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CEC'S RPS COMPLIANCE GUIDELINES FOR BIOGAS AND THE U.S. PIPELINE NETWORK: SPECIAL REPORT TO THE LOS ANGELES DEPARTMENT OF WATER AND POWER

BENJAMIN SCHLESINGER AND ASSOCIATES, LLC

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CEC'S RPS COMPLIANCE GUIDELINES FOR BIOGAS AND THE U.S. GAS PIPELINE NETWORK:

SPECIAL REPORT TO THE LOS ANGELES DEPARTMENT OF WATER AND POWER

By
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Introduction

Biogas from landfills – sometimes also called biomethane or landfill gas (LFG) – is a renewable resource whose supply does not run out as long as communities dispose of their solid wastes in sanitary landfills on a continuing basis. The Los Angeles Department of Water and Power uses biogas to generate electricity in several of its electricity generating plants in order to help meet its goals under California's renewable portfolio standards (RPS). The Department buys biogas under commercial contracts, much like they and other utilities purchase natural gas, and biogas is delivered to its power plants via the same pipeline network that also delivers natural gas around the State and the nation.

The Department asked Benjamin Schlesinger and Associates, LLC (herein, "BSA" or "Schlesinger"), a consulting firm specializing in the energy and pipeline industries, and in economic analysis of natural gas transportation, to prepare a report that describes and analyzes the Department's biogas contracts and the CEC's RPS eligibility guidelines. The overall goal of the BSA report is to determine the extent to which the Shell and Atmos contracts, and the CEC's guidelines, conform with one another and with national policies and regulatory standards governing the way natural gas pipeline capacity is utilized, and gas supplies are transported, within the U.S. on the nation's pipeline grid.

BSA is uniquely qualified to carry out this assignment because of its four decades of experience as gas industry analyses and economics, with focus on pipelines, utilities, fuel for power generators, landfill gas projects and other aspects. For example, BSA advised the NYMEX in developing its natural gas futures contract, advised lenders and developers of more than 100 power plants – including the Department's power plants, and others in California – on fuel supply planning and risks. BSA also served as consultants to CEC to help develop information about gas pipeline operations, costs and capacities to help improve CEC's North American regional gas economic forecasting model.

Further information about BSA's qualifications, representative clients and key personnel may be found at www.BSAenergy.com.

Executive Summary of Major Conclusions

BSA's report addresses the following issues, and its major conclusions and implications are as follows:

- **What is biogas from landfills, how is it produced, and how and why does its production relate to greenhouse gas emissions? What happens to landfill gas if it is not produced and consumed?**

Biogas from landfills is a renewable resource that can be transported on the nation's gas pipeline network. Since biogas consists largely of methane, its capture prevents emissions of methane, a powerful greenhouse gas; capturing biogas also reduces air emissions and removes public dangers and nuisance in and around landfills. Recycling and composting programs have succeeded in stabilizing the growth in municipal solid waste that is actually landfilled in the U.S., although enough biogas is, or can be produced to power approximately 1 GW of electricity generation capacity.[1] California's prodigious demand for renewable fuels, resulting from its nationally leading RPS goals, serves as a catalyst for recovery of biogas from the approximately 450 U.S. landfills that still do not now recover biogas.

- **In general, how does the US pipeline network function both contractually and economically? What arrangements are necessary to deliver transport gas from pipeline receipt points within and outside California to in-state delivery points for at RPS certified power plants? How are gas deliveries commonly performed?**

North American gas pipelines function as an interconnected grid, under "open access" rules promulgated by the Federal Energy Regulatory Commission (FERC). As it has evolved over three decades, the nation's policy regarding gas pipelines is aimed at encouraging fair market trading of gas and efficient use of pipeline capacity, rather than forcing gas along one or another prescribed path. Consequently, concepts of "upstream" and "downstream" have less meaning than in the past; they might relate to actual gas supply flow paths in one month or on one day, but then not so in the next month or day. Instead, pipeline gas supplies flow in a way that takes advantage of multiple arbitrage opportunities, i.e., gas commerce in pipeline markets rebalances prices. The result is that gas travels from lower priced hubs to higher-priced hubs thus ensuring the system operates in the most efficient and economical way possible.

- **Under LADWP's biogas contracts that are currently in effect, where is the landfill biogas sourced, what pipeline system(s) initially receives it, and which pipeline(s) transport that gas to the Department's RPS certified electricity generating plants in California, either with or against the physical flow of the gas in the pipeline? Did LADWP's biogas contracts with Shell and Atmos, executed in**

[1] Based on information from the EPA and EIA, assuming 1,020 landfills produce enough electricity to power 500,000 homes (http://www.epa.gov/lmop/faq/lfg.html), and average electricity demand of 903 kwh per month per home, with 50% load factor.

2009, conform to the delivery standards for the US pipeline gas industry and its network in 2009?

Under the Department's biogas contracts with Shell and Atmos, flows of biogas move along the physical contract path in a way that is consistent with Federal regulatory policy. Flows along the physical contract path may from time to time include front-haul or backhaul, as needed to optimize pipeline system operations and minimize the cost of transportation. Pipeline quality and heat content standards require that biogas injected into pipelines be identical to, and interchangeable with natural gas in all respects. Consequently, Shell and Atmos are delivering biogas to the Department at the Kern River Pipeline and other natural gas pipeline systems in the WECC region that deliver gas into California in a way that complies with Federal regulatory policy and operates exactly as those regulations intend, as outlined in this report and in Appendix A.

- **In general, are CEC's RPS guidelines and required attestations with respect to the producing location of biogas, and its transportation and delivery, consistent with approved pipeline tariffs and actual practices at the Federal level and within California?**

Yes. The CEC could not have stated more clearly in its RPS eligibility guidelines that were in effect at the time the Atmos and Shell contracts were executed that biogas deliveries could be made to California power plants via the U.S. gas pipeline network according to the standards under which that network operates under FERC rules – namely, market-based flows enabling efficient operations along lines described in the preceding section of this report, as amplified in Appendix A.

- **Did LADWP's biogas contracts with Shell and Atmos, executed in 2009, conform to and satisfy the delivery requirements for biogas found in the Third Edition of the CEC's RPS eligibility guidelines? The Fourth Edition?**

The answer is yes to both. For reasons described above, the LADWP's biogas contracts with Shell and Atmos both conform to and satisfy the delivery requirements for biogas found in the CEC's Third Edition and Fourth Edition of its RPS eligibility guidelines, issued in January 2008 and January 2011, respectively.

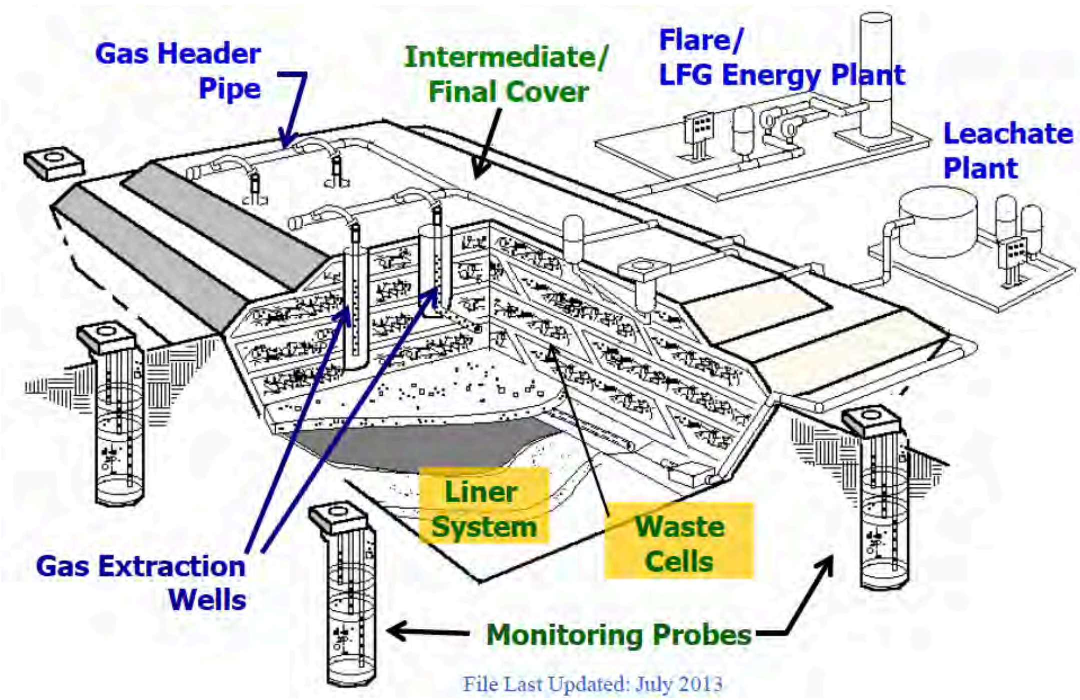
The language in both editions, as it refers to eligible pipeline deliveries, clearly allows delivery of biogas in a way that is consistent with regulatory standards at the Federal and California levels. Any arbitrary requirement to move gas on pipelines in some prescribed fashion would forbid altogether the use of the U.S. gas pipeline grid to transport biogas to the Department's power plants. To prevent use of the grid in this way would remove California's biogas demand from the nation's potential landfill gas supplies because the alternatives to the pipeline grid would be extreme in their expense, unnecessary and accomplish nothing in return, e.g., private pipelines or small-scale LNG. As indicated above, gas and biogas move on the pipeline grid under regulatory standards that ensure the most efficient and economical operations.

In summary, placing special requirements on the way the nation's gas pipeline grid delivers biogas – which is identical to natural gas once received by a pipeline – could not be guaranteed, and would frustrate RPS goals by increasing GHG emissions in several ways – by forcing added flaring at landfills because national markets for biogas could not be accessed by California buyers, or by requiring less efficient biogas transportation options such as very small-scale LNG. Ending any possible RPS compliance for biogas because the CEC cannot control the way pipelines operate would effectively retard interstate commerce by leaving only options available that would frustrate or circumvent FERC and CPUC gas pipeline policies and operations.

Biogas from Sanitary Landfills – What Is It and What Is the Best Use for It?

The biogas story begins with sanitary landfills.[2] After municipal solid wastes (MSW) are deposited, these sites are covered daily with earth and other material in order to protect public safety and health, and prevent odors and other nuisances. This process effectively top-seals the MSW on a regular basis, thus it minimizes MSW exposure to oxygen and thereby contributes to anaerobic decomposition. The result of anaerobic decomposition of the MSW is production in-place of raw biogas that consists mostly of carbon dioxide and methane in roughly equal measure, plus various impurities. After treatment (see Figure 1), the biogas that is delivered into pipelines (for redelivery to power plants, buildings and industries) consists primarily of methane, which is essentially the same as natural gas.[3]

Figure 1 Biogas Formation and Treatment Steps at Municipal Sanitary Landfills



Source: US Environmental Protection Agency (EPA).

[2] "In order to be designated a sanitary landfill, a disposal site must meet the following three general but basic conditions: 1) compaction of the wastes, 2) daily covering of the wastes (with soil or other material) to remove them from the influence of the outside environment, and 3) control and prevention of negative impacts on the public health and on the environment (e.g., odors, contaminated water supplies, etc.)." "Thus, all definitions of "sanitary landfill" call for the isolation of the landfilled wastes from the environment until the wastes are rendered innocuous through the biological, chemical, and physical processes of nature. " United Nations Environmental Program (UNEP), International Environmental Technology Center (IETC), *Solid Waste Management*, Vol. 1, Part III, pp. 323-324.

[3] Further technical detail on biogas capture, treatment and electricity generation technologies can be found in a number of resources, e.g., U.S. Environmental Protection Agency, *LFG Energy Project Development Handbook*, International Methane to Markets (M2) Partnership: *Landfill Gas Energy Technologies*. Kracow 2010.

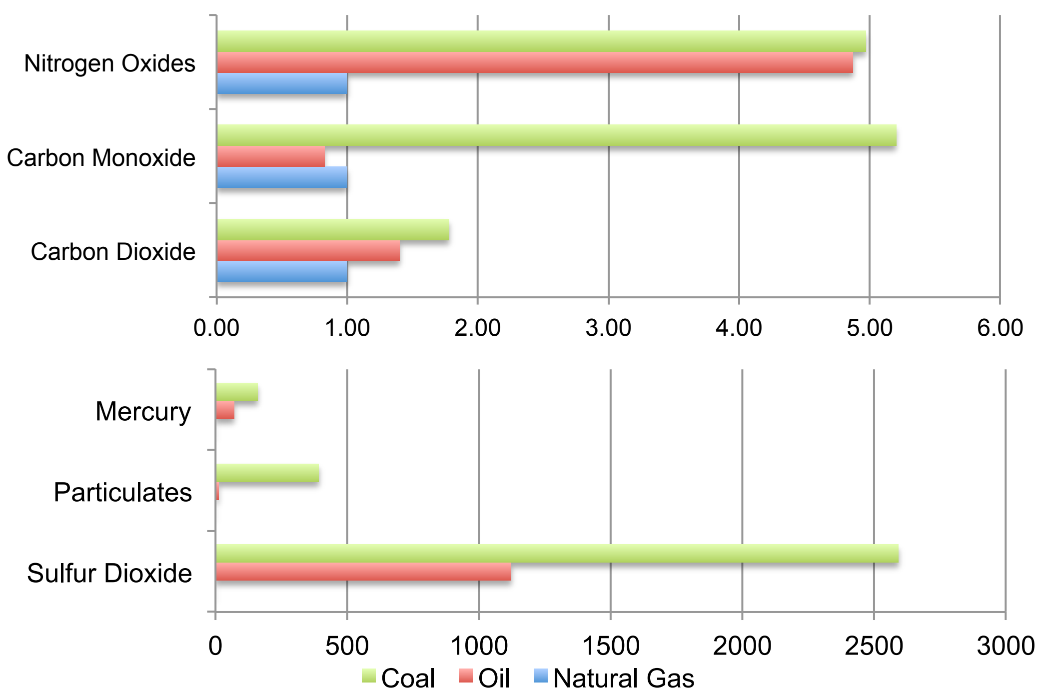
Biogas left in place in landfills and not recovered eventually works its way up to the surface, escapes through the top-sealing material, and enters the atmosphere. The problems created by atmospheric releases of biogas from landfills are numerous:[4]

- Public hazard, as the methane contained in biogas is explosive
- Nuisance and health risks to surrounding areas caused by noxious fumes and odors
- Air pollution, because unburned biogases act as photo-oxidants that form smog
- Global climate change –methane, a major component of biogas, is a powerful greenhouse gas, with global warming effects that are approximately 20 to 70 times that of carbon dioxide.

To prevent problems caused by escaping biogas, most communities with sanitary landfills require that it be captured and disposed of, typically by either one of two ways:

- Simply burning off the raw biogas (flaring)
- Treating the biogas to meet certain specifications so it may be transported along with, and intermingled with natural gas in pipelines and gas utility mains.

Figure 2 Comparison of Air Emissions from Burning Biogas versus Other Fuels (Biogas=1)



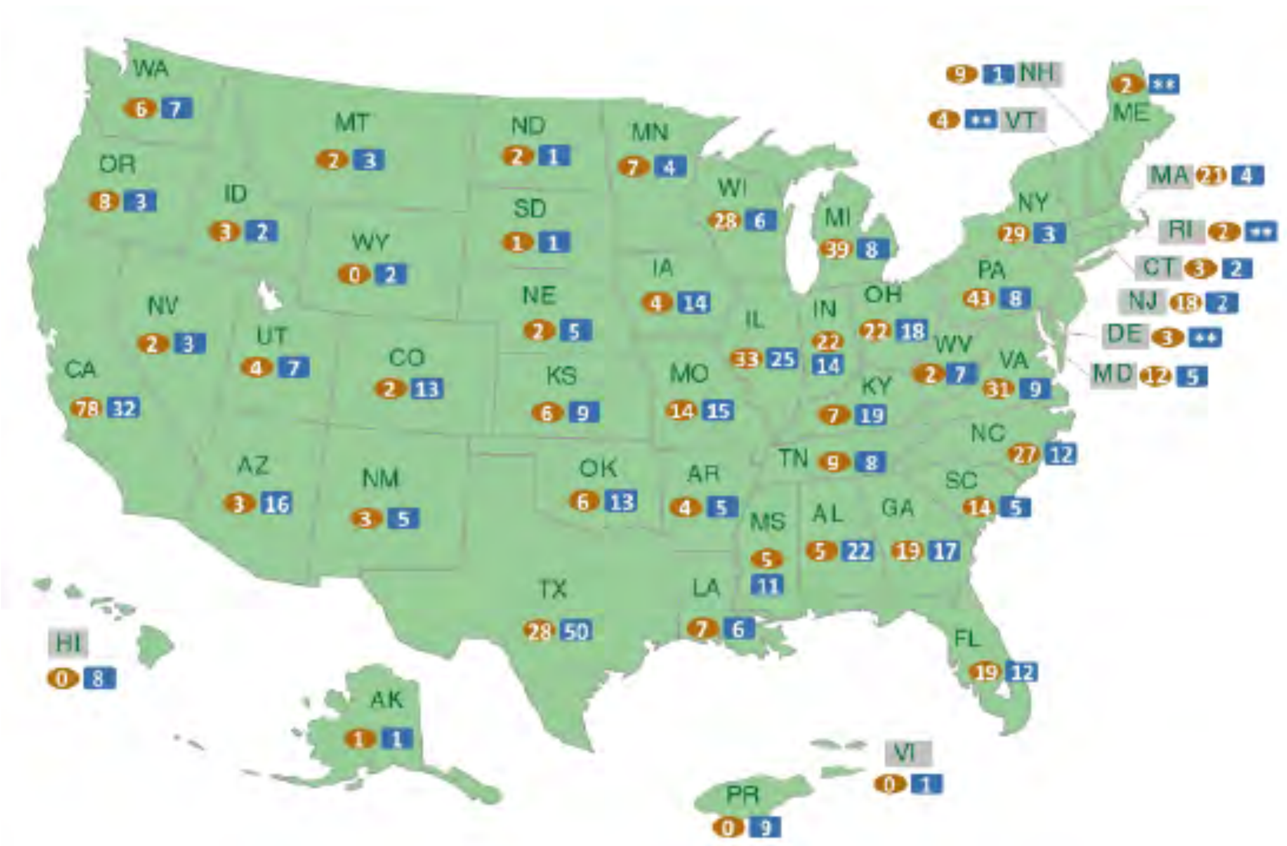
Source: US Environmental Protection Agency (EPA).

[4] See, for example, July 18, 2013 Notice of Intent issued by The Conservation Law Foundation to sue Broadrock Gas Services, LLC, Rhode Island LFG Genco, LLC, and Rhode Island Resource Recovery Corporation for violations of the Clean Air Act, which states, "Fugitive landfill gas threatens public health, disrupts the quality of life for many living near and around the Landfill, and contributes to climate change." (Page 3).

In particular, biogas is a nearly ideal fuel for electricity generation because it can be transported readily on existing gas pipelines and its air emissions when burned for electricity generation are minimal, as shown above in Figure 2.

At the present time, approximately 58% of the nation's landfills recover biogas for electricity generation or other such beneficial uses as supplemental natural gas supply, natural gas vehicles, etc. In other words, approximately 450 operating or recently closed landfills with one million tons of waste or more have no biogas recovery projects (see Figure 3).[5] There are reasons for this – only 29 of the 50 states have renewable portfolio standards (RPS), and none have goals that are as aggressive as those required in California under AB 32. In addition, low U.S. natural gas prices have reduced the incentive to recover biogas. Consequently, it is clear that California's demand for renewable resources can be a major driver for biogas recovery nationally on the U.S. gas pipeline grid (discussed further below).

Figure 3 Existing and Untapped Biogas Supply Projects, by State



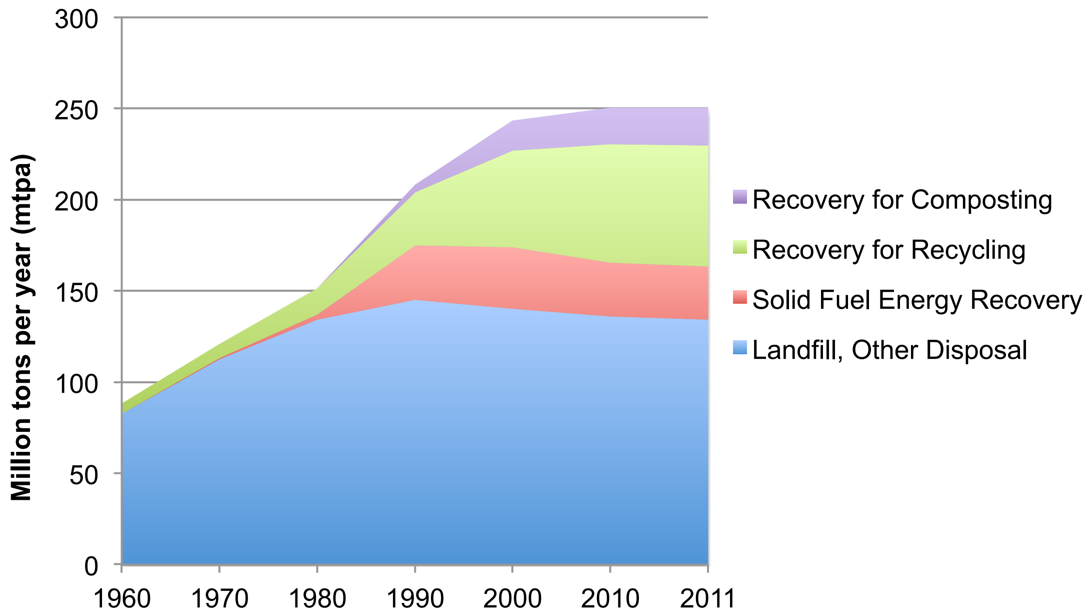
Source: U.S. EPA Landfill Gas Outreach Program, data current to June 2013.

Before leaving this section, it is worth noting that growth in MSW volumes is eventually limited by available landfill sites; therefore, as a matter of policy, MSW volumes are being curbed in the U.S. through concerted recycling and other programs. As shown in Figure 4, only about

5 An Overview of Landfill Gas Energy in the United States, U.S. Environmental Protection Agency Landfill Methane Outreach Program (LMOP), July 2013.

half the MSW produced in the U.S. (53.6% in 2011) is disposed of in landfills; the rest is recycled for use in a number of industries,[6] recovered and converted to solid fuel for electricity and steam generation, and composted.

Figure 4 Municipal Solid Waste (MSW) Generation and Recycling: 1960-2011



Source: U.S. Environmental Protection Agency, Municipal Solid Waste in the United States, 2011 Facts and Figures, Office of Solid Waste (5306P), EPA 530-R-13-001, May 2013.

After recycling and other recapture shown in Figure 4, the remaining 134 million tons per annum (mtpa) of MSW that is landfilled is sufficient to produce 1 GW of electric power, if it were all producing biogas. Not all biogas that could be produced, however, is being produced; the EPA reports that approximately 450 landfills in the U.S. do not now recover biogas.[7]

Conclusions. Biogas from landfills is a renewable resource that can be transported on the nation's gas pipeline network. Since biogas consists largely of methane, its capture prevents emissions of methane, a powerful greenhouse gas; capturing biogas also reduces air emissions and removes public dangers and nuisance in and around landfills. Recycling and composting programs have succeeded in stabilizing the growth in MSW that is actually landfilled in the U.S., although enough biogas is, or can be produced to power approximately 1 GW of electricity generation capacity.[8] California's prodigious demand for renewable fuels, resulting from its nationally leading RPS goals, serves as a catalyst for recovery of biogas from the approximately 450 U.S. landfills that do not now recover biogas.

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[6] Recovery for recycling includes newsprint and other paper materials, auto batteries and tires, steel, aluminum, yard clippings, glass, and a variety of recyclable plastics.

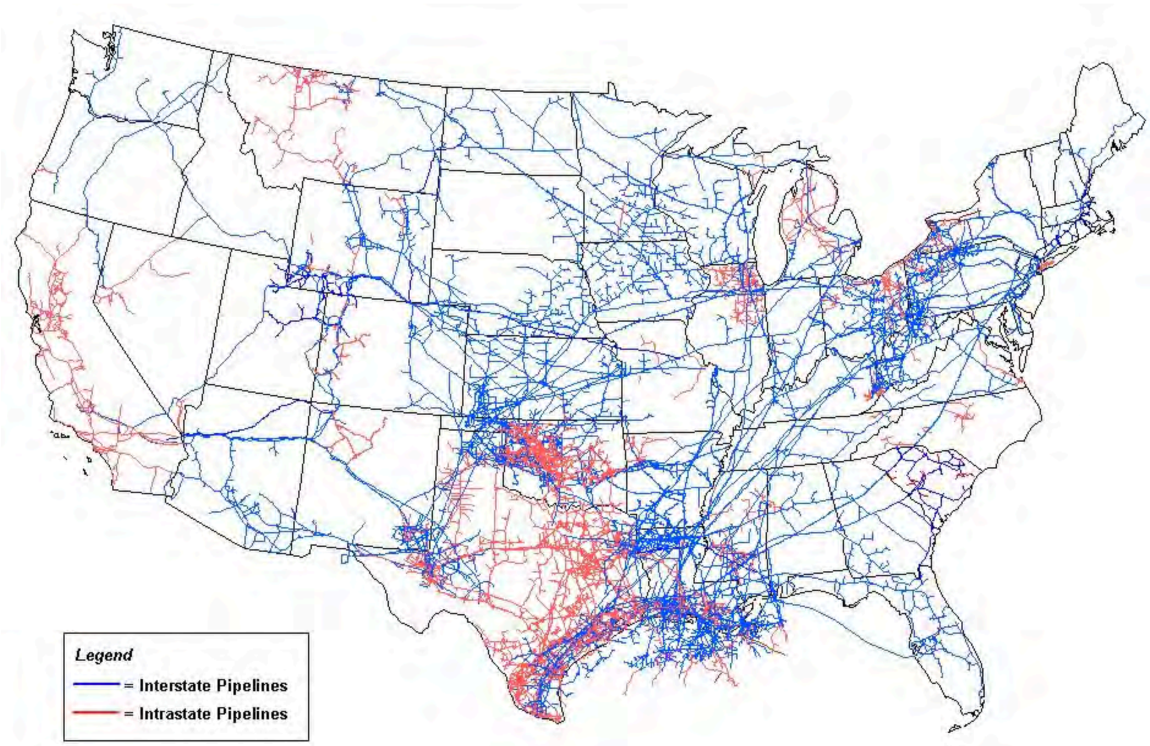
[7] Ibid., EPA Overview of Landfill Gas Energy.

[8] Based on information from the EPA and EIA, assuming 1,020 landfills produce enough electricity to power 500,000 homes (http://www.epa.gov/lmop/faq/lfg.html), and average electricity demand of 903 kwh per month per home, with 50% load factor.

The Gas Pipeline Network

Biogas is delivered to the Department's power generating facilities via the U.S. gas transmission pipeline network. This network is an interconnected grid consisting of more than 310,000 miles of high-pressure long-distance pipelines in the U.S. (illustrated in Figure 5), and more than two million miles of gas distribution utility lines, plus addition miles of gas-lines in Canada.

Figure 5 Natural Gas Pipeline Network



Source: EIA, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System.

The pipeline grid in North America is interconnected throughout the continent – the only exception is Alaska because its gas pipelines have no physical connection to the continental gas grid (Hawaii has no gas pipelines).[9] Consequently, every natural gas pipeline is interconnected with every other gas pipeline.

Before the 1980s, the nation's gas pipelines operated as merchants, with only limited interchanges of gas among them, thus natural gas flowed along a predictable path from contracted producers, down the pipeline, to contracted utilities. Gas or biogas produced in one consuming region could not, and did not, move to another consuming region.[10] Most gas

9 See Appendix A for further detail on the gas pipeline network and its interrelationship with gas price formation, and gas contracting and trading.

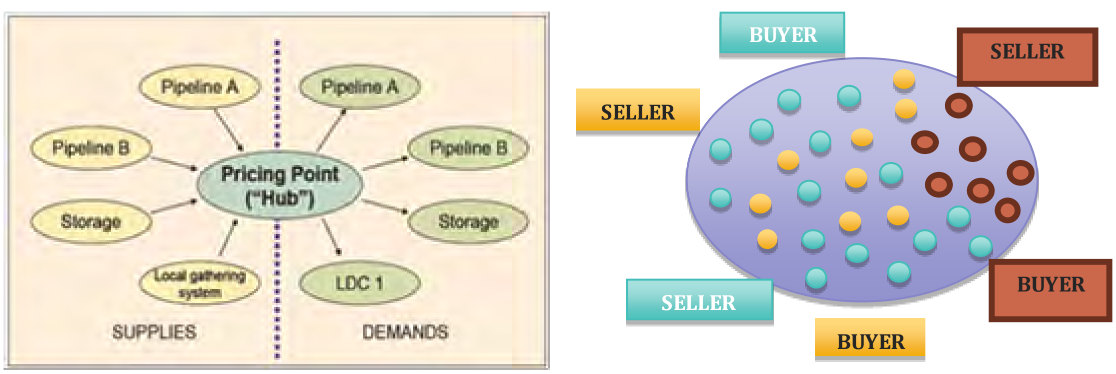
10 Except during certain gas supply emergencies.

pipeline networks outside the U.S. and Canada continue to function in this way, i.e., as individual merchant companies.

During the 1980s, following enactment of the Natural Gas Policy Act of 1978 and ensuing regulatory reforms, U.S. gas pipelines were transformed from a set of merchant companies independent of one another, to interdependent open access carriers.[11] During the 1990s and 2000s, the gas pipeline network strengthened its operations as open access carriers, and today it operates as an essentially unified grid. Gas flows along its most economical routes, following complex and always-changing paths from low price hubs to higher price points in a large number of ongoing supply auctions (discussed in more detail in Appendix A). In this way, gas finds its most economical route to market, and the pipeline grid functions in the most economical way to minimize consumer costs.

Since this transformation, tracing the movement of molecules of natural gas has been all but impossible, and commercially irrelevant.[12] Specific gas resources that are purchased under contract do not predictably, if at all, reach their buyers. Instead, gas now moves from hub to hub among more than 100 "pooling points" throughout the U.S. and Canada. At each pooling point, each molecule of gas, from all contracted sources, is comingled with all others, and then follows along its most economical path. The paths and flow directions may change daily in response to price signals that are volatile and change continually.

Figure 6 Illustration of Natural Gas Pipeline Hubs and Pooling Points



Source: Benjamin Schlesinger and Associates, LLC.

Figure 6 illustrates what takes place at pipeline hubs and pooling points, and shows how complex and irrelevant physical gas flows have become in commerce. On the left side of the figure, at the intersection of two or more pipelines, gas moves from a seller who has gas on one pipeline to a buyer needing gas on another pipeline based on relative prices, with gas sellers seeking the highest price. In other words, as depicted on the right side of the figure, gas from

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[11] Open access as it applies to U.S. pipelines refers to a contract carriage system under which the right to transport gas on the pipeline (up to a set maximum amount) may be reserved or booked by any third-party creditworthy shipper, who then may release capacity rights into secondary markets, i.e., much like a rental condo that may be sublet.

[12] Much as it is neither possible nor relevant to trace individual electrons in the power transmission and distribution grids.

any source (represented by different colors) is acceptable to the buyer, rather than the particular gas molecules being delivered by his seller. In this way, the fungible nature of natural gas molecules – or biogas, to the extent those molecules are also present in the mix – means the most economical path will always be followed. The point of this structure is to maximize consumer benefit.

In the nation's gas grid, the decision to ship gas is intertwined with the decision to buy and sell gas. If the price of gas at two different hubs, A and B, is the same, but a pipeline would have to be paid the regulated rate to transport gas from A to B, then gas needing to move from one hub to the other would, in fact, be sold at one hub and a same quantity of other gas (identical) will be purchased at the other hub.

The foregoing realities mean that concepts of "upstream" and "downstream" have less meaning than in the past; i.e., these terms might relate to actual gas supply flow paths in one month or on one day, but then not so in the next month or day. As described above and further in Appendix A, under Federal open access gas pipeline policies, price makes that determination. In other words, to ensure that the most economical gas supplies are made available to consumers, pipeline gas supply flows or is traded, so as to minimize transportation costs. Thus, even though a gas pipeline might flow in the direction of California, any individual gas or biogas supply contracted from a particular source might or might not flow physically to the customer.[13]

Likewise, under the 1997 Gas Accord and ensuing CPUC regulatory reforms, intra-state California gas pipelines operate in much the same way as Federally regulated pipelines, and commerce in natural gas takes place using the same kinds of commercial mechanisms in the interstate market. Even though a California gas pipeline might flow in the direction of Los Angeles, any individual gas or biogas supply contracted from a particular source might or might not flow physically to the specific customer.

Conclusion. North American gas pipelines function as an interconnected grid, under "open access" rules promulgated by the Federal Energy Regulatory Commission (FERC). As it has evolved over three decades, the nation's policy regarding gas pipelines is aimed at encouraging fair market trading of gas and efficient use of pipeline capacity, rather than forcing gas along one or another prescribed path. Consequently, concepts of "upstream" and "downstream" have less meaning than in the past; they might relate to actual gas supply flow paths in one month or on one day, but then not so in the next month or day. Instead, pipeline gas supplies flow in a way that takes advantage of multiple arbitrage opportunities, i.e., gas commerce in pipeline markets rebalances prices, so that gas travels from lower priced hubs to higher-priced hubs. Gas deliveries on the pipeline grid take place in a way that ensures the system operates in the most efficient and economical way possible. Thus, even though some Western gas

[13] The fact that it might or might not, and that flows are intertwined with arbitrage in a complex way, cannot be overlooked. Thus, biogas produced in the Houston, TX area where gas prices are, say $6.00 per MMBtu, will not flow to Wyoming, where gas prices are lower by, say $.75 per MMBtu; instead, trades will take place so as to effectively transport the gas most efficiently. But, conversely, biogas produced in a landfill in Pennsylvania, where prices are, say $4.00 per MMBtu, might physically travel to Houston in this example.

pipelines typically flow in the direction of California, the flow of any individual gas or biogas supply contracted from a particular source cannot be guaranteed to move in any prescribed direction.

The Department's Biogas Contracts' Compliance with Pipeline Grid Practices and Regulatory Standards[14]

The Department has filed with the CEC current information regarding the landfills from which Shell and Atmos have arranged to procure biogas on its behalf, which include the following:[15]

- Shell
    - Air Liquide -Live Oak Landfill, Atlanta, GA
    - Beacon Landfill, PA
    - Fort Smith Landfill, Fort Smith, AR
    - Greenwood Farms Landfill, Tyler, TX
    - Imperial Landfill, Pittsburgh, PA
    - Jefferson Davis Parish Sanitary landfill, Welsh, LA
    - Johnson County Landfill, Shawnee, KS
    - Pinnacle Road Landfill, Moraine, OH
    - Rumpke Sanitary Landfill, Cincinnati, OH
    - Stony Hollow Landfill, Dayton, OH
    - Turkey Creek Landfill, Houston, TX
    - Westside Gas Producers, LLC Landfill, Three Rivers, MI.

- Atmos
    - Seneca Landfill, Evans City, PA
    - McCarty Road Landfill, Houston, TX
    - Iris Glen Landfill, Johnson City, TN
    - Carter Valley Landfill, Church Hill, TN.

Information supplied by the Department identifies locations where the biogas is sourced, as well as the pipeline system that initially receives the Department's biogas. In addition, each interconnecting pipeline is identified. Each initial receiving and linked gas pipeline is part of the pipeline grid that transports biogas to the Department's RPS certified electricity generating plants in California.

In light of the information that the Department has supplied, we address the question of whether or not the Department's biogas contracts with Shell and Atmos, executed in 2009,

14 Summaries of the Department's biogas purchase contracts with Shell and Atmos are contained in Appendix B.

15 Locations are approximate; further information is on file with the CEC.

conform to and are consistent with the delivery standards and operations in the US gas pipeline gas network.

The answer to the foregoing question is yes. Under the Shell and Atmos contracts, biogas from each of the foregoing landfills is transported to the Department's facilities via gas pipelines that are interconnected under arrangements that are typical of, and consistent with the way gas is transported along the U.S. gas pipeline network. As described in the foregoing section, natural gas is a fungible commodity, and this includes biogas from landfills. Once biogas has been produced from landfills, it consists largely of methane and other materials in a way that meets gas pipeline acceptability standards with respect to quality and heat content. If biogas were not interchangeable with natural gas and failed to meet pipeline quality and heat content standards, then it would be rejected by the pipeline and could not be delivered anywhere via the nation's gas pipeline grid. When biogas is accepted by the pipeline and is injected into a pipeline system, it is then completely indistinguishable from, and is commingled with natural gas derived from other sources.

At that point, once Department's biogas enters a gas pipeline, it is transported to California the same way any other gas supply is transported to California under U.S. gas pipeline practices and standards that comport with the FERC's regulatory market design as described above in this report and in Appendix A. For the Department's biogas under the Shell and Atmos contracts, this works in either of the following two ways:

- Front-Haul with the flow of gas along the physical contract path. To the extent gas hub prices are uniformly rising along the physical contract path from the contracted landfill to the Department's power plants, then the biogas will be "front-hauled," i.e., will travel in the direction of the final delivering pipeline to California, i.e., to the Kern River Pipeline in each of the Department's sources of biogas under its contracts with Shell and Atmos.

- Back-Haul against the flow of gas along the physical contract path. To the extent gas hub prices are not uniformly rising along the physical contract path from the contracted landfill to the Department's power plants, then the biogas will be "back-hauled," i.e., will move physically against the direction of flow or will be sold elsewhere and be delivered through repurchase at the necessary location. The purpose of back-hauls is to minimize the cost of transporting gas in pipelines, and to signal markets about the need for changes in pipeline capacity. In this instance, under the Department's contracts with Shell and Atmos, the physical biogas supplies will travel to their most economical destination, and Shell or Atmos, as the case may be, will purchase an equivalent volume of gas for delivery to the Department's power plants via the Kern River Pipeline.

In the foregoing way, the Department's biogas contracts with Shell and Atmos are transported in a way that is consistent with operations in the U.S. gas industry under the FERC's rules and regulations that apply to the pipeline network, within the pipelines' FERC-approved transportation tariffs.

For example, the segments in the physical contract path from the KC Landfill-to-Gas Energy Project, which is located adjacent to the Johnson County Landfill in Shawnee, Kansas, are as follows:[16]

- The EIF KC Landfill-to-Gas Energy Project injects the Department's biogas into the Quest Pipeline (currently, KPC Pipeline). The KPC Pipeline is a Federally regulated interstate pipeline that operates under its FERC tariff on an open access basis along lines described in this report.

- In the next link en route to California, KPC Pipeline interconnects near Kansas City, Kansas, with the Panhandle Eastern Pipeline ("PEPL"), which is also a Federally regulated interstate pipeline that operates under its FERC tariff along lines described in this report.

- PEPL interconnects in Indiana with the Rockies Express Pipeline ("REX"), which is an east-west gas pipeline, and is also Federally regulated as above.

- REX is interconnected in Western Wyoming with the Kern River Pipeline, which is a WECC region pipeline that delivers gas to California.

- Finally, the Department's biogas is delivered to California using its firm capacity contract on Kern River.

As of March 2014, the array of hub prices along the foregoing contract path is as shown in Figure 7.

At first glance, it appears that March 2014 gas hub prices are uniformly rising along the physical contract path from the Johnson County Landfill to the Department's power plants in Los Angeles, and that the Department's biogas is being "front-hauled" in the direction of California. However, gas prices are volatile, thus the Department's biogas supplies will follow pricing signals and flow against the physical contract path from time to time, at any time. In other words, under the regulatory system in place for U.S. interstate gas pipelines, there can be no guaranty of front-haul or back-haul, only that the gas will physically flow from point to point in its most economical and efficient direction. The gas delivery mechanisms described above, in the previous section of this report, and in Appendix A, are a valid, efficient and necessary means of gas transportation on the nation's pipeline grid.

Conclusion. Under the Department's biogas contracts with Shell and Atmos, flows of biogas move along the physical contract path in a way that is consistent with Federal regulatory policy. Flows along the physical contract path may from time to time include front-haul or backhaul, with front-haul or back-haul gas deliveries taking place as needed to optimize pipeline system operations and minimize the cost of transportation. Pipeline quality and heat

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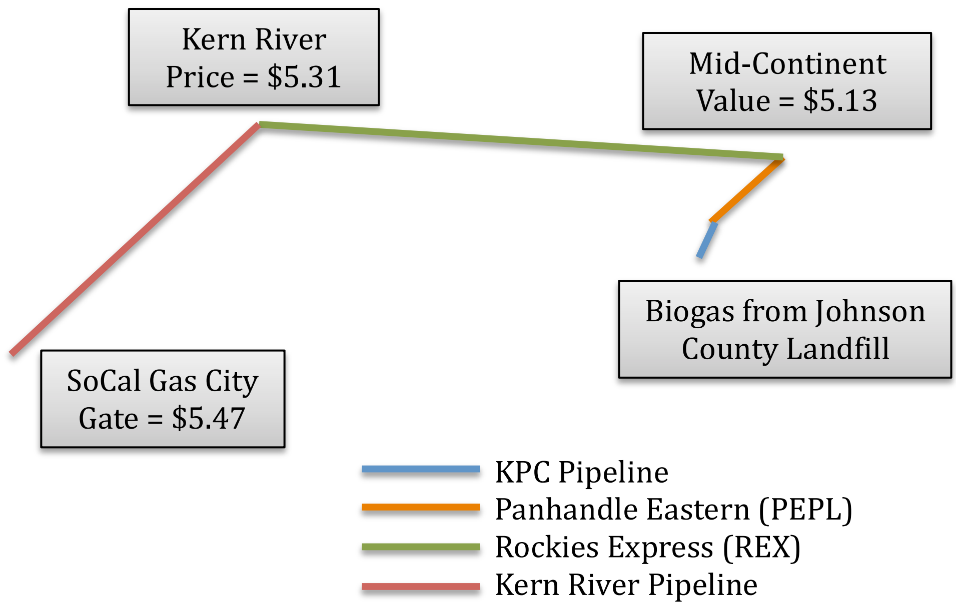
[16] First amendment to the June 30, 2008 Base Contract for Sale and Purchase of Natural Gas between the LADWP and Coral Energy Resources (Shell), LADWP Agreement No. 96 125-510, Attachment C: "Landfill Gas Producer Attestation."

content standards require that biogas injected into pipelines be identical to, and interchangeable with natural gas in all respects. For this reason, by delivering natural gas to the Department at the Kern River Pipeline for biogas produced at landfills elsewhere, Shell and Atmos are complying with Federal regulatory policy and operating exactly as those regulations intend, as outlined in this report and in Appendix A.

Figure 7 Physical Contract Path: Johnson County Landfill Biogas to Los Angeles



Source: Benjamin Schlesinger & Associates, LLC, from Platts McGraw Hill Financial, Inside FERC's Gas Market Report, Prices of Spot Gas Delivered to Pipelines, March 1, 2014.

CEC RPS Guidelines, Pipeline Regulatory Policies, and Industry Standards

This section addresses the question of whether or not the CEC's RPS eligibility standards and guidelines with respect to the transportation of biogas from its sources of production to the Department's possession are consistent with approved pipeline tariffs and actual standards of practice at the Federal level and within California.

The answer is yes, they were at the time the Department entered into the Shell and Atmos contracts. Over the past several years, the CEC's guidelines for certification of facilities under the State's Renewable Portfolio Standards have undergone a number of changes and revisions with respect to the way biogas may be delivered. RPS guidelines in effect at the time the Shell and Atmos contracts were entered were those set forth in the CEC's Third Edition, dated January 2008.[17] The Third Edition remained in effect until January 2011, when CEC

[17] California Energy Commission (CEC), Commission Guidebook: Renewables Portfolio Standard Eligibility, Third Edition, January 2008 (CEC-300-2007-006-ED3-CMF).

promulgated the Fourth Edition.[18] The Fourth Edition was issued in large measure as a clarifying document to the Third Edition.[19]

In each of these documents, the eligibility for certification of biogas delivered by pipelines to California power plants required the following:

> "The gas must be injected into a natural gas pipeline system that is either within the WECC region ***or interconnected to a natural gas pipeline system in the WECC region that delivers gas into California.***…"[20]

As discussed in the foregoing section, every U.S. gas pipeline is physically interconnected with (i.e., is literally bolted to) every pipeline that delivers gas into California. This includes, for example, the Rockies Express (REX) pipeline, described above, that moves gas between Marcellus shale fields in the Ohio Basin and the interconnection in Wyoming with the Kern River Pipeline, which delivers gas to California. REX also has interconnections with a number of pipelines between Wyoming and Ohio, including PEPL in the example discussed above. The foregoing language also includes the Enterprise Partners Pipeline that moves gas between the Houston area and interconnections in West Texas with the El Paso and Transwestern Pipelines, both of which deliver gas to California. Likewise, the CEC's language covers each of the physical contract paths from each source of biogas in Department's contracts with Shell and Atmos.

Consequently, the clause in the foregoing provision that is italicized and in bold demonstrates that the CEC understands clearly the way the interstate (and in-state) gas pipeline network functions, i.e., through its interconnections or hubs, and that it will allow transshipments of biogas from distant landfills to the state's power plants, as long as the pipeline receiving the biogas is interconnected with a pipeline located in the WECC region that delivers gas to California.

A clarifying provision was added in the Fourth Edition that further underscores the consistency of the Commission's RPS Guidelines with standard U.S. gas pipeline operations, as follows:

> "The applicant, or authorized party, must enter into contracts for the delivery (firm or interruptible) or storage of the gas with every pipeline or storage facility operator transporting or storing the gas from the injection point to California (or to the electric generation facility if the electric generation facility is located outside of California).

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18 California Energy Commission (CEC), Commission Guidebook: Renewables Portfolio Standard Eligibility, Fourth Edition, January 2011 (CEC- 300- 2010- 007- CMF).

19 In the Seventh Edition of the Commission Guidebook, footnote 16 on page 22 states: "The eligibility requirements for the third and fourth editions of the RPS Eligibility Guidebook are largely the same with some additions to the fourth edition of the guidebook that were largely introduced as clarifications to the third edition guidebook."

20 Ibid., Third Edition, page 21; in the Fourth Edition, see page 20 (note that, in the Fourth Edition, the term biomethane is used instead of the term gas, and the word "located" is added to this provision; otherwise, the two corresponding provisions are identical in wording).

> ***Delivery contracts with the pipeline operators may be for delivery with or against the physical flow of the gas in the pipeline***."[21]

This provision also poses no limitations as to the operation of the gas pipeline network in delivering biogas to California, since delivery under contract may take place "with or against the physical flow of gas in the pipeline" i.e., clearly referring to front-haul and back-haul as practiced throughout the gas pipeline grid.,

For this reason, it is clear that the foregoing clarification reinforces the consistency of the Commission's guidelines with standard industry practice because essentially all flowing gas on pipelines is either front-haul or back-haul, as discussed above. Consequently, the Third and Forth Edition guidelines permitted biogas to flow to California power plants along the U.S. pipeline network in a way that is consistent with operations that are FERC-authorized (and CPUC-authorized, for in-state gas pipelines).

Conclusion. CEC could not have stated more clearly in its RPS eligibility guidelines that were in effect at the time the Atmos and Shell contracts were entered that biogas deliveries could be made to California power plants via the U.S. gas pipeline network according to the standards under which that network operates under FERC rules. These operations involve market-based flows enabling efficient operations along lines described in the preceding section of this report, as amplified in Appendix A.

The Jones "Letter of Interpretation" Dated September 22, 2009

Between the time the CEC issued the Third and Fourth Editions of its Eligibility Guidelines, On September 22, 2009, Melissa Jones of the CEC staff sent to Cambrian Energy Management, LLC a five-paragraph letter captioned "Letter of Interpretation - California Renewables Portfolio Standard Biogas Injected Into a Natural Gas Pipeline."

At its core, the Jones letter states as follows:

> "According to the Renewables Portfolio Standard Eligibility Guidebook, Third Edition, biogas injected into a natural gas transportation pipeline must be "delivered into California for use in an RPS-certified multi-fuel facility" (Footnote to Third Edition, Page 20) to result in the facility's generation being considered as RPS- eligible electricity. Consequently, there must be a physical contract path from the injection facility to a point within the state of California. Other natural gas transport mechanisms are not satisfactory methods of delivery. For example, selling biogas at an out-of-state hub and purchasing an equivalent amount of gas from an in-state hub is not a satisfactory method of demonstrating delivery into California and would not meet the RPS eligibility requirements.

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[21] Ibid., Fourth Edition, page 20.

> "Biogas injected into a natural gas pipeline may be delivered as either firm or interruptible. However, only the biogas that is delivered may be counted towards the renewable component of the designated electric generation facility. In the event of an audit, at a minimum the parties must provide monthly invoices demonstrating delivery at each delivery point along the physical contract path. Further documentation may be required at the discretion of Energy Commission staff."

The foregoing interpretation (herein, the "Jones Interpretation") is surprising because it runs counter to the plain language of the Third Edition, which (again) states:

> "The gas must be injected into a natural gas pipeline system that is either within the WECC region or interconnected to a natural gas pipeline system in the WECC region that delivers gas into California."[22]

This passage is the only portion of the Third Edition of the CEC's RPS eligibility guidelines that addresses directly the matter of how biogas procured from out-of-state landfills and injected into gas pipelines must be transported to California. The passage clearly states that one of the choices available for delivery of biogas is through a pipeline that interconnects with a Western pipeline that delivers gas to California (herein, a "WECC pipeline"). As stated above, this requirement for an interconnection could refer to any pipeline in North America other than those located in Alaska, which would not qualify, as they are not "interconnected to a natural gas pipeline system in the WECC region that delivers gas into California" or any other pipeline in the Lower 48 states.

Moreover, there is no limitation in the foregoing passage as to which way the interconnecting gas pipeline must flow, only that the "gas pipeline system in the WECC region…delivers gas into California." In addition, there is no limitation as to the number of pipelines through which the required interconnection must be present. In other words, a pipeline interconnects with a WECC pipeline if it interconnects with another pipeline that interconnects with a WECC pipeline – if it takes more than one pipeline, there is still an interconnection present to a WECC pipeline.

The term "physical contract path" appears nowhere in the Third Edition of the CEC's RPS regulatory guidelines as they relate to biogas; indeed, its first mention by the CEC at all is in the Jones Interpretation. But even this requirement does not change matters because the term does not, on its face, preclude back-haul in order to deliver gas to the WECC pipeline.

The Fourth Edition, which was issued approximately 15 months after the Jones Interpretation, lends further support to the CEC's acknowledgement of how the pipeline system operates to deliver biogas to California. In the Fourth Edition, the following clarification was added:

> "Delivery contracts with the pipeline operators may be for delivery with or against the physical flow of the gas in the pipeline."[23]

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22 Ibid., Third Edition, page 21.

23 Ibid., Fourth Edition, page 20.

This passage utterly belies the Jones Interpretation. In fact, the practice of delivering gas by buying at one hub and selling at another is fully consistent with the way pipeline systems and their shippers operate under both Federal and California regulations.

Had the CEC precluded back-haul as a biogas delivery mechanism, as would the Jones Interpretation, biogas could not be delivered via pipelines because, in so doing, the CEC would have required that transportation function in a way that cannot coexist with regulatory standards for pipeline operations. As described in preceding sections, these standards came into effect for good reasons – namely, to prevent uneconomic and inefficient gas flows from taking place on the pipeline network, just the kinds of flows that the Jones Interpretation would attempt to enforce.

Conclusion. The Jones Interpretation stands apart from the plain meaning of the CEC's Third Edition of its RPS Eligibility Guidelines as they refer to pipeline deliveries of biogas. The clarification CEC put forth in the Fourth Edition even further isolates the Jones Interpretation from the CEC's intent at the time.[24] To accept the 2009 Jones Interpretation under which "selling biogas at an out-of-state hub and purchasing an equivalent amount of gas from an in-state hub is not a satisfactory method of demonstrating delivery into California and would not meet the RPS eligibility requirements"[25] would be to run counter to the regulatory and commercial mechanisms that are in place throughout the grid, nor, indeed, could any such a limitation be guaranteed to take place at all. By disallowing the fluid gas pipeline market mechanisms in place for three decades, the Jones Interpretation would altogether preclude the use of natural gas pipelines to make biogas deliveries.

Compliance of the Shell and Atmos Contracts with CEC Guidelines

This section addresses the following two questions:

a) Did LADWP's biogas contracts with Shell and Atmos, executed in 2009, conform to and satisfy the delivery requirements for biogas found in the 3rd Guidebook for the CEC?

The answer is yes. For reasons described above, the LADWP's biogas contracts with Shell and Atmos both conform to and satisfy the delivery requirements for biogas found in the CEC's 3rd Guidebook. The language in this Guidebook, as it refers to eligible pipeline deliveries, clearly allows biogas transportation as encouraged by both Federal and California rules.

b) Did LADWP's biogas contracts with Shell and Atmos, executed in 2009, conform to and satisfy the delivery requirements for biogas found in the 4th Guidebook for the CEC?

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24 Later on, in the Seventh Edition, the CEC changed its RPS certification guidelines in a way that absolutely forecloses the use of the U.S. gas pipeline network to deliver biogas.

25 Letter from Melissa Jones, CEC, to Evan Williams, Cambrian Energy Management, LLC, dated September 22, 2009, page 1.

Again, the answer is yes. If there was any doubt as to the CEC's intent to allow biogas deliveries along lines of open access pipeline policies, the Fourth Edition erased those doubts because it allows "delivery with or against the physical flow of the gas in the pipeline." The alternative offered by the Jones Interpretation would preclude transportation of biogas on the U.S. gas pipeline system because, under the FERC's regulations and pipeline operations as practiced in the industry, there can be no guaranty of front-haul or back-haul at any given time or location along the physical contract path.

The only alternatives available to use the nation's gas pipeline grid by which the Department could obtain biogas from distant sources would force an excessive and unnecessary economic penalty on the Department's ratepayers. Individual landfills produce fairly limited quantities of biogas, e.g., at most 2,000 Dth to 5,000 Dth per day, therefore, constructing a new, special gas pipeline to transport biogas from a distant landfill to California – which is what it would take to guaranty front-haul – would be unprecedentedly uneconomical. The alternatives to using the nation's pipeline grid to deliver biogas as it operates are generally uneconomical, e.g., to liquefy biogas at its point of production, converting it into liquefied natural gas (LNG), then deliver the LNG to California by truck or rail. Again, such small-scale LNG options are only used where there is no alternative delivery mechanism because they are very costly compared to pipelines in terms of dollars and energy required. Consequently, requiring LNG at such small scale would be extremely inefficient and uneconomical and would, likewise, exact a prohibitive penalty on biogas and upon the Department's ratepayers with no corresponding benefit.[26]

Conclusion. As described above, here in the U.S., we have an elaborate gas pipeline network that operates by intent through front-hauls and back-hauls taking place in ways that make the most efficient and economical use of the grid. There is and cannot be any guaranty that molecules of gas will move in any particular direction. Indeed, this is also true within California, along in-State gas pipelines – gas deliveries to power plants and other buyers can be guaranteed, and a path may be designated. However, as it is regulated and functions much like the Federal gas pipeline grid, California gas pipelines also operate, by intent, to deliver gas in the most economical way possible.

In summary, the Third and Fourth Edition of the CEC's RPS Eligibility Guidelines encourage biogas transportation and delivery via the U.S. pipeline grid. Any other interpretation would have forbid the use of the U.S. gas pipeline grid altogether to transport biogas to the Department's power plants, thus removing California's biogas demand from the nation's landfills. The alternatives to the pipeline grid are extreme in their expense, unnecessary and accomplish nothing in return. Any interpretation like that in the Jones letter would, moreover, frustrate RPS goals by increasing GHG emissions in several ways – by forcing added flaring at landfills because markets for biogas cannot be accessed, or by requiring less efficient biogas transportation options such as very small-scale LNG. By ending all possible RPS compliance for biogas by preventing shipment through US gas pipelines, the Jones Interpretation would

[26] Further information about construction and operational costs of small-scale LNG, energy consumed in its processes, and when and why it is sometimes used may be found in several references, e.g., the UN Economic Commission for Europe (ECE) Sustainable Energy Program, *Current state and prospects of LNG in the ECE Region*, 2014.

retard interstate commerce by leaving only options available that would frustrate or circumvent FERC and CPUC gas pipeline policies and operations.

Appendix A: How Natural Gas Pipelines and Pricing Work

This appendix provides a description of North American gas price formation in relation to the gas pipeline network, including pricing methodology and trends, volatility, and review of underpinning assumptions and the impact of underlying key drivers.

North American gas prices are formed explicitly by the forces of supply and demand acting at each of a large number of individual trading locations (hubs, or pooling points). The major concepts and assumptions that underpin this market have changed dramatically in the past several decades, and today they differ sharply from the underpinnings of more traditional markets elsewhere. Some of the important differentiating aspects of the way prices are formed in the North American gas pipeline markets include:

Gas spot markets. Most gas is bought and sold in the US and Canada in physical spot transactions on trading clearinghouses and in short and immediate term bilateral transactions. Transactions may be bilateral in the sense that the legal ownership of gas changes in each trade passes from one seller to one buyer at a specified volume, price, time and location (i.e. at a specific hub or market centre, see below). Alternatively, transactions may take place on clearinghouses, with multiple buyers and sellers acting in to establish a single pool price, much like power pools, e.g., on the InterContinental Exchange (ICE). Whether they take place within clearinghouses or in bilateral transactions, spot gas trades reconcile instantaneous supply/demand imbalances when and where they occur, thus they act as market-clearing mechanisms in an economic sense. In other words, spot gas prices are usually arrived at without direct reference to other fuels such as oil or coal. Longer term transactions take price signals from reported gas spot prices at hub locations.

Hubs and indices. A hub where participants can buy and sell gas typically consists of a pipeline receipt or delivery zone, a multi-pipeline intersection, or a gas storage facility. Examples of each of these include:

Hype of Hub or Pooling Point	Examples
Pipeline receipt or delivery zone	Permian Basin, Houston Ship Channel (HSC), Socal City Gates
Multi-pipeline intersection	Socal border, Henry Hub, Wheeler Ridge, Malin
Gas storage facility	Lebanon, PA

Henry Hub is an especially active intersection-based hub where buyers and sellers can move gas from any one of eight intersecting pipelines to another. Henry Hub is the physical delivery location in the highly-traded NYMEX gas futures contract, thus underpinning its importance in the North American gas trade. As illustrated in Figure 6, natural gas at a hub is fungible because quality and other pipeline gas specifications do not differ greatly from one pipeline system to another. Price reporting services – e.g. Platts, Natural Gas Intelligence, Natural Gas

Week – continually survey dozens or hundreds of market participants and, from these data, they construct and publish daily, weekly and next-month price indices.

Capacity markets. FERC-regulated pipelines are not allowed to buy and sell gas (apart from incidental amounts); instead, they offer tolling services for hire – transportation, storage, etc. The same regulatory structure holds true for most state-regulated pipelines, e.g., pipelines within California. The right of third-party access to pipeline capacity guarantees that the pipeline's owners cannot act to create bottlenecks that would otherwise interfere with the market or compete with buyers and sellers.[27] Capacity is acquired directly with the pipeline by contract, or from existing contract holders in secondary markets in which firm capacity rights are released to other shippers. In this way, pipeline capacity rights are available in a flexible array of durations, some for a decade or more and some as short as a day or less (e.g. for power generation needs), and along various paths.

Marketers and brokers. With the profusion of buyers and sellers in North America, and the many spot gas and pipeline capacity choices, most trading is carried out between and through marketing companies whose role it is to facilitate transactions. Some consultants and brokers also facilitate trades, although most marketers act as traders in that they buy and sell gas at a price, rather than as brokers who simply match parties, and they deal directly with infrastructure owners to transport and store gas in separate transactions. For any gas buyer or seller, there is always a marketer willing to serve as a counterparty, albeit at a market price. This market structure has been crucial to the development of shale gas, whose supply may vary considerably and on short notice.

Physical and financial transactions. Price risk management services (often purely hedging) are available in separate markets and contracts apart from, and alongside, physical market transactions in North America. These markets include regulated exchanges such as the Chicago Mercantile Exchange's New York Mercantile Exchange (CME-NYMEX) and the Inter-Continental Exchange (ICE), as well as in less-regulated over-the-counter (OTC) transactions. Some degree of bundling physical and financial transactions is frequently available as well, thus presenting numerous choices of how to structure transactions. The availability of price risk management services in separate markets contributes to liquidity of gas spot markets in North America because it frees them to focus on physical gas matters while pricing at index, leaving them unburdened by the need to define and incorporate longer term pricing matters in each deal.

Standardized contracts. Liquidity requires a large number of transactions, which would not be possible if each contract had to be scripted individually. North American gas markets operate efficiently using standard sales and purchase agreements (SPA). For physical transactions, the standardized contract issued by the North American Energy Standards Board (NAESB) reduces the individual transaction to filling out a few blank spaces in a single cover sheet – names, identification, volume, receipt and delivery points, start date, end date. Most other terms and conditions are stated in the body of the standard contract, including

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[27] The ability to do so could severely distort markets, e.g., in 2000, when a physical break in the El Paso pipeline during a low hydro season reduced capacity, causing a massive upsurge in gas prices in California and elsewhere throughout North America.

responsibilities of the parties, default conditions, force majeure, billing, balancing, etc. Creditworthiness is typically agreed and demonstrated in advance. Likewise, pipeline transportation arrangements are handled in standard-form contracts along lines of examples contained in each pipeline's tariff. Financial contracts are also offered at standard terms and conditions, e.g. the NYMEX gas futures contract is lengthy but has only two blanks to be completed: the price of gas and the month of physical delivery, all else is standardized.

Variety and flexibility. Prices may be biased upward or downward depending on the degree of flexibility one party has relative to the other party, or other conditions. For example, swing contracting enables one party to backstop the other's requirements, at a premium. Likewise, put conditions enable sellers to dispose of gas when and where it becomes available, i.e. put gas to the buyer, also with an agreed price bias relative to index.

As the US and Canadian gas markets evolved the foregoing ways of doing business over the past three decades, trading has become all the more smooth, flexible and widespread. Market information has become excellent at each of more than 100 hubs around the continent. As described above, competing suppliers and buyers in North America continually negotiate and establish gas prices throughout each day at hubs in spot markets, with diurnal, geographic, and service differentiation as needed in individual cases. Weather, pipeline capacity availability, electricity and other demand surges, and other forces affect changes in the value of gas throughout the day and throughout the grid every day, thus buyers and sellers are continually bidding and settling under different circumstances that drive prices in different directions. As production and demand changes take place, gas demand and supply can vary greatly from point to point throughout the grid over days, seasons, and decades – and these variations drive differences among hub prices.

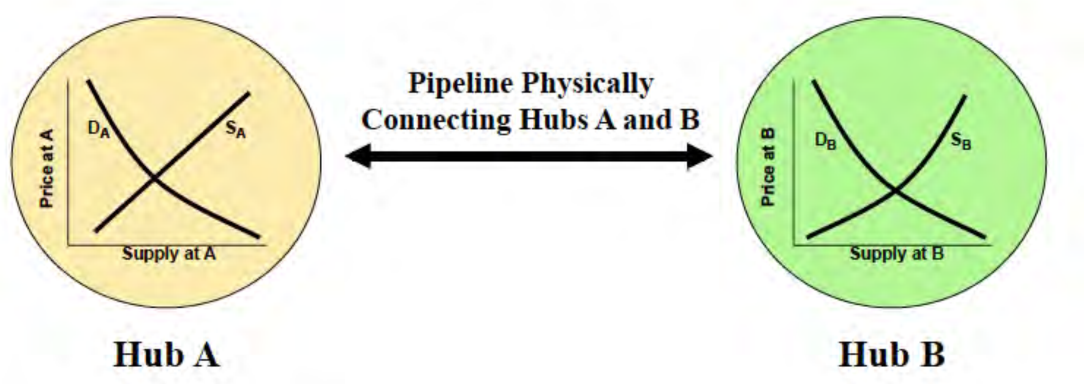
Decision to Transport or Trade[28]

Basis differential (or just "basis") is defined as the difference in the value of gas, the commodity, at one location versus at another location. As primary and secondary pipeline capacity markets gained in trading activity, competitive basis differentials have emerged among dozens of market centers, or hubs, throughout North America.

Importantly, basis bears little relation to pipeline transportation rates, which are set under U.S. regulation taking into account costs of service, i.e., capital recovery, rate of return, etc. Instead, basis is determined by gas prices reflective of supply-demand balances in different markets. In Figure 8, Hub A and Hub B each represent active gas markets, at which trading is liquid enough so that price is determined by the interaction of supply and demand at any point in time. In other words, gas may always be bought or sold at each hub because there is always a counterparty, at a price.

[28] This discussion is adapted and taken largely from Energy Law and Transactions, Section 87.02(9), authored by Benjamin Schlesinger.

Figure 8 Interaction of Hubs and the Transport or Trade Decision



For example, if the cost of gas is $4.00 per MMBtu at Hub A and $4.10 per MMBtu at Hub B, then the basis differential is $.10/MMBtu.

If one assumes that the pipeline's maximum allowable transportation rate to transport gas from point A to point B equals $.45/MMBtu, then basis markets work as follows:

If Basis is less than maximum rates, e.g., the $.45 per MMBtu referred to above, then the pipeline may discount to meet basis: Apart from long-term contract pricing arrangements that may be extant, no pipeline can reasonably expect to receive more than the basis at any point in time for shipping gas from Hub A to Hub B at that same time, regardless of its lawful maximum tariff rates.

In short-term capacity markets, which accounts for the overwhelming majority of gas industry transactions, a pipeline's attempt to collect maximum rates in excess of basis would encounter competition from the trade in gas: a shipper in this example who needs to move gas from Hub A to Hub B would sell off his gas at Hub A for $4.00/MMBtu, and repurchase gas at Hub B for $4.10/MMBtu, calling his loss of $.10/MMBtu the cost of "transportation" from A to B. Thus, basis limits the rates pipelines can charge as long as Hub A and Hub B are both competitive points of supply and demand.

Appendix B: Summaries of Shall and Atmos Contracts

This appendix provides brief summary points in the Department's contracts to purchase biogas from Coral Energy Resources. L.P., a subsidiary of Shell Energy North America ("Shell"), and from Atmos Energy Marketing ("Atmos").

There are two parts to each of these contracts:

- Base Contract for Sale and Purchase of Natural Gas. For their basic buy-sell terms and conditions, both Shell and Atmos have adopted the North American Energy Standards Board (NAESB) standard form contract (NAESB Standard 6.3.1) that is widely used throughout the gas industry. The NAESB is a voluntary group organized to increase transactional efficiency and reduce cost by providing, at nominal charge, standard form agreements of this kind for common transactions. Parties to contract need to complete the first page, in which they identify themselves for notice, billing and other purposes, and they make a number of elections presented throughout the contract. Parties also frequently append additional terms and conditions that fit their individual transactions, as both Shell and Atmos have done. In each case, the parties have appended to the standard NAESB contract language a number of specific provisions that are primarily technical and legal clarifications.

- Transaction Confirmation for Immediate Delivery. For specific aspects of the transaction, such as price, delivery conditions and other transaction-specific elements, both Shell and Atmos have used the NAESB format, but have added a number of terms and conditions, certifications, and the like that apply to the biogas transaction.

Specifics for each contract follow:

Key provisions of Shell Contract (LADWP Agreement No. 96 125-510)

1. The standard NAESB contract between LADWP and Shell is dated February 1, 2008.

2. In the second part of the agreement, entitled Transaction Confirmation for Immediate Delivery, provisions are as follows:

    a. Transporter is Kern River Transmission (KRT), under transportation contract Nos. 1006 and 1706, which are held by the Department.
    b. Price is redacted.
    c. Duration - August 1, 2009 to June 30, 2014.
    d. Performance Obligation – Quantity is 3,500 MMbtu/day increasing to 8,200 consisting of environmental attributes and base load gas as specified in special provisions.

e. Special Provisions: Lay out definition of landfill gas as defined by CEC January 2008 Guidebook. "parties understand that this landfill gas will be delivered to Buyer through and exchange rather than direct long-haul transportation. Specifically, that environmental attributes will be unbundled from the gas near the landfill source, and the resulting gas without environmental attributes will be sold by the Seller in the local market. The gas will be with an equal quantity of gas and re-bundled with environmental attributes for delivery to Buyer at the specified delivery point as Standard Base Load gas".
f. Delivery Point: Opal, Wyoming, the initial receipt point of KRT.
g. Attestations by seller that this is biogas.
h. No excusal from obligations of the parties should the CEC change the rules.

Key provisions of Atmos Contract (LADWP Agreement No. 96 125-516)

1. The standard NAESB contract between LADWP and Atmos is dated July 30, 2009.

2. In the second part of the agreement, entitled Transaction Confirmation for Immediate Delivery, provisions are as follows:

    a. Transporter is Kern River Transmission (KRT), under transportation contract Nos. 1006 and 1706, which are held by the Department.
    b. Price is redacted.
    c. Duration - September 1, 2009 to July 31, 2014.
    d. Performance Obligation – Quantity is 5,000 MMbtu/day consisting of environmental attributes and base load gas as specified in special provisions.
    e. Delivery Point: KRT – Opal, Wyoming.
    f. Point of Sale, Purchase: Opal/Kern receipt.
    g. Attestations by seller that this is biogas.
    h. There is a second Transaction Confirmation for Immediate Delivery for 600 MMbtu that states in the Special Provision: this is landfill gas that as defined by CEC January 2008 Guidebook. In addition, the "parties understand that this landfill gas will be delivered to Buyer through and exchange rather than direct long-haul transportation. Specifically, that environmental attributes will be unbundled from the gas near the landfill source, and the resulting gas without environmental attributes will be sold by the Seller in the local market. The gas will be with an equal quantity of gas and re-bundled with environmental attributes for delivery to Buyer at the specified delivery point as Standard Base Load gas."
    i. No excusal from obligations of the parties should the CEC change the rules.