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Todd R. Campbell, MEM, MPP  
Director of Public Policy



February 13, 2009

Ms. Manisha Singh  
Lead Policy and Regulatory WG  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95812

*Via e-mail: mansingh@arb.ca.gov*

Re: Comments on the January Draft of the Low Carbon Fuel Standard Regulation.

Dear Ms. Singh:

Clean Energy would like to thank the California Air Resources Board (CARB) staff for the opportunity to comment on the Draft Low Carbon Fuel Standard (LCFS) updated this January 2009. We would like to acknowledge and applaud staff for making several key changes to the draft LCFS regulation that better reflects the practices of our Industry, including the section on regulated parties and the inclusion on biogas as a fuel option. That said, we do continue to have a number of concerns on how staff plans to proceed with the proposed regulation. Please accept the below comments that continue to reiterate or amplify our concerns over certain sections of the draft regulation.

**Section 95421. Applicability**

**Exemption for compliant fuels, recognition of biomethane:**

Clean Energy supports the new subdivision (b), which 1) exempts fuels presumed to comply with the 2020 LCFS standard from LCFS regulations unless the regulated party chooses to generate LCFS credits and 2) recognizes biomethane as a distinct fuel from conventional natural gas.

**Home Refueling Appliances:** It appears that owners of natural gas home refueling appliances (HRAs) are considered regulated parties and will be exempt from LCFS regulations only if they choose not to generate LCFS credits. While we do not expect individual HRA owners to seek to generate LCFS credits, which would be extremely small, the fact remains that they appear to be a regulated party, as follows:

- HRAs dispense compressed natural gas.
- Pursuant to 95424(a)(5)(A), the regulated party for CNG, whether biogas or conventional gas, is "the person that owns the natural gas fueling equipment at the facility at which the gas is dispensed to motor vehicles for transportation use."



- It appears that an HRA is “fueling equipment,” the facility at which the gas is dispensed” is the garage where the HRA is installed, and the regulated party is the individual that owns the HRA.
- Because natural gas for transportation purposes is supplied by all providers in California at an aggregated volume of more than 3.6 million gge/year, natural gas regulated parties cannot exercise the low volume exemption in 95421(c).

In other words the owner of an HRA would be subject to all LCFS regulations in the unlikely event that he or she decided to generate LCFS credits. This interpretation also has implications for the quarterly reporting requirements in 95424(c)(3). We would like to discuss this question further with ARB staff to seek clarification.

**Section 95422. Standards Applied to Gasoline and Diesel Fuel Portions of a Regulated Party’s Fuel-Pool Average Carbon-Intensity**

We have two comments on this section. First, it would be helpful if CARB staff could provide the rationale for revising the carbon-intensity for gasoline and diesel fuel. The lack of transparency for these changes made by CARB staff are of significant concern as the ability for anyone to validate staff’s conclusions is severely diminished or next to impossible unless you are insider. The fact that stakeholders who are not directly participating in the discussions between staff and the prospective regulated parties reduces external stakeholders any meaningful chance to comment intelligently on CARB staff’s changes to gasoline or diesel carbon intensity. We therefore would ask that CARB provide the rationale for its proposal that in understandable before further reducing the carbon intensity for both gasoline and diesel under the next draft.

Second, we reiterate our support for a linear compliance pathway between years 2010 and 2020 for carbon-intensity reductions under the LCFS. The current compliance line currently proposed by CARB has been modified but not meaningfully and still represents a back-ended compliance schedule (i.e., a five percent carbon intensity reduction will not be achieved until 2017 and the goal is ten percent by 2020). Not only will this slow capital investments in key low carbon fuel strategies, including biogas, but it could also potentially set up the rule to fail. Too much reliance on back-ended progress could force decision makers to weaken the rule and undermine investor confidence for the remainder of the rule and beyond.

**Section 95424(5)(B)(2). Where No Biogas LNG is Added to Fossil LNG.**

We urge CARB staff to remove the word “initially” from the definition of regulated party for fossil LNG as it should be the owner of the LNG when it is transferred to the fueling facility, not the “initial owner” of the LNG. The final definition should read:

*For fuel consisting solely of fossil LNG, the regulated party is the person that owns the fossil LNG when it is transferred to the facility at which the fossil LNG is dispensed to motor vehicles for their transportation use.*

This is a critical correction as it is the owner of the fossil LNG during the transfer of the fuel that determines its ultimate destination and use as a transportation fuel.

**Quarterly reporting requirements:**

The January amendments make no changes to the December language on quarterly reporting requirements. As we stated in our December comments, we continue to believe that separate



metering is unnecessary in many cases. We also remain concerned that the option of using an alternative reporting method that is “equivalent to or better than” the separate metering method is a vague standard that may be impossible to meet.

For example, home fueling facilities are included in the reporting requirements. HRAs only provide CNG and are designed only for light-duty vehicles. We find it hard to believe the ARB actually wants to receive quarterly reports from each individual owner of an HRA, especially when even without any reporting you can be assured of what kind of fuel is being dispensed and into what class of vehicle. Beyond HRAs, there are other fueling settings (municipal bus fleets, private truck fleets) where both the type of fuel and the type of vehicle is known without any need for metering at each dispenser. In these cases, facility-wide metering will provide the same data at much less expense. We would like to discuss this issue further with staff.

### **Section 95425. LCFS Credits and Deficits**

#### **Proposed EER Values for Heavy-Duty/Off-Road Applications for CNG/LNG Should Reflect All Current NG Engine Technology**

The January 2009 draft proposes to adjust the EER value of CNG/LNG for heavy-duty/off-road applications from 1.0 to 0.9. Other stakeholders, who happen to represent our direct competitors’ interests – those of diesel and gasoline – have proposed that the EER value for natural gas engines in the heavy-duty sector be further diminished by factoring in aging natural gas engines in current California fleets. The intent of this proposal by our competitors is clear as it desperately seeks to maintain the status quo and put up yet another barrier to the successful implementation of low carbon fuels here in the state of California. CARB staff should reject such blatant proposals to water down alternatives that can provide clear low carbon benefits and adopt an EER that is reflective of current NG engine technology for the following reasons.

#### **EER Values should reflect the Low Carbon Benefits of Current Engines, Not those that may or may not be present in Legacy Fleets.**

The intent of the LCFS is to reduce the carbon content of fuel used in California’s fleets from 2010 through 2020, not to improve the fuel efficiencies of legacy NG engines in current California fleets, or any other engine that uses a competing fuel for that matter, as some stakeholders would propose. For example, we do not believe it is the intent of the LCFS to compare the EER values for a 1980 model year diesel engine that currently operates within California’s goods movement system. Nor is it in the interest for CARB to consider the EER values for legacy diesel engines that might or might not have been retrofitted. Any proposal to reduce the EER value for NG engines to diesel engines, based on legacy considerations, while failing to consider legacy diesel issues complicated by retrofits of diesel particulate traps, etc., is not only unfair, it’s an accounting nightmare designed to do one thing: prevent CARB from achieving its LCFS goals.

EER values used to calculate LCFS credits and deficits for heavy-duty engines in 2010 through 2020 must reflect current engine technology applicable to all fuels until future advancements in comparable engine technology can be validated. To propose that new users of natural gas engines should have their LCFS credits penalized due to legacy engines currently operating within the state is outright unfair and places an unnecessary hurdle to the introduction of low carbon fuels in California’s marketplace.

## **Proposed EER Value of 0.9 does not represent Current NG Engine Technology**

There are two types of NG engine technologies for heavy-duty engines: spark-ignited and high pressure-direct injection (HPDI). Therefore, both of these engine technologies should be evaluated and accounted for accordingly when determining an appropriate EER value for HDDV NG engines under the LCFS. CARB's latest proposed EER value for CNG/LNG in the heavy-duty engine sector is poorly reflective of spark-ignited, not HPDI, systems and the EER is unfairly calculated as its comparison engine does not meet the same tough emissions standards. Further, CARB's failure to factor in the HPDI system at all is not acceptable and misrepresents the CNG/LNG industry's engine capabilities.

## **Final Spark-Ignited Engine EER Value Should be 1.0**

Dealing with the spark-ignited engines first and foremost, we understand that CARB modified the EER value for CNG/LNG engines solely based on reviewing certification data for spark-ignited NG engines, namely the ISL-G produced by Cummins Westport. Further, the EER value for this engine is based on the following flawed assumptions: (a) the ISL-G engine – that is certified to the US EPA 2010 emissions standards – was compared to its diesel counterpart that is not certified to the 2010 US EPA emissions standard and (b) CARB assumed that the efficiency of the Cummins diesel engine would remain the same when it eventually becomes 2010 US EPA compliant. Based on this comparison, it is clearly not “apples to apples” and effectively penalizes the only certified US EPA 2010 compliant heavy-duty engine on the market today. Despite this biased approach, the EER value for the ISL-G is still an impressive 0.92 to 0.94 (or an average of 0.93) based on data provided by Cummins Westport, not 0.9.

Clean Energy therefore urges CARB, based on CARB's inability to provide a certified diesel engine that can compare against the ISL-G, that it assume a 1.0 EER value for spark-ignited natural gas engines in the heavy-duty sector for now. Although it is understandable that CARB wants to assume that all diesel engines will be compliant with US EPA 2010 emissions standards in 2010, CARB cannot make this assumption without evidence as such an assumption discriminates against a compliant product, effectively penalizing it. Further, the fact that one engine manufacture – Caterpillar – has left the market based on its inability to achieve the US EPA 2010 emissions targets, another – International – is asking that the US EPA extend the deadline for compliance due to complications, and several other manufacturers are still unsure how they will comply places credible doubt on what we can expect to see in terms of diesel engine performance in 2010. In addition to this level of uncertainty, it should be further noted that the US EPA 2010 standard allows for emissions averaging with emissions credits and provides another reason why diesel engines for the 2010 production year can be compliant but not actually achieve 2010 emissions targets. Penalizing the ISL-G on this basis is not only counter productive to CARB's low carbon fuel goals, such a decision would be counter to the Agency's clean air goals.

## **Final HPDI Engine EER Value Should be 1.0+**

After asking CARB staff why HPDI technology manufactured by Westport Innovations was not included, we were notified that CARB staff did not have a certification for this technology. During this discussion, we provided the executive order for this certification (A-343-0004) for the ISX natural gas engine. We further explained that this technology, unlike the spark-ignited ISL-G, suffers no efficiency penalty and matches, if not exceeds, the efficiency of a diesel engine. We were asked if the ISX was expected to meet the US EPA 2010 emissions standards and found it odd that CARB would make the assumption that diesel engines





produced in 2010 would be compliant but fail to extend that assumption to the natural gas ISX, particularly when natural gas engines – including the ISX – have historically been lower in criteria air emissions than their diesel counterparts (see Attachment A). This further supports our argument that CARB should base its EER values on current technologies rather than make assumptions that are based on a lack of data. In fact, because the ISX will most likely not require as much pre- or after-treatment to comply with US EPA 2010 emission standards, CARB can probably expect a better EER value for the ISX in 2010. We therefore recommend that CARB apply an EER value of 1.0 or greater for HPDI systems. To discount this engine as proposed in the January draft to an EER value of 0.9 is not only inaccurate, punitive, but counter to the very goals set by CARB for air quality and greenhouse gas reduction. We urge you to reject the EER value proposed in the January LCFS draft and revert back to a 1.0 EER value or greater.

### **Final Conclusions on EER Value for Natural Gas Engines in the Heavy-Duty Sector**

Not only are the methods to evaluate the newly proposed EER value for natural gas engines in the heavy-duty sector inconsistent for varying engine types, the assumptions are flawed and based on a lack of data which penalizes an engine technology that exclusively exceeds current criteria emission and low carbon fuel standards and, in some cases, complies with 2010 criteria emission standards. CARB must reject its newly proposed EER Value of 0.9 and revert back to a value of 1.0 or greater. In fact, our ask for a EER value greater than 1.0 for NG engines is supported by CARB's own analysis on electric vehicles and fuel cells where credit has been given to those technologies without actual product on the market. The only difference here is, our technology is on the road today, consistently improves year after year, and supports CARB's emissions goals for criteria and GHG pollutants for 2010 and 2020.

### **Twenty Percent Credit Rollover Cap:**

We continue to be disappointed that the 20 percent credit rollover cap remains in the January amendments. As we stated in prior comments, the combination of a backloaded compliance schedule in 95422 and the inability to meet more than 20 percent of an annual compliance obligation with credits generated from a previous year imposes a heavy penalty on producers of low carbon fuels that meet and exceed the 2020 LCFS requirements. The *Supporting Documentation for the Draft Regulation on the LCFS* (CARB, Oct. 2008, page 38) states that "the gasoline and diesel standards are backloaded so that, if necessary, credits that were banked in the early years will help with compliance in the later years." The stringent 20 percent cap on prior year credits directly conflicts with the ARB's earlier thinking on this issue.

Staff commentary in the December version states that the cap on prior year credits is proposed to ensure that they "are not used preferentially for compliance purposes in a manner that would effectively circumvent the compliance obligation of a given year." But in what way is compliance circumvented? If a regulated party fails to meet the LCFS carbon reduction requirement and complies instead by buying credits, that means a complying alternative fuel producer is not only producing low carbon fuel but is selling it into the vehicle fuel marketplace. In other words, as more credits that are sold, that is evidence that more GHG emissions are being reduced by the use of alternative fuels. Far from being a failing of the program, that is the point of the program – to increase the production and use of compliant low carbon fuels. We again urge the CARB to eliminate or, at a minimum, relax the limit on the use of prior year credits.

## Section 95429. Regulation Review



We are opposed to a review period that will evaluate the implementation of the LCFS if it could be used to weaken the rule's resolve: to reduce the carbon content of transportation fuels by ten percent from 2010 to 2020. Building in such review periods provides an opportunity for stakeholders who never supported the rule just another forum to dismantle or weaken the rule's resolve (i.e., the Zero Emission Vehicle rule). We feel this is counterproductive to CARB's LCF goals and builds in another level of uncertainty during a period of significant financial uncertainty for investors who have an interest in providing financial credit to low carbon fuel markets. We, therefore urge CARB staff to remove this review period from consideration as it can only strengthen those who represent the status quo and weaken the very industries that stand to assist CARB in achieving a low carbon future.

## Appendix B. Table B1. Carbon intensity table using Method 1

We appreciate CARB staff's efforts to review and update the pathway analysis of LNG. We assume this is the case because all of the pathways for LNG under Table B1 state that each pathway is under review. Clean Energy would like to reiterate that the likelihood of imported natural gas is significantly diminishing given the vast unconventional supplies now accessible for domestic natural gas. This ability to access unconventional natural gas in the US has extended proved reserves from roughly 80 to 118 years at 2007 consumption levels and we expect the price of the commodity to dip down to the \$3.00 range this year given current oversupply (see Attachment B). Clean Energy would therefore like to submit to CARB staff that most, if not all, LNG produced for the CA transportation sector will be made from domestic sources, such as the Rocky Mountains, for the foreseeable future and this should be reflected as such in the new revisions.

## Conclusions.

We would like to thank CARB staff for your efforts and hard work throughout this regulatory process. We believe the LCFS regulation is improving significantly and, more and more, is capturing the intricacies of the LCF marketplace. We look forward to supporting your efforts in further refining this rule to ensure that it achieves the very goals that it sets out to accomplish by 2020.

Thank you for your time and careful consideration of our comments.

Sincerely,

A handwritten signature in blue ink that reads "Todd R. Campbell" with the initials "TKK" written at the end.

Todd R. Campbell

## Attachment A: ISX Certification

 <b>CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY</b> <b>AIR RESOURCES BOARD</b>	<b>WESTPORT FUELS SYSTEMS, INC.</b>	<b>EXECUTIVE ORDER A-343-0004</b> <b>New On-Road Heavy-Duty Engines</b>
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Pursuant to the authority vested in the Air Resources Board by Health and Safety Code Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-02-003;

**IT IS ORDERED AND RESOLVED:** The engine and emission control systems produced by the manufacturer are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	ENGINE SIZES (L)	FUEL TYPE <sup>1</sup>	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS <sup>2</sup>	ECS & SPECIAL FEATURES <sup>3</sup>
			BF (CNG / Diesel)	Diesel	HHDD	
2008	8WFSH0912XAL	14.9		Diesel	HHDD	HPDI, ECM, TC, CAC, EGR, OC, PTOX
ENGINE MODELS / CODBS (rated power, in hp)						
ENGINE (L)	14.9 ISXG 450 HPDI / 1 (450), ISXG 450 HPDI / 2 (450), ISXG 450 HPDI / 3 (400)					

<sup>1</sup> - not applicable; GNVH=gross vehicle weight rating; 13 CCR 1956.1=Title 13, California Code of Regulations, Section 1956.1; 40 CFR 86.002=Title 40, Code of Federal Regulations, Section 86.002; L=liter; hp=horsepower; km=kilometer;  
<sup>2</sup> CNG/LNG=compressed/liquefied natural gas; LPG=liquefied petroleum gas; E85=85% ethanol fuel; MF=multi fuel a.k.a. BF=bi fuel; DF=dual fuel; FF=flexible fuel;  
<sup>3</sup> L/MH/HDD=light/medium/heavy heavy-duty diesel; UB=urban bus; HOD=heavy duty Otto;  
 ECS=emission control system; TWC/OC=three-way/oxidizing catalyst; WU (prefix)=warm-up catalyst; DPF=diesel particulate filter; PTOX=periodic trip oxidizer; HO2S/O2S=heated/oxygen sensor; HAFSA/APS=heated/air-fuel ratio sensor (a.k.a. universal or linear oxygen sensor); TBI=triple body fuel injection; SF/MPI=sequential/multi port fuel injection; DGI=direct gasoline injection; GCARB=gaseous carburetor; IDI/DBI=indirect/direct diesel injection; TC= turbocharger; CAC=charge air cooler; EGR=exhaust gas recirculation; PAB/AIR=pulsed/secondary air injection; SPL=smoke puff limiter; ECM/PC=engine/powertrain control module; EM=engine modification; 2 (prefix)=parallel; 3 (prefix)=in series; HPDI=High Pressure Direct Injection (2007NOV29)

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.1 (urban bus) or 13 CCR 1956.8 (other than urban bus); 2) the EURO and NTE limits under the applicable California exhaust emission standards and test procedures for heavy-duty diesel engines and vehicles (Test Procedures); and 3) the corresponding certification levels, in g/bhp-hr, for this engine family. "Diesel" CO, EURO and NTE certification compliance may have been demonstrated by the manufacturer as provided under the applicable Test Procedures in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [ ] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR 1956.1 or 13 CCR 1956.8 are in parentheses.)

	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO
STD	0.14	0.14	-	-	-	-	18.5	15.5	0.01	0.01	-	-
FEL	-	-	0.80	0.80	1.2	1.2	-	-	-	-	-	-
CERT	0.10	0.03	0.80	0.79	1.2	0.78	0.5	0.2	0.008	0.004	-	-
NTE	0.21		1.20		1.5		19.4		0.02		-	

<sup>1</sup> g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; EURO=Euro III European Steady-State Cycle; NTE=Not-to-Exceed; STD=standard or emission test cap; FEL=family emission limit; CERT=certification level; NMHC=non-methane hydrocarbon; NOx=oxide of nitrogen; CO=carbon monoxide; PM=particulate matter; HCHO=formaldehyde;

**BE IT FURTHER RESOLVED:** Certification to the FEL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(s) is the emission level declared by the manufacturer and serves in lieu of an emission standard for certification purposes in any averaging, banking, or trading (ABT) programs. It will be used for determining compliance of any engine in this family and compliance with such ABT programs.

**BE IT FURTHER RESOLVED:** The listed engine models have been certified to the split engine family standards under 13 CCR 1956.8(b) [diesel engines] or 13 CCR 1956.8(d) [Otto engines] and the Incorporated 40 CFR 86.007-15(m)(9).

**BE IT FURTHER RESOLVED:** For the listed engine models the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR 1965 (emission control labels) and 13 CCR 2035 et seq. (emission control warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

The Bureau of Automotive Repair will be notified by copy of this Executive Order.

Executed at El Monte, California on this 30 day of November 2007.

  
**Annette Hebart, Chief**  
**Mobile Source Operations Division**

## **Attachment B: Domestic Supply of Natural Gas Substantial**

### **Houston Chronicle**

CERAWEEK

Natural gas CEO strikes positive tone

By KRISTEN HAYS

February 12, 2009

The natural gas industry faces low prices, high stockpiles and an onshore rig count that is falling fast — but the head of the nation’s largest natural gas producer is optimistic.

“We only need gas prices to be ‘good’ for three to six months every two-year period,” Chesapeake Energy Chief Executive Aubrey McClendon told reporters Wednesday at the Cambridge Energy Research Association’s annual CERAWeek oil and gas conference in Houston. “Then we’d be happy for them to fall to benefit consumers and affect our competitors.”

During a presentation at the conference, McClendon said his company believes “the fix is in for an oversupply,” referring to the boom in onshore production in natural gas shale plays where his company is among the most aggressive players.

That boom pushed natural gas production up by as much as 6 percent last year, but recession-weakened demand and prices that are down more than 60 percent from 2008 highs led to high stockpiles.

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<http://www.chron.com/disp/story.mpl/headline/biz/6259502.html>

### **Dallas Morning News**

Chesapeake CEO urges incentives for natural gas

By ELIZABETH SOUDER

February 12, 2009

Chesapeake Energy Corp. chief executive Aubrey McClendon wants Americans to use more of his product, natural gas.

McClendon is pushing federal lawmakers to offer incentives for natural gas vehicles and to regulate carbon dioxide emissions. Most experts say natural gas, which emits less carbon dioxide than coal, could gain market share if Congress limits greenhouse gas emissions.

"I guess my real dream here is that we begin to transition our transport network away from products that are based on oil and replace that with a fuel that's made in America," McClendon said after a speech to the Cambridge Energy Research Associates conference on Wednesday.

Click here to continue reading:

[http://www.dallasnews.com/sharedcontent/dws/bus/stories/DN-ceragas\\_12bus.ART.State.Edition1.4c0f34b.html](http://www.dallasnews.com/sharedcontent/dws/bus/stories/DN-ceragas_12bus.ART.State.Edition1.4c0f34b.html)

## Fort Worth Star Telegram

Natural gas producers heartened by shift toward clean energy

By JIM FUQUAY

February 12, 2009

In recent years, most natural gas representatives in the nation's capital were satisfied to keep their heads down and avoid too much attention.

But with the growing likelihood of carbon controls in the United States, natural gas's position as the most likely fuel to help bridge the long-term transition to renewable and low-carbon energy sources is creating a reason to take a higher profile.

"I'm heartened by a rising awareness of the value of natural gas in Washington," said Skip Horvath, president of the Natural Gas Supply Association, which represents producers. The remarkable growth in U.S. natural gas supply, largely the result of new sources like the Barnett Shale, is only now becoming familiar to policymakers looking for a plentiful, relatively clean power source, Horvath said.

This change in attitude was exemplified here at Cambridge Energy Research Associates' annual energy forum by a Monday address from Rep. Edward Markey, the Massachusetts Democrat who holds leadership positions on committees overseeing energy and environmental legislation.

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<http://www.star-telegram.com/business/story/1199700.html>

WALL STREET JOURNAL  
FEBRUARY 8, 2009, 4:29 P.M. ET  
PRODUCERS

## Bad Call

*The conventional wisdom said that the U.S. would soon become a big importer of natural gas. The conventional wisdom blew it.*

By RUSSELL GOLD

In the summer of 2003, former Federal Reserve Chairman Alan Greenspan appeared before a congressional committee to share his thoughts about the U.S. natural-gas market. It might have been better for the industry, and some investors, had he kept those views to himself.

Recent price spikes, Mr. Greenspan said, were the result of increased demand chasing limited U.S. supplies. Natural gas heats about half of U.S. homes and generates 20% of the nation's electricity.

To stabilize the market, Mr. Greenspan said, the U.S. needed to become a major importer of liquefied natural gas, or LNG. Moreover, he added, "Access to world natural-gas supplies will require a major expansion of LNG terminal import capacity." New facilities would have to be built in the U.S. to handle the expected surge in imports.

Mr. Greenspan and the industry experts who shared this view -- and there were many -- couldn't have been more wrong. But within a year of his testimony, there were plans for 40 new or expanded LNG terminals under consideration in North America, according to a tally by the Federal Energy Regulatory Commission. By March 2005, the list had grown to 55.

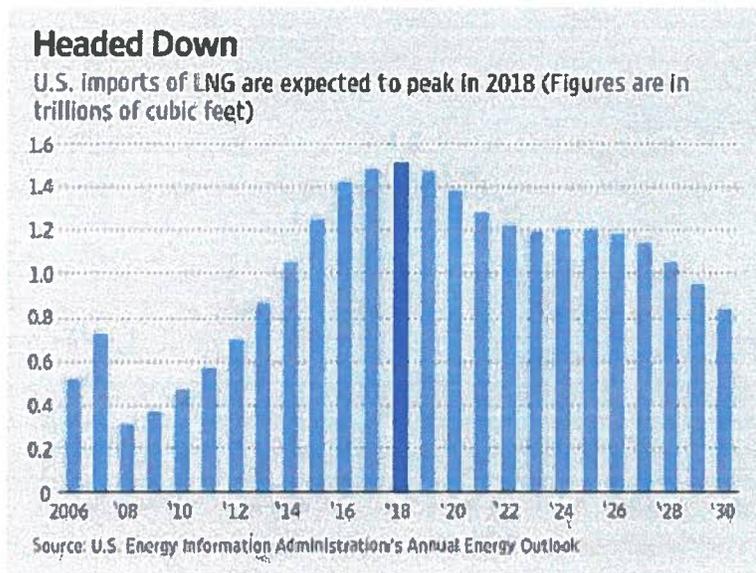
Today only six have been built, and most of those sit idle. Weeks pass between visits from a tanker full of frosty LNG. Even before the economic slowdown, it was clear the nation had ample natural-gas supplies. Large-scale imports simply weren't needed. And new reports suggest the U.S. won't need to turn into a massive importer of natural gas anytime soon.

How did the conventional wisdom get it so wrong?

### *Shale Shock*

Forecasts can swing abruptly when it comes to figuring out where natural gas is needed and how much. Expectations of future supply can change quickly, too. As this market grows and adjusts, once-lauded business plans can quickly be swept aside.

"There is still a lot of uncharted territory," says Bob Fryklund, vice president of industry relations at energy consulting firm IHS Inc. in Houston. "People are still trying to understand how this market works."



A few years ago, most people looked at U.S. natural-gas production and saw it entering a slow, terminal decline. But in fact, the opposite has happened. Rising prices and easy financing encouraged a horde of companies to develop "unconventional" gas fields such as the Barnett and Haynesville shales, located, respectively, in north Texas and along the Texas-Louisiana border. These shale wells, once thought to be too costly and difficult to exploit, succeeded beyond everyone's expectations.

"We went through a period of high prices that allowed a higher-priced supply to mature enough that costs have come down," says Jen Snyder, head of North American natural-gas research for Edinburgh-based consultant Wood Mackenzie.

The unconventional wells are producing more gas with each passing season -- and becoming less expensive to drill. Recently drilled wells in the Haynesville shale are starting off at 24 million cubic feet a day and are profitable even with natural-gas prices as low as \$4 per million British thermal units. "Huge," was the succinct appraisal of the Haynesville shale recently by a BMO Capital Markets energy analyst.

This surge of new gas has lowered domestic prices and reduced the need for imports. Meanwhile, companies that bought into the earlier vision of soaring imports and strings of new terminals went from being Wall Street darlings to also rans.

### *Cheniere's Play*

One of these is Houston-based [Cheniere Energy](#) Inc. Cheniere Chairman and Chief Executive Charif Souki was an early believer in the future of import terminals. He decided back in 2000 to pursue an aggressive LNG strategy, securing land and permits and building terminals. The plan was to build the entryway for imported gas and charge a fee to anyone who wanted in.

In 2004 and 2005, Cheniere made presentations to Wall Street analysts about how it would build a string of LNG terminals. It held options on land to develop terminals from Alabama all the way down to Brownsville, Texas, on the Mexican border. In some presentations, it used a map that seemed to suggest its terminals would dominate the western half of the Gulf of Mexico.

Investors responded positively to that vision and pushed Cheniere shares, which during 2004 had traded for around \$10, to a high of about \$44 in 2006.

But Cheniere was preparing for an incoming wave of imported LNG that hasn't arrived. It built the Sabine Pass facility, on the waterway straddling the Texas-Louisiana border, large enough to accommodate one LNG tanker a week. Only three arrived from the time the facility opened last April to the end of 2008. Cheniere's plans to build another LNG terminal in Corpus Christi, Texas, meanwhile, are dormant, as are plans for a terminal in Cameron Parish, La.

The company's miscalculation has hammered the stock. Its shares are trading for less than \$5, and the company has struggled with liquidity. Last April, it laid off more than half of its 360 employees in an effort to preserve cash.

"I underestimated price volatility," says Mr. Souki, who adds that he never expected natural-gas prices to rise as quickly as they did from early 2002 to mid-2005 -- the surge that made it profitable

for other companies to tap into domestic supplies such as the Barnett and Haynesville shales.

### *Change in Outlook*

The federal government, too, has radically changed its forecasts. In 2006, the Energy Information Administration forecast that LNG imports would reach 6.4 trillion cubic feet in 2025. But in its Annual Energy Outlook released in December, it slashed that to 1.2 trillion cubic feet. Imported natural gas, including pipelines from Canada, made up 16% of U.S. natural-gas consumption in 2007, but is expected to drop to below 3% by 2030.

Last year, a little more than 1% of gas consumed in the U.S. was delivered into the nation's pipeline grid by LNG tankers. Some analysts have begun asking whether LNG import levels will ever rise much above this level. "North America may be out of the loop, may be self-sufficient," says Jim Jensen, a natural-gas consultant in Weston, Mass.

Mr. Souki insists that the situation will improve and that gas prices will moderate at a level favoring imports because of their lower operating costs. "I have not changed my views," he says.

Others believe that more LNG will come to the U.S. this year as well -- but not to make up for domestic shortfalls, as routinely happens with oil.

### *Dumping Ground?*

Instead, North America is becoming a dumping ground for the world's excess natural gas. In 2009, new LNG supplies from Indonesia, Qatar, Russia and Yemen are expected to enter global markets, at a time when a depressed global economy has shrunk demand for fuel. The U.S. Gulf Coast, meanwhile, is perhaps the only region in the world capable of absorbing and storing this enormous excess gas supply.

LNG sellers will first fill up markets in Asia and Europe, which pay top prices. What's left over will likely head to underused terminals in North America. It's "the market of last resort," says Ira Joseph, an LNG analyst with PIRA Energy in New York.

The bad news is that the LNG will arrive at a time when big users, such as the petrochemical and fertilizer industry, are cutting demand, and as even more domestic supply comes from the giant new unconventional wells.

The result: Storage will fill up, and prices could crater.

Some of the overseas LNG may end up entering the U.S. through Sabine Pass. Cheniere sold half of the capacity at Sabine Pass to [Total SA](#) and [Chevron Corp.](#), global energy giants that wanted to ensure access to U.S. gas markets. But Cheniere kept the other half of the import capacity for itself, in hopes of buying spot cargos and importing the gas itself.

If this flow of LNG does arrive, it will come none too soon for Cheniere, which hasn't turned an annual profit since it first issued stock to the public in 1996. It still owns half of the capacity at Sabine Pass, and unused terminal space doesn't generate revenue. In February 2008, the company needed to borrow to pay off debts and maintain liquidity.

"It was a miserable time to be raising money and a miserable time to be in the LNG business," says Mr. Souki. Accustomed to raising capital for borrowing costs of 7% to 8%, it settled for a \$250 million convertible equity deal in August for which it must pay 12% interest.

The \$250 million is enough to keep Cheniere afloat for another three years, according to the company. By then, Mr. Souki says he expects to have sold half again of the capacity Cheniere has held onto at Sabine Pass.

—Mr. Gold is a staff reporter for The Wall Street Journal in Austin, Texas.