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California Energy Commission
DOCKETED
14-IEP-1B
TN 73380
JUL 15 2014

MEMORANDUM

TO: Allison Smith, Southern California Gas Company

FROM: Patrick Couch, Gladstein, Neandross & Associates

DATE: April 21, 2014

SUBJECT: CNG Fuel Price Projections for California

Overview

The California Energy Commission is currently engaged in the development of the biennial Integrated Energy Policy Report (IEPR). Compressed natural gas (CNG) is expected to be an important part of the IEPR as the CEC seeks to "develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety." (Pub. Res. Code § 25301(a)) CEC staff have indicated to SoCalGas that there is concern that the price spread between CNG and petroleum fuels may not persist over the long term, thereby weakening the value of investments in CNG vehicles and infrastructure. In response, SoCalGas has asked GNA to provide estimates of the pump price of CNG in California. This memo summarizes GNA's estimates of future CNG pump pricing for a large public access fuel station over the next ten years.

Key Takeaways

- Natural gas commodity costs currently represent approximately one-third of the total pump price for CNG at a public station. This somewhat mitigates the impact of natural gas commodity price increases on CNG pump price.
- Current average public fuel station pricing is estimated to range between $2.10 and $2.66 per diesel gallon equivalent (DGE). Costs at private stations are estimated to be $0.30-$0.50 lower. These prices do not include any tax credits or incentive funds.
- Based on US Energy Information Administration (EIA) projections for natural gas commodity costs and based on GNA's internal analysis of CNG dispensing costs, annual average dispensed costs of CNG are expected to remain between $2.21 and $2.63 per DGE through 2024. ***This implies an average cost savings of $1.48 per DGE (vs diesel) and $1.20 per GGE (vs gasoline) over the next ten years.***
- Even under a high natural gas commodity price scenario ($0.80 per therm[1]), the dispensed cost of CNG is expected to remain $0.74-$1.53 per DGE lower than diesel fuel and $0.67-$1.22 per GGE lower than gasoline.

[1] 1 therm is equal to 100,000 British Thermal Units (BTU)

Background

Natural gas producers have previously reported that the historically low prices of natural gas, averaging \$0.38 per therm over the last six years, are economically unsustainable. They suggest that a price of \$0.50-0.70 per therm is more likely to represent a sustainable price point. It is reasonable to question the effect that such an increase in natural gas prices would have on the cost of CNG at the pump.

The dispensed cost of CNG represents several cost components including the commodity cost of natural gas, electricity costs to operate the station, station maintenance, recovery of invested capital, and taxes. The per DGE costs associated with station maintenance, electricity use, and capital recovery are strongly affected by the utilization of the station, with higher utilization stations realizing lower costs per DGE dispensed. By contrast, natural gas commodity costs and taxes are relatively insensitive to station utilization. In addition to all of these costs, a public station operator also reasonably expects to derive a profit from operating the station. This profit is referred to as the margin and is modeled in this analysis as a fixed percentage of the combined natural gas, electricity, maintenance, capital recovery, and tax costs. Taken together, these costs represent the “dispensed cost” of CNG. In a competitive market, it is assumed that the dispensed cost of CNG will be equivalent to the “pump price” - the price at which CNG is sold to the public.

Based on our experience with dozens of CNG station development projects and fleet deployments of NGVs, GNA has developed a build-up of the CNG pump price for a large, public access CNG station dispensing approximately 1.5 million DGE per year.[2] Using this price build-up, we explore the impacts of higher natural gas commodity prices on the pump price of CNG.

Results

The CNG price build-up reflects GNA’s estimates of mid-range costs for taxes, electrical utility energy and demand charges, and natural gas transmission costs for the California market. A table detailing the breakdown of costs is provided in the attached appendix. Using these mid-range costs, the pump price was calculated under three scenarios reflecting low, mid-range, and high natural gas commodity costs. The low commodity cost scenario assumes a natural gas procurement cost of \$0.40 per therm and is comparable to the average CA Border index price in 2013. The mid-range cost scenario assumes a procurement cost of \$0.60 per therm and is comparable to recent index pricing. The high cost scenario assumes a procurement price of \$0.80 per therm, a value that is 33% higher than the highest bidweek index price for the CA Border since 2009.

The CNG pump price is further calculated assuming 15% and a 25% gross margin on the fully loaded cost to dispense CNG. Based on these combinations of natural gas pricing and gross margin, the resulting pump price of CNG ranges from \$2.10 to \$3.04 per DGE (Figure 1). The low and mid-range scenarios

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[2] Note that a significantly smaller station would be expected to show somewhat higher costs, approximately 10% higher, on a per DGE basis provided that both stations are well utilized.

reflect natural gas pricing that is similar to the range of CA Border index prices seen over the last year. The resulting estimates of CNG pump pricing are consistent with the reported average CNG prices for the West Coast in the US DOE Alternative Fuels Price Reports for 2013 and 2014.[3]

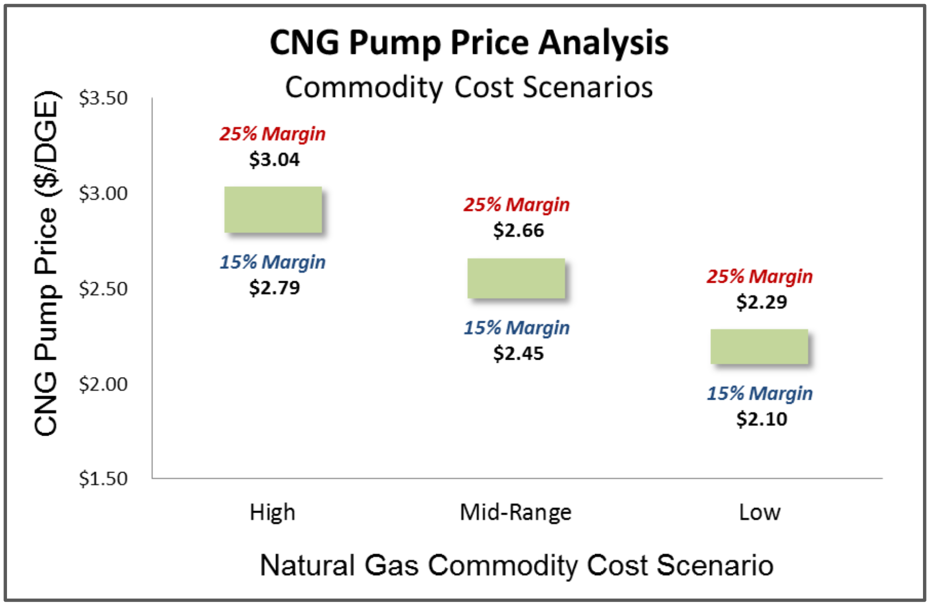

Figure 1. CNG pump price estimates for commodity cost scenarios

To provide CNG pump price projections for the 2014-2024 timeframe, natural gas commodity price and electricity cost projections from the US EIA are used in the cost build-up model. Price projections are taken from the 2014 Annual Energy Outlook (AEO).[4] Additionally, the 2014 AEO provides projections for gasoline, diesel, and natural gas pump prices. These EIA projections are compared to the CNG pump price from the cost build-up model to estimate the price spread between CNG, diesel, and gasoline. As shown in Figure 2, both the EIA projected natural gas pump price and the range of pump prices estimated using the cost build-up model show a significant long-term price advantage over diesel and gasoline.

Note that while the GNA cost model incorporated the natural gas commodity price and electricity rate projections from EIA, the rest of the model is developed independent of the EIA data. The fact that the GNA estimates align closely with the EIA projections for natural gas pump pricing suggests that both models have independently developed similar dispensing cost estimates (excluding natural gas commodity costs).

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[3] http://www.afdc.energy.gov/publications/latest_additions

[4] AEO2014 Energy Prices by Sector – Pacific Region. Reference case.

Comparing both the GNA estimates and the EIA projections for natural gas pump pricing to diesel and gasoline pump pricing over the next ten years, it is clear that natural gas pricing shows a wide, and actually increasing, price spread projected over this timeframe. ***This implies an average cost savings of $1.48 per DGE (vs diesel) and $1.20 per GGE (vs gasoline) over the next ten years.*** Even under a high natural gas commodity price scenario ($0.80 per therm), the dispensed cost of CNG is expected to remain $0.74-$1.53 per DGE lower than diesel fuel and $0.67-$1.22 per GGE lower than gasoline. Ultimately, for CNG pump pricing to reach parity with diesel or gasoline, natural gas commodity prices would have to double from their 2013 average *and* petroleum prices would have to drop by roughly a dollar per gallon from current projections.

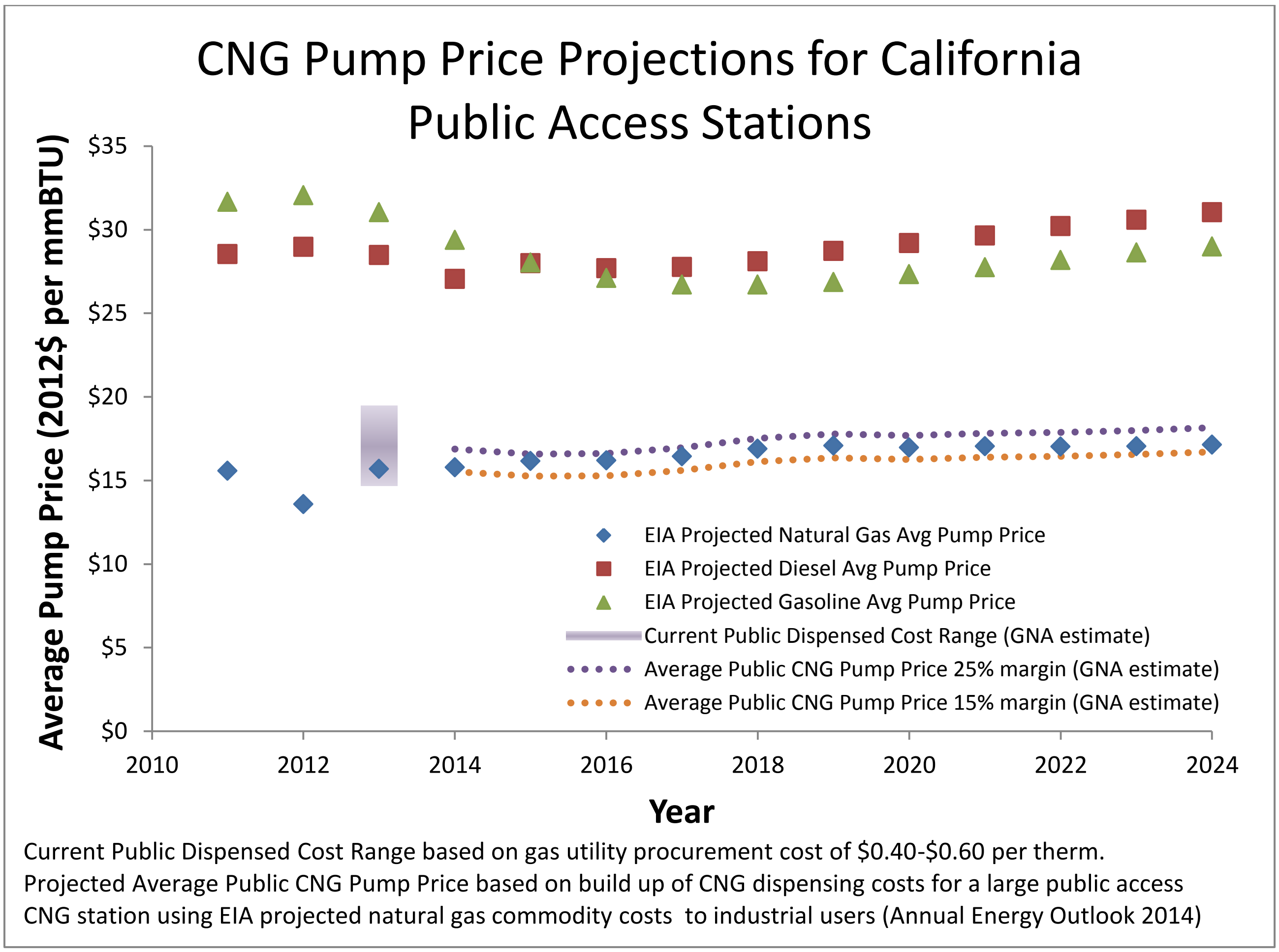

Figure 2. CNG Pump Price Projections for California Public Access Stations

Appendix – Detailed Cost Table

		GNA Scenarios			Total Price Projections based on EIA Commodity Cost Projections										
	Component Cost	**1**	**2**	**3**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Natural Gas Costs	**Commodity Cost**	**$0.901**	**$0.701**	**$0.501**	**$0.612**	**$0.589**	**$0.592**	**$0.620**	**$0.666**	**$0.687**	**$0.680**	**$0.691**	**$0.697**	**$0.706**	**$0.720**
	Procurement Cost	$0.800	$0.600	$0.400	$0.612	$0.589	$0.592	$0.620	$0.666	$0.687	$0.680	$0.691	$0.697	$0.706	$0.720
	Transmission	$0.101	$0.101	$0.101	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
	Taxes	**$0.260**	**$0.251**	**$0.242**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**	**$0.220**
	Federal Excise Tax	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133	$0.133
	State Fuel Use Tax	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032	$0.032
	CEC NG Surcharge	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055	$0.055
	State Sales Tax	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
	Utility User Tax	$0.041	$0.032	$0.023	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
	Compression	**$0.320**	**$0.320**	**$0.320**	**$0.320**	**$0.319**	**$0.319**	**$0.318**	**$0.318**	**$0.318**	**$0.317**	**$0.317**	**$0.317**	**$0.317**	**$0.316**
	Electricity Energy	$0.045	$0.045	$0.045	$0.045	$0.044	$0.044	$0.043	$0.043	$0.043	$0.042	$0.042	$0.042	$0.042	$0.042
	Electricity Demand	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075	$0.075
	Maintenance	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200	$0.200
	Capital Recovery	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**	**$0.212**
	Total ($/therm)	**$1.69**	**$1.48**	**$1.27**	**$1.36**	**$1.34**	**$1.34**	**$1.37**	**$1.42**	**$1.44**	**$1.43**	**$1.44**	**$1.44**	**$1.45**	**$1.47**
	Total ($/DGE)	**$2.43**	**$2.13**	**$1.83**	**$1.96**	**$1.92**	**$1.93**	**$1.96**	**$2.03**	**$2.06**	**$2.05**	**$2.06**	**$2.07**	**$2.09**	**$2.11**
	+ Public Access Margin (15%)	$0.36	$0.32	$0.27	$0.29	$0.29	$0.29	$0.29	$0.30	$0.31	$0.31	$0.31	$0.31	$0.31	$0.32
	+ Public Access Margin (25%)	$0.61	$0.53	$0.46	$0.49	$0.48	$0.48	$0.49	$0.51	$0.52	$0.51	$0.52	$0.52	$0.52	$0.53
	Total Public Access Price @15% Margin($/DGE)	**$2.79**	**$2.45**	**$2.10**	**$2.25**	**$2.21**	**$2.21**	**$2.26**	**$2.34**	**$2.37**	**$2.36**	**$2.37**	**$2.38**	**$2.40**	**$2.42**
	Total Public Access Price @25% Margin($/DGE)	**$3.04**	**$2.66**	**$2.29**	**$2.44**	**$2.40**	**$2.41**	**$2.46**	**$2.54**	**$2.58**	**$2.56**	**$2.58**	**$2.59**	**$2.61**	**$2.63**
	Commodity fraction (ex-margin)	53%	47%	39%	45%	44%	44%	45%	47%	48%	48%	48%	48%	49%	49%
	Commodity fraction (15% margin)	46%	41%	34%	39%	38%	38%	39%	41%	42%	41%	42%	42%	42%	43%
	Commodity fraction (25% margin)	43%	38%	31%	36%	35%	35%	36%	38%	38%	38%	38%	39%	39%	39%
	Public access price @15% margin(nom $/mmbtu)	$19.46	$17.06	$14.66	$15.68	$15.41	$15.44	$15.75	$16.28	$16.52	$16.43	$16.55	$16.61	$16.72	$16.88
	Public access price @25% margin(nom $/mmbtu)	$21.16	$18.55	$15.93	$17.04	$16.75	$16.78	$17.12	$17.70	$17.95	$17.86	$17.99	$18.06	$18.18	$18.35
	Public access price @15% margin(2012$/mmbtu)	$19.27	$16.89	$14.51	$15.52	$15.26	$15.28	$15.59	$16.12	$16.35	$16.27	$16.39	$16.45	$16.56	$16.71
	Public access price @25% margin(2012$/mmbtu)	$20.95	$18.36	$15.77	$16.87	$16.58	$16.61	$16.95	$17.52	$17.77	$17.68	$17.81	$17.88	$18.00	$18.16

Allison Smith, SoCalGas

April 21, 2014

Price Spreads	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Diesel Price (2012$/mmbtu)	$27.05	$27.99	$27.68	$27.76	$28.09	$28.72	$29.19	$29.65	$30.21	$30.59	$31.04
Diesel Price (2012$/DGE)	**$3.75**	**$3.88**	**$3.83**	**$3.84**	**$3.89**	**$3.98**	**$4.04**	**$4.11**	**$4.18**	**$4.24**	**$4.30**
CNG-Diesel Price Spread (2012$/DGE) @25% CNG margin	**($1.30)**	**($1.47)**	**($1.43)**	**($1.39)**	**($1.35)**	**($1.40)**	**($1.48)**	**($1.53)**	**($1.59)**	**($1.63)**	**($1.67)**
Gasoline Price (2012$/mmbtu)	$29.38	$28.03	$27.11	$26.71	$26.70	$26.86	$27.33	$27.74	$28.17	$28.62	$28.99
Gasoline Price (2012$/GGE)	**$3.67**	**$3.50**	**$3.39**	**$3.34**	**$3.34**	**$3.36**	**$3.42**	**$3.47**	**$3.52**	**$3.58**	**$3.62**
CNG-Gasoline Price Spread (2012$/GGE) @25% CNG margin	**($1.50)**	**($1.34)**	**($1.22)**	**($1.12)**	**($1.05)**	**($1.03)**	**($1.10)**	**($1.14)**	**($1.18)**	**($1.22)**	**($1.25)**
Price spread vs diesel -Scenario 1 CNG costs ($/DGE)	($0.74)	($0.87)	($0.83)	($0.84)	($0.89)	($0.97)	($1.04)	($1.10)	($1.18)	($1.23)	($1.29)
Price spread vs gasoline - Scenario 1 CNG costs ($/GGE)	($1.00)	($0.84)	($0.72)	($0.67)	($0.67)	($0.69)	($0.75)	($0.80)	($0.85)	($0.91)	($0.95)

Scenario 1: High commodity price

Scenario 2: Mid-range commodity price

Scenario 3: Low commodity price

All other costs assumed to be "mid-range" costs