/rankorder/2179rank.html (accessed on January 13, 2013).

[54] See for example Julie Jang and Jonathan Sintor, the International Energy Agency Report on Chinese National Oil Companies (February 2011) at 36: "The recent investments by the NOCs will make it even less dependent, as they have helped China to secure a total of 120 Bcm of natural gas by 2015, which could account for 52% of China's demand. This assumes that the two routes from Russia are completed (total 68 Bcm/y), all pipelines are used in full capacity, and China's demand in 2015 is 230 Bcm according to CNPC's forecast." www.iea.org/publications/freepublications/overseas_china.pdf

[55] *See id.* (construction of gas pipelines from the north and the south); Pipelines International (March 2011) www.pipelinesinternational.com/news/the_pipelines_feeding_chinas_burgeoning_economy/0555358/;Oil & Gas Eurasia, "Kazakhstan, China Agreed On Gas Pipeline Construction, (Nov. 9, 2012) www.oilandgaseurasia.com/tech_trend/kazakhstan-china-agreed-gas-pipeline-construction

[56] It has been estimated that liquefaction, cryogenic transportation and regasification result in a life cycle emission of GHG from LNG about 30 percent greater than for gas in its natural state. See European Commission Joint Research Centre, Liquefied Natural Gas for Europe-Some important Issues for Consideration (2009) at 16-17; European Commission Joint Research Centre, Climate impact of potential shale gas production in the European Union (2012).

CNG vehicles would also substantially reduce smog, particulate emissions and harmful toxins emitted from tailpipes compared to using gasoline.[57] "EPA has for many years rated the Honda Civic GX as the cleanest internal combustion engine vehicle in the world."[58] The Honda Civic GX has been named by the American Council for an Energy Efficient Economy as one of the greenest vehicles for nine consecutive years; and in 2012 the Civic GX was named Green Car of the Year by the Green Car Journal.[59] The 2007 CEC Report, discussed at pages 13-14, *supra*, found that CNG would reduce VOCs by 72%, CO by 11%, NO_x by 12-19%, particulate emissions (10 microns) by 42% and would reduce weighted toxics 38 to 95%.[60] (The baseline gas vehicles in the study were vehicles compliant with California's more restrictive standards for criteria and non-criteria pollutants and using that baseline could understate the results of comparing CNG with the gasoline-fueled vehicles subject to EPA's less restrictive requirements applicable to other states).[61] "Compared with conventional gasoline, natural gas LDV's generally reduce smog-producing pollutants by 60-90% (DOE/EPA) 2010."[62]

Those substantial reductions of the tailpipe emissions that harm health would reduce the costs of Medicare and Medicaid and private insurance arising from allergies, asthma, COPD and other respiratory problems. A study by the American Lung Foundation (California) concluded that California's already more restrictive emissions criteria (2010) if further substantially reduced could avoid at least $3.7 billion per year in

[57] Knittel, *supra* note 9 at 23 n. 9.
[58] Argonne Lab Report supra note 19 at 15.
[59] www.automobiles.honda.com/civic-natural-gas/reviews.aspx
[60] CEC Report, note 48, *supra* at 55.
[61] California is the only state permitted to establish its own more restrictive standards than EPA's applicable to the other 49 states.
[62] Argonne Lab Report, *supra* note 19 at 15.

health costs for California alone.[63] It further concluded that California's' existing (but more restrictive emissions standard compared to the U.S. generally) equates to $1.19 in damage per gallon of gasoline or about $20 per fill-up.[64] Professor Knittel valued the public benefits of using CNG associated with reducing such local pollutants at $831 per private sedan.[65]

E. FE IS REQUIRED TO CONSIDER THAT EXPORTS WOULD ELIMINATE INTERFUEL COMPETITION IN THE MARKET FOR MOTOR TRANSPORT FUEL, AND EXPLAIN WHY THAT ANTICOMPETITIVE RESULT WOULD BE IN THE PUBLIC INTEREST.

1. The Export Authorizations Would Permit Long-Term Supply Contracts That Would Preferentially Remove Natural Gas For Foreign Use For 25 Years Regardless of The Comparative Value Of Foreign and Domestic Demand.

The authorizations requested are for 25 years and would permit the exporters to enter into 25-year, firm contracts to supply potentially huge quantities of natural gas to foreign markets. It is important for FE to understand the economics of LNG trade and how that contrasts to the U.S. market. The LNG trade is characterized by huge capital investments on both the supply and the buy side that are fixed and closely tied to specific entities. Liquefaction trains on the one hand in the exporting country and regasification facilities (and in some cases pipelines from those facilities) on the other. The scale of these investments can be approximated by the unit costs associated with them by NERA.[66] There are many reasons that the parties require long-term bilateral agreements to protect the expectations on which these investments are to be made. From the

[63] American Lung Association in California, The Road To Clean Air at 1 (fig. "Fleetwide Damages Avoided per year). "Data analyzed in this study includes numbers of premature deaths, hospitalizations, asthma and other respiratory symptoms, numbers of lost work days and numbers of lost school days as well as public health costs related to these outcomes." *Id.* at 1.
[64] This figure includes GHG costs as well as local pollution costs. Fact Sheet, note 38, *supra* at 2.
[65] Knittel, note 9 *supra* at 8, Table 2.
[66] NERA Export Study at 86 to 88 showing combined costs (without the value of the commodity) of $5.58 to Asia and $4.24 to Asia per MMBtu.

exporters perspective, its investment in liquefaction could be undone should the proposed importer subsequently find a pipeline alternative to LNG, for example. The history of LNG projects provides instances in which, despite these contractual undertakings, the changing economic circumstances induced one party to breach its obligations rendering the investment of the other unusable.[67] These instances suffice to explain why the exporter would seek contractual protection against those desires should the economic circumstances change. The NERA report does not address these issues at length but appears to agree that the vast majority of the LNG trade is and will be pursuant to long-term contracts with a firm delivery obligation in order to protect the specialized capital linked to particular actors.

Some of the applications indicate that the liquefaction projects will be project-financed. For those projects financing and disbursement will be based on a very detailed review of the long-term contracts with credit-worthy counterparties necessary to eliminate risk that the project once funded will generate the revenue stream used to forecast net revenue to provide the necessary debt-coverage ratio. Even if the facility were to be based on corporate "balance sheet financing," the company would not approve and advance funding for the project unless the contract facilities were in place.

In summary these economic requirements arising from the inherent risks of deploying fixed capital which is economically unmovable and linked to specific parties or geographic regions finds expression in the near universal practice to obtain fixed, long-term contracts, typically for 25 years, thereby permitting risks to be covered during the

[67] Examples of this are the breach by Sonatrach to honor its commitment to the buyers in the El Paso I project to import LNG from Algeria. After the facilities for importation were built, Sonatrach sought a price increase that was a multiple of the agreed price. Sonatrach did the same thing with ENEL after completion of the Trans Mediterranean pipeline connecting Algeria to Italy.

period of external financing, or in the case of balance sheet financing, the amortization period necessary for recovery of investment.

These types of arrangements are not customary, however, in the U.S. natural gas market which has evolved since deregulation of the merchant function and advent of open-access pipeline transportation in the mid 80's to a modern commodity market with an efficient mix of contract lengths. When building a specific factory or other off-taker of gas, it is not necessary to lock-up a gas supply for 25 years.

Today we are at the incipience of the new supply curve for natural gas that arises from advancement in recovery technology. As might be expected at this early date, the confidence surrounding that supply is clouded. For example, with respect to certain shale plays, the EIA, following reexamination of producer claims by the U.S. Geological Survey, substantially pared its prior year's estimates of production. Questions remain both about the resource base and the flow rates and these issues will be refined as data are reported form producing wells. Yet at this early date, before the EIA can (or should) be able to express the necessary confidence level, the oil and gas industry wishes to lock up the export authorization for 9 Tcf of natural gas (as of January 4, 2012) to non-FTA countries. This amount is 43 percent of current production and not much less than that as a percentage of expanded production forecast for 2035.

This has two implications for the U.S. gas market. First, the projects will go or not go based on the ability to garner contracts entered into ***before*** the facilities are built. These contracts will be based upon projections made in the next year when no single entity (or the industry collectively) can be confident at this early time of the assessment of recovery and flow rates from shale plays. Yet, the projection of that production makes

up a huge share of future supply as the existing offshore sources are expected to diminish. Second, the issuance of orders authorizing export could have a chilling effect on investment in alternative domestic applications for using natural gas. Again, this is because of the long-term contracts for which authorization is sought for export and the effect that would have on the future availability of natural gas for domestic uses.

Financial institutions backing export projects might take these risks and companies with large balance sheets might be willing to take them as well. In many circumstances, those risks, however well or poorly they turn out to have been assessed, safely can be left to the individual entities to take and to bear them as they see fit. But here the construction of billions of dollars of liquefaction facilities and the firm supply obligations that go with it could have an outsized effect on the U.S. economy.

An example of the effect on the U.S. economy of errors in judgment of the companies seeking authorization under Section 3 of the NGA is furnished by the El Paso I project. This project was authorized and built based on the assessment of the importing companies of the price and supply of natural gas. Within 2 years of that, however, there was abundant supply of domestic natural gas at prices far below the import price. Imports would have the effect of shutting in lower-cost domestic production, thereby worsening the balance of trade and unnecessarily raising consumer prices while reducing GDP. A commitment for 25 years that can be detrimental within a year or so is a very risky thing for the U.S. First, once the agreements are signed, the gas supply is effectively committed despite the fact that U.S. consumers manufacturing an item of great value to the economy would be willing to bid more. Similarly with the motoring public which likely would be willing to pay more than the importer but which will be shut out from

supply. These entities could bid up the price but that would have no effect on the portion of the supply committed under long-term contracts in terms of their ability to procure the supply. As discussed above, there is a living history of companies at the time of seeking authorization to be exuberant in their forecasts to justify a capital project only to be shown to be very wide of their predictions in a few years.

As shown above, the use of CNG as motor fuel would displace imported oil and it would thereby make a contribution to reducing the balance of trade payments about five times greater than would exporting natural gas. And while serving energy policy to wean the U.S. off of petroleum, does not pose those same outsized risks as the 25-year commitments being sought.

If the domestic economy were given several years to invest in gas utilization equipment before the authorizations to export were considered, there would be a fairer opportunity for the market to produce a more economically efficient outcome. At the same time, there would be an opportunity to base forecasts of supply on more accurate geological production data rather than on the investor oriented hyperbole that often characterizes—and has characterized the industry's press releases.

2. The Elimination of Competition Might Be The Purpose and Will Be the Effect of Exporting LNG.

As shown previously, CNG is a close substitute for gasoline and diesel fuels. If the integrated oil companies did not own both oil and gas they would not have the incentive that they do to export natural gas to prevent it from competing with their existing gasoline and diesel business. In a free-market economy, the role of government is to ensure competitive outcomes not to protect an incumbent industry from competition

from new entrants. Yet, it may be that competitive threat which causes the pell mall rush to gain export authorizations even if those authorizations might not be used for some time. As noted earlier, the issuance of the order of authorization might itself quell investor desire to participate in capital projects for the use of gas in the U.S. that would threaten the incumbents. For example Chevron has sought authorization to commence exports at its discretion to commence within 8 years of the authorization being issued.

Competition policy is a cornerstone of American law and the basis on which a free market economy produces results that advance social welfare. The Supreme Court has stated that the presence of some regulation does not excuse consideration of antitrust policy and, indeed, can make the play of competition more rather than less important. The Courts have, moreover, expressed this very principle in finding that the decision-making under the NGA cannot stand when it fails to address cogently how a decision that might adversely affect competition would nevertheless benefit consumers.

In *Maryland People's Counsel v. FERC*, 761 F.2d 780 (D.C. Cir. 1989) (MPC II) then Judge Ginsburg ruled on the challenge to the FERC's blanket certificate program, joined by Judges Mikva and then Judge Scalia. That program addressed a circumstance parallel to that today. Natural gas prices were falling in markets that had as a competitive alternative residual fuel oil. (Here, petroleum sales are threatened by competition in the motor transport market from natural gas, a close substitute). The Blanket Certificate programs permitted selective transportation of lower-priced gas to such consumers who were highly price elastic in the short-term while not requiring pipeline companies to transport gas to "captive consumers" who were highly price inelastic in the short-term. The FERC justified this segmentation of the market as one necessary to prevent a broader

collapse of prices that would dampen the necessary incentives to explore for and develop gas. ("At the same time, this rule should provide some stimulus to the exploration and development of long-term domestic gas reserves." Id. at 788-89).

The MPC argued that the program had the effect to "bleed of competitive pressure" and was the perfect tool for a price-discriminating monopolist. The Court responded that the FERC's rationale to justify the program, in part, on the basis that the sales that would be lost would stimulate further Exploration and Development with eventual benefit to consumers, could not "impress[] a reasonable mind" and "failed to cohere into a direct response to the price discrimination concerns MPC presented." *Id*. at 789. Here, as noted at pages, 10-13 *supra*, natural gas and gasoline are close substitutes. Exporting natural gas which benefits producers of oil by eliminating inter-fuel competition with natural gas in the market for motor transport, in order to create incentives to keep the gas boom going, is just as anticompetitive, just as market-distorting and just as "incapable of impressing a reasonable mind" as was the FERC blanket certificate program invalidated by the Court in MPC II.

IV. THE EXPORT STUDY FAILS TO ADDRESS ANY RELEVANT REQUIREMENT OF THE NATURAL GAS ACT AND CONTAINS FLAWED ASSUMPTIONS THAT RENDER IT USELESS TO AID DECISION-MAKING.

A. THE FAILURE TO CONSIDER ALTERNATIVE USES FOR NATURAL GAS MAKE THE STUDY IRRELEVANT TO FE'S DUTIES.

As noted previously, the cornerstone of U.S. energy policy is to free the economy from the grip of petroleum which historically has generated price-shocks that have induced or exacerbated recessions for nearly 40 years. Yet no analysis has been made to

support excluding from consideration the potential for the greater domestic supply of natural gas to substitute for gasoline and diesel, thereby backing out imports of petroleum.

The analysis commences with CNG representing less than 1 percent of natural gas usage and doesn't get much beyond that. It is the very nature of a comprehensive macroeconomic model that relationships are tightly circumscribed and leave little scope for adjustments. A low starting value for the percentage of gas allocated to transportation is not able to be examined for changes that could make that grow substantially. Basically, the nature of the macroeconomic analysis is to hold relatively constant the starting inputs except for the variances in the model to adjust the values at the margin.

Instead of relying on a black box that takes the low starting value for gas used in transportation and grows it slightly, an analysis that is robust would look at the relevant sectors in isolation and make detailed comparisons that underlie the values to be input. In such an analysis, we would examine the foregoing factors justifying the expansion of natural gas into non-fleet transportation. That analysis would examine, for example, the 77 percent rate of penetration of gas into that market in Pakistan, the fact that the CNG vehicles are off the shelf, use fuel that is 40 percent of the cost of gasoline, reduce GHGs by 30 percent, substantially reduce local pollutants, improve the balance of trade payments by 5 times the amount of exports of LNG and that CNG stations are being funded by the Pentagon in Afghanistan. In light of these highly relevant factors, the failure to consider this potential is at once massive and inexplicable.

It almost appears that DOE is at war with itself. On the one hand it maintains a website accurately extolling the virtues of CNG, maintains a Clean Cities Program

funding certain transportation initiatives, maintains an alternative fuels website, along with EPA, extolling the benefits of CNG in reducing local pollutants and, most prominently, claims that using CNG will help achieve Energy Independence. Then, FE, without regard to the money spent by DOE on the above, for its analysis of whether to ship off the very natural gas needed for those efforts uses a model that implicitly assumes none of the progress, benefits or objectives of DOE are possible or desirable.

B. THE CENTRAL PREMISE OF THE STUDY REGARDING QUANTITIES EXPORTED IS CONTRARY TO THE TERMS ON WHICH AUTHORIZATION IS SOUGHT.

As explained in part E. 1 at p. 20, *supra*, the economics of the LNG trade give rise to the need for long-term contracts to allocate the risks of relation-specific capital and the applicants have, indeed, sought authorizations for export pursuant to 25-year agreements to supply gas on a firm basis. The Study, however, incorporated the assumption that the amount of LNG exported will be determined by a long-run equilibrium model (hereinafter "LREM"). Each of the cases, posits that the quantity to be exported will be determined based upon the relative prices of long-term supply conditions in U.S. and foreign markets. This is not the condition in the real world, however. In the real world, the exporters and their counterparties will make assessments now of whether to go forward. If they do, their obligations are fixed for 25 years based on today's forecast of prices and quantities. The real world analysis then is to compare those fixed obligations (and hence fixed quantities) measured against the prices affecting U.S. supply under the various cases. By contrast, the LREM continuously adjusts the demand and supply

responses as economic conditions change—something the exporters are bound by contract not to do.

Furthermore, it would be an abdication of responsibility for FE to accept the comforting nostrum that exporters won't export if the—**in the future**—gas supply were lower than expected and U.S. gas prices were higher than expected. Rather, it must take as a given that if it does grant the export authority, it will be exercised soon by every entity authorized to do so in the maximum amount permitted by the authorization. The purpose of the FE analysis is not to measure what might happen if despite its authorizations, the exporter chooses to export a lesser amount or the market accepts a lesser amount as the Export Study does. Rather, the purpose must be to ensure that FE's evaluation of the effect of exports is consistent with the terms of the authorizations to export. This means that for purposes of its analysis FE must use the entire 9 Tcf/year, or any lesser amount it considers as the limit of its cumulative authorizations, and fix the quantity at the date of inception, say 2015 or 2016. To authorize something and then claim its effect need not be considered because it might not be utilized would be the height of irrational decision-making.

C. THE LONG-RUN EQUILIBRIUM MODEL IS USELESS FOR THE APPLICATION FOR WHICH IT HAS BEEN USED.

Long-run equilibrium models (hereinafter "LREM") have their place in econometric analysis in some circumstances, but they also are not suited to reveal outcomes in other situations. As noted previously, the nature of such a model is that it does not compare alternative strategies to alter current market profiles but instead takes the current market profile as a given For an agency required to use its authority to further

energy independence, this necessarily means that using the LREM to make decisions necessarily will tend to further the status quo—the starting point of the inputs to the econometric model. DOE should instead recognize that it is dealing with an energy commodity—natural gas—of which the U.S. and the world has a great deal more than it has petroleum. In the transport markets comprising 71 percent of demand for petroleum, natural gas is a close substitute. Petroleum is a commodity trading at a world oil price while natural gas largely (but not always) trades at below and without regard to oil prices. Indeed the Study assumes that the LNG exports would be made at a net-back price lower than the price of petroleum and that exports will never cause the price of natural gas to rise to the oil-equivalent price. Furthermore, we have evidence from distinguished economists that the sustained price-shocks from geopolitical events affecting oil markets have an outsized influence on whether, how deep and for how long the economy goes into recession.[68] The essence of the LREM—and the reason its use here is misplaced—is that it assumes that producers and consumers have time to adapt to the long-term equilibrium supply or demand. As Nouriel Roubini and James Hamilton have pointed out, however, the harm to the economy arising from such things as sustained oil-price shocks is that consumers and producers cannot adjust quickly enough to avert what can be long and deep recessions in which there is a difference of an order of magnitude between the value of the lost production and the GDP loss.[69] Furthermore, using BLS statistics, the Urban Institute showed that the wages from such recessions do not recover for years after the recession has ended. So, on the one hand, exports are being considered

[68] These real world oil-shocks are not akin to the demand shock or supply shock cases run in the study. Those refer to demand or supply being larger and smaller respectively than the levels assumed in the reference case.
[69] Hamilton, note 5, *supra* at 27.

because of the new supply curve, but the model excludes consideration of the new demand arising from that event and the effect on the economy of backing out oil as compared to backing out gas.

D. SUMMARY OF THE STUDY'S FUNDAMENTAL FLAWS.

The essence of this Study is to assume that the gas to be exported will be surplus to domestic needs except for what are assumed to be a relatively small group of manufacturers which contribute a relatively small amount to GDP. The amount exported is adjusted on a continuous equilibrium basis without regard to the actual amount authorized such that no exporter misjudges the market in the long-term, despite the fact that it will make its judgment (and be stuck with it) at the outset of the 25-year contract term. Then, magically, future conditions affecting the value of the gas in foreign markets are brought to bear on the export volumes diminishing them when the value of domestic production is high despite the fact that the decisions in the real world would have been made years earlier when the contracts were executed, thereby binding future behavior. Alternative potential uses of the gas to be exported are disregarded despite the fact that, for example, substituting CNG for gasoline would require up to 17 Tcf and for diesel another 7 Tcf per year on top of the 24 Tcf of existing demand and a supply forecast to be 28 Tcf in 2035—which is within the 25-year authorization period. Based on the set of blinders the study puts onto the analysis by these assumptions, not surprisingly, the study concludes that exports produce positive benefits and the more that is exported, the greater the benefits. Essentially, what it states is a truism, that if the conditions under which free trade in a commodity will produce benefits are assumed to exist, the outcome of that

trade will improve welfare. Well, dandy—but we knew that without a "study." What makes the Study "work" to produce its conclusions is a set of assumptions which are:

1. Counter to reality regarding when the quantities are fixed;

2. counter to the reality that bets made now years before the conditions of the future are known are not infrequently wrong but nevertheless irreversible;

3. counter to the conditions confronting the U.S. DOE arising from (a) OPEC, (b) the geographical concentration of petroleum in a turbulent part of the world, (c) burgeoning demand for petroleum by rapidly developing economies and geopolitical risks that have proven to create oil shocks that create or exacerbate recession, diminish wages for years after, and create budgetary shocks caused by increased benefits for unemployed workers.

Happily, in the magical world of the LREM these facts don't occur, recessions are banished and, of course, there is no OPEC or U.S. vulnerability to oil prices—none of that exists. We are required by the Study to don blinders, obliging us to maintain tunnel vision that focuses only on the outcomes dictated by irrelevant analyses and counterfactual assumptions used to obfuscate that nothing in the study has any relevance to the policy issues before FE and that govern whether, in the real world, exporting gas in any quantity will disserve the nation's preeminent economic objective for nearly 40 years to free itself from the baleful consequences of recession-inducing oil price-shocks by shedding its addiction to petroleum. Nor does the model incorporate assumptions about the value of the lost public benefits of reduced emissions of GHGs and local pollutants that would arise from using the gas to be exported as a substitute for gasoline and diesel fuels or of the increased GHGs from liquefaction and transport.

E. Numerous Second Order Effects Arise From Technical Deficiencies

The most important point is that the study was conceived and executed to focus on an artificial situation that bears no resemblance to the U.S. energy picture and the effect on the U.S. energy economy and on the larger economy of exporting LNG. Nevertheless there are, in addition, numerous serious methodological issues, as well. We will not dwell on these because there is essentially nothing that could be done to make this Study relevant to anything that DOE/FE is bound to consider. An econometric analysis of an irrelevancy no matter how precisely conceived and executed to produce its result is no less useless.

Nevertheless we comment on a few among the many such issues. (i) The data of demand for gas in the U.S. used is curiously out of date given that the Study was awarded after the new data had been available. (ii) The assumption that only industries would be affected by price increases for which energy represents more than 5% of their costs is unsupportable. In many basic industries, the profit margin is well within that 5% band. For example, an increase in gas costs from 5 to 6% a reduction of profits of 20%. (iii) There appears to be no analysis of the cost to other gas consumers of new pipeline facilities arising from the proposed location of the facilities. Some locations will impose greater costs than others. Because there is likely to be a mismatch between the benefits and costs to different shippers of the new pipeline capacity needed to make up for capacity used by exporters, this issue should receive attention and analysis and be coordinated with the FERC.

CONCLUSION

The U.S. has considered energy independence a preeminent economic imperative for four decades. Now that achieving it is in prospect, DOE/FE seems poised to export it for 25 years on a firm committed basis. To export our domestically produced substitute for imported oil—the only near-term solution to exposure to oil price-shocks reasonably available to the U.S. in the next several decades—at a time of burgeoning global demand for oil that is bound to further increase its price and strengthen OPEC's power, and at a time of increasing potential instability in the Middle East likely to increase oil's vulnerability to geopolitical events creating recession-inducing price shocks, would be a self-inflicted wound of enormous proportions. Recessions caused or exacerbated by dependence on oil would reduce revenue and raise costs of unemployment benefits exacerbating the already difficult problem of budget deficits. Imagine the complication for deficit reduction if an oil price shock were to occur within the next several years. Even apart from the budgetary costs of recession, removing natural gas from the domestic economy would harm the public fisc—state and federal—for which transportation fuel is an important cost and the savings by using natural gas an important benefit.

Because of the capital expenditures for liquefaction trains and the authorization of long-term supply obligations, the export authorizations also would be irreversible for 25 years. Approving the exports before domestic demand for the gas for vehicles and manufacturing have had an opportunity to catch up to the new supply through capital expenditures necessary for that consumption misunderstands how markets work. In this case the authorizations for export are anticompetitive both eliminating lower-cost natural gas as a competitor to petroleum motor fuels and by creating choke points for demand

that would harm independent producers of natural gas. Although oil companies that control both oil and gas would benefit from this anticompetitive agenda, independent producers of gas would be harmed. Any arbitrage benefit of natural gas between domestic and foreign markets for natural gas would be captured exclusively by the owners of the authorized export facilities. Independent producers would instead benefit by more competition among purchasers which domestic use would provide rather than to have 25 to 50 percent of the demand for gas controlled by a handful of exporter-purchasers. Finally, for the U.S. to embrace energy independence by using domestic gas to reduce its vulnerability to oil priced by a cartel should not be upset by the misplaced concept of "free trade." Our commitment to free trade does not require the U.S. to unilaterally disarm itself in combating the anticompetitive tactics of a cartel of foreign nations.

DOE should give U.S. industry a minimum of 4 years to put into place demand for natural gas before revisiting the possible authorization of a 25-year commitment for export and the immediate diversion of capital to projects that would immensely harm the U.S. economy for much of this century. A hasty DOE decision authorizing exports—at the incipience of the new supply curve for natural gas—thereby defeating energy independence would be one of the most anticompetitive, misinformed and costly blunders in American history. At once, it would increase OPEC's power, expose the U.S. to greater economic harm from its dependence on oil, allow oil companies to reap rents when oil prices spike that benefits them by only one-fifth of the harm to the economy and exposes our military response capability precisely when it is likely to be most needed. The motoring public would be harmed as would independent producers, state and federal governments which depend on CNG to reduce transportation costs for municipal fleets,

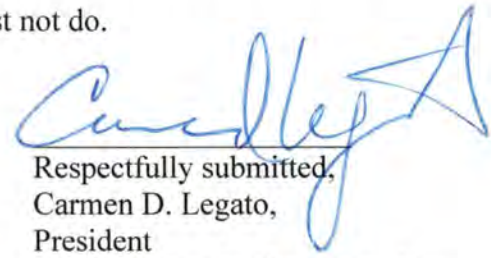
the federal budget which would be pressed by federal payments for Medicare and Medicaid for health costs that could be ameliorated by reducing the local pollutants by using CNG, and efforts to combat climate change by reducing GHGs by 30 percent. A positive contribution to trade payments would be quintupled by using natural gas as motor fuel to back out imported oil.

Substituting CNG for gasoline is not technically challenging. Rather, it is a problem stemming directly from the failure of government to level the playing field for CNG that was created both by government's asymmetrical subsidies to other fuels and un-priced externalities relative to oil. As Professor Knittel of MIT has shown, among all possible methods of motive force for autos, CNG has the lowest cost taking into consideration externalities and the greatest return on tax credits of any source, yet has received credits that are a fraction of those afforded other industries.[70] The most significant hurdle for the use of natural gas in passenger vehicles is the network externality—the chicken and egg problem of coordinating the roll-out of dedicated CNG vehicles and CNG filling stations simultaneously. It is important to recognize that the status quo advantage of gasoline does not arise because of economics. Rather that history of the industry creating a reliance on liquid petroleum fuels prevents the economically efficient outcome that would arise given fair competition between CNG and gasoline.

The Pakistani government solved the network externality problem with a resulting 77 percent penetration rate in the passenger vehicle sector and the DOD is helping Afghanistan to solve it. If Pakistan could do it, why not the U.S.? Instead of fulfilling its mission to free the economy of dependence on oil and to protect the U.S. consumer, DOE appears to be teetering on the precipice of surrendering energy

[70] Christopher Knittel, *supra* note 6 at 17.

independence, economic security and a more favorable trade balance to growing OPEC dominance while harming the economy, the motoring public, the state and federal fisc, military security and the environment. This it must not do.



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UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

In Re: Invitation To Comment Regarding LNG Export Study	))	Pursuant to the Notice to be incorporated in all dockets for Applications to Export LNG, Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC FE, Docket No. 10-161-LNG, et. al

VERIFICATION

ARLINGTON, VA)

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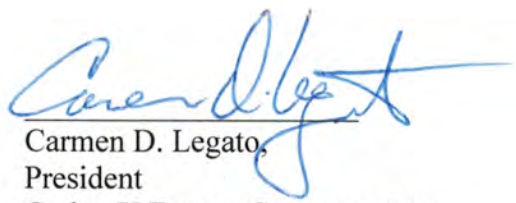
Pursuant to 10 C.F.R. § 590.103(b) (2012) and 28 U.S. Code Sec. 1746 , I, Carmen D. Legato, verifies under penalty of perjury that I am authorized to execute this verification, that I have read the foregoing document, and that all facts stated herein are true and correct to the best of my knowledge, information, and belief.



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CERTIFIED STATEMENT OF AUTHORIZED REPRESENTATIVE

Pursuant to 10 C.F.R. § 590.103(b) (2012), I, Carmen D. Legato, hereby certify that I am a duly authorized representative of CarbonX Energy Company, Inc., and that I am authorized to sign and file with the Department of Energy, Office of Fossil Energy, on behalf of CarbonX Energy Company, Inc., the foregoing Comments on LNG Export Study in the above-captioned proceeding.

Dated at Arlington, Virginia this 24th day of January, 2013.

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