FORTNIGHTLY'S

SPARK

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The on-line gateway for readers of Public Utilities Fortnightly magazine.

*In this issue **Spark** turns to natural gas. Renewed attention is being paid to this industry as prices rise, and there are consequences besides obvious economic impacts. Natural gas quality and interchangeability are affecting the industry. Of course, different gas sectors have different concerns.*

Next, what can we learn from geographic regions where customer switching has occurred in large numbers? What does that really mean? Industry experts weigh in with a new study that may surprise you.

President Bush on June 15 at the 16th Annual Energy Efficiency Forum in Washington, D.C., said: "I told Congress I want a comprehensive energy bill on my desk by the August recess." What do you think ?

Lori A. Burkhart
Editor

NATURAL GAS QUALITY

FERC Eyes New Rules

By Lori A. Burkhart

The gas industry is changing. According to the American Gas Association (AGA), the nation is expected to increase its imports of liquefied natural gas (LNG) from 3% of the supply mix to upwards of 20% by 2020, while at the same time increasing production from new sources such as coal bed methane. These changes are impacting the quality of gas in the U.S. and the consequences are the subject of much industry concern.

Gas quality garnered lots of attention last summer, when former FERC commissioner Donald Santa Jr. presented a draft paper to FERC on "Liquid Hydrocarbon Dropout in Natural Gas Infrastructure." That paper, issued by the Natural Gas Council, was the impetus for attention to these issues, and now that work finally is getting its due. On May 17, FERC held a technical conference on the myriad of issues surrounding gas quality, which absent an industry consensus may lead to a rulemaking.

Last year, at a meeting at FERC held in July, Santa represented the Natural Gas Council, made up of six trade associations and three research groups, concerned about high gas prices and problems unique to gas. The paper he presented points out that historically the commercial value of hydrocarbon liquids extracted from natural gas, referred to as natural gas liquids (NGLs), has been greater than the commercial value of the »

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thermal content that would be added if the liquids remained part of the gas stream. Thus, gas processing to extract those liquids is common practice. But recent natural gas price increases relative to the NGL prices have eliminated the economic incentive to extract NGLs. In this environment, suppliers and processors may elect either to reduce extraction levels or bypass processing altogether.

But that lack of processing leads to problems for transmission, distribution and use of domestic natural gas. The decreased level of processing causes larger amounts of liquefiable hydrocarbons in the gas stream, resulting in a greater potential for hydrocarbon liquids to drop out of the gas phase while in transit to the end user. The molecular changes increase the potential for problems in pipeline and local distribution company (LDC) operations from compression, measurement and regulation or over-pressure protection devices, as well as possible damage to gas turbines used to generate electricity.

Also, it can lead to end-use problems, such as damage to in-home appliances. At that July 28, 2004 meeting, FERC chairman Pat Wood expressed concern over the cost impact on residential users of natural gas who are receiving the lesser quality of gas to the home. Lori Traweek, representing the American Gas Association (AGA), agreed that "too many liquids can clog the pipe, so that gas can't get to the meter." The result is that appliances in the home not only have decreased efficiency, but a lower shelf life.

On Feb. 28, 2005, a second research paper was issued by the Natural Gas Council, "Natural Gas Interchangeability and Non-Combustion End Use,"

In this environment, suppliers and processors may elect either to reduce extraction levels or bypass processing altogether.

which focuses on equally important issues arising from expected increases in importation of liquefied natural gas (LNG) and generally use of more varied production sources. Achieving gas interchangeability allows the replacement of gas of one quality and source with gas of another quality and source, hopefully without affecting the end-use performance. It is defined in the paper as "the ability to substitute one gaseous fuel for another in a combustion application without materially changing operational safety, efficiency, performance or materially increasing air pollutant emissions."

For years, interstate natural gas pipelines have included gas quality specifications in their tariffs, primarily stating which gas is acceptable to transport. The interchangeability aspect usually includes a hydrocarbon element relating to high heating value (HHV) of vaporized LNG (Btu content) when compared to the HHV of typical domestic pipeline gas.

But there are more problems expected as the U.S. increases its imports of LNG from other countries, and as gas liquids are not removed from natural gas. Markets outside the U.S. receive and burn gas at a greater HHV than in the U.S., and their facilities are designed generally to produce LNG within the HHV range of 1,100 to 1,180 Btu per cubic foot. In contrast, the typical gas collected from the U.S. Gulf Coast region has been significantly lower in HHV, because historically the HHV liquids such as ethane, propane and butane are stripped out for use as refining process feedstock. (The typical U.S. HHV is between 1,025 and 1,060 Btu, but it can go as low as 950 Btu per cubic foot.) But again, rising gas prices have reduced incentives to strip out those elements.

For example, in 2000, natural gas prices averaged $3.38 per MMBtu and natural gas liquid prices averaged $5.44 per MMBtu. Contrast that to 2003, when gas prices average $5.38 per MMBtu, while liquids were valued at $5.26 per MMBtu, and one sees that the economic incentive for processing is gone. (*For a related example, see Figure 1 on pg. 6*).

Hydrocarbon Dew Point

Liquids that drop out of the natural gas stream can affect the integrity of the pipeline and distribution systems.

The White Paper on Liquid Hydrocarbon examines the issue of hydrocarbon liquid dropout and how to manage it in order to *(Cont. on p. 6)*

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ENERGY RETAIL MARKET SUCCESS

A Global Experience

By Philip Lewis, Paul Grey and James Griffin

The ongoing debate as to whether liberalized energy retail markets can encourage significant levels of customer involvement and activity, seen by many as a pre-requisite for a competitive energy market, continues to rage. In the U.S., despite successes in Texas, it is not hard to find high-profile signs of liberalized decay. Great Britain is often proclaimed the first and only bastion of successful retail competition because (largely) of its high levels of customer activity, but is often dismissed by critics as merely an eternal exception. Perhaps it is not surprising then, that liberalization is often viewed with a degree of disaffection, disinterest and disillusionment.

The debate over market switching is further complicated by a severe lack of available and reliable comparative switching data and explanations. Research may be conducted on a national or market level, but decision makers and commentators alike generally are isolated from the wisdom that only can be derived from global research.

In search of the truth of the matter, VaasaEmg, the Nordic centre for expertise in energy and utilities marketing, and Peace Software, a global billing software provider, embarked on a major project in 2004, *The Utility Customer Switching Research Project*. The project, backed by standardized data from more than 50 leading partners and external sources, monitors and analyses utility customer switch rates and trends in over 30 competitive energy retail markets around the world.

Initial project findings indicate that energy retail competition can thrive in a variety of markets around the world. In fact, active customer switching between energy suppliers already is taking place in at least ten markets, and the number of customers around the world able to choose their electricity and gas supplier grows substantially year-by-year.

Only one of the ten most active markets is currently in North America, but the research suggests that this lack is mainly the result of inappropriate regulation and a lack of competitive commitment.

A Global Ranking Table

Research has highlighted dramatic trends and differences and has given rise to the classification of markets into four categories (*Figure 1*): Hot, Active, Slow and Dormant. In addition, the research suggests two distinct groups of markets; the 12 ranked markets with material customer switching and the others with little recognizable customer switching.

Hot Markets

Great Britain and the Australian states of South Australia and Victoria were far and away the hottest markets in 2004. These markets typically are characterised by relatively high levels of customer awareness, competitor marketing activity and regulatory commitment to competition. Savings opportunities also are significant, but not necessarily higher than elsewhere. There is no convincing evidence though, that customers in these hot markets are psychologically or culturally different from those in other less active markets such as Finland, at least not in a way that »

Figure 1 Ranking of the world's most active utility retail markets in 2004

Category	Market*	Rank
HOT	Great Britain	1
	Victoria (Australia)	2
	South Australia (Australia)	3
ACTIVE	Sweden	4
	Norway	5
	Netherlands	6
	New Zealand	7
	Texas (USA)	8
	Flanders (Belgium)	9
	New South Wales (Australia)	10
SLOW	Finland	11
	Denmark	12
DORMANT	Austria; Germany; Spain; Alberta, Ontario (Canada); California, Connecticut, Illinois, Maine, Maryland, Massachusetts, Michigan, New York, New Jersey, New Hampshire, Ohio, Pennsylvania, Rhode Island (USA)	Not ranked

* Designated by country, province, or state

would explain differences in switching behaviour. There were no North American markets in this category in 2004.

It seems that markets can become highly active even after a sustained initial period of relative inactivity following market liberalization. In this respect, Australia is a fascinating case. South Australia's gas and electricity markets exhibited a dramatic increase in customer switching in 2004, pushing it from being a new market with limited customer switching to one of the hottest energy retail markets in the world. Some of the foremost factors contributing to this striking increase in retail market activity include the divestment of the retail customer base by the state government, limited-time switching credits granted to a portion of the customer base, and price increases which led consumers to evaluate their retail energy supply options.

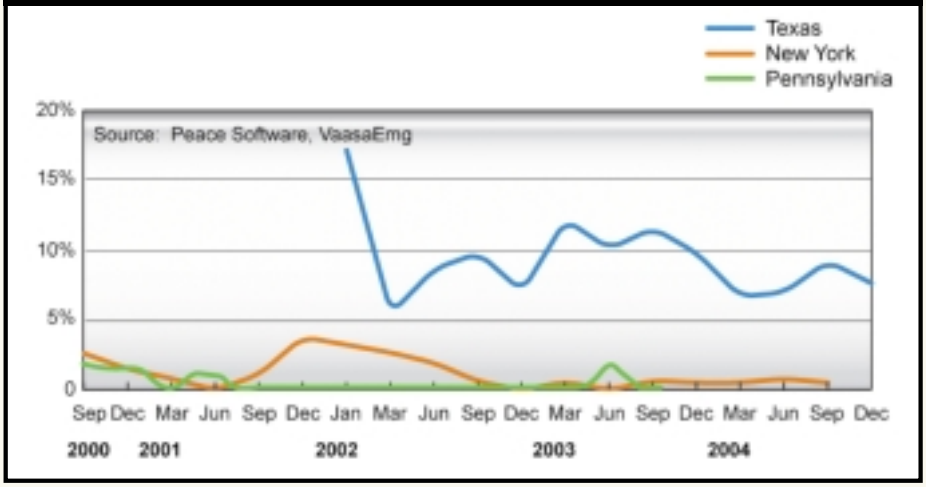
Alongside South Australia is its neighbour, Victoria, which also has witnessed accelerated customer switching since the end of 2003, with the number of customers switching almost doubling between then and the end of 2004. Some of the principal reasons behind this acceleration include incumbent utilities launching targeted lifestyle products and ramping up sales and marketing activities, incumbents from other states successfully entering the Victorian market, and a healthy number of new entrants initiating selling campaigns in pursuit of critical-mass market share.

Active Markets

Eight markets are classified as Active, and these range from mature, relatively stable markets, such as New Zealand, to those in the initial throes of competition, such as the Netherlands.

At the very least, active markets require the basic elements of a competitive energy market. These include a sufficient number of active suppliers; unbundling or at least a reasonable control of distribution tariffs; market access; price transparency and supply margins; decent customer awareness; and, simple switching procedures.

Figure 2 Annualized 2004 Rate of Switching by Market in three U.S. Markets



These basic elements are exemplified by Texas (*Figure 2*), in comparison to other liberalized North American markets. The Texas electricity market opened in January 2002 and stands alone amongst U.S. state markets for having separated its utility retail operations from distribution, a market structure that has more in common with markets in Australia and Europe than other U.S. markets, which tend to employ a hybrid coexistence of regulated and competitive utility operations. In 2004, Texas showed an annual customer switching rate around the seven per cent level. The Texas market is also notable for the sheer number of participants, with over 40 energy retailers actively competing for customers.

Norway and New Zealand highlight how markets can go through a post-hot cool-off period as switching drops from a hot to active level. This is an emerging trait of well-established markets. For instance, in 2003 Norway was a hot market, with customer switching around the 20 per cent level following a temporary, but large hike in wholesale prices and extensive utility marketing activity. In 2004, customer switching levels stabilized around the ten per cent level, due in part to greater wholesale price stability, but also because of the high number of customers who recently had switched.

Moderately active switching also can be prompted by opportunistic marketing in the face of negative media activity and public unrest. The Netherlands market for instance, which opened to full retail competition in July 2004, experienced switching levels of just under ten per cent during the last six months of 2004, boosted by a recent spate of public relations crises affecting a number of the leading players, as well as the market as a whole. Various innovative marketing initiatives from some of the smaller non-incumbent players also have helped increase customer switching levels.

Slow Markets

Only two markets were ranked as slow in 2004, namely Finland and Denmark. In both cases, the regulatory supervision of the market has been very respectable, the key elements of competitive electricity markets broadly have been met, no severe technical difficulties have been encountered and there is little sign of improper behaviour in the market. The slow switching primarily may be down to a lack of regulatory fine tuning, such as inappro- »

priate taxation and a lack of customer education; immaturity in the market, despite a long period of liberalization; and, situational factors such as the lack of new entrant interest in the market, insufficient consumption levels and an absence of kick starts such as big price peaks.

Dormant Markets

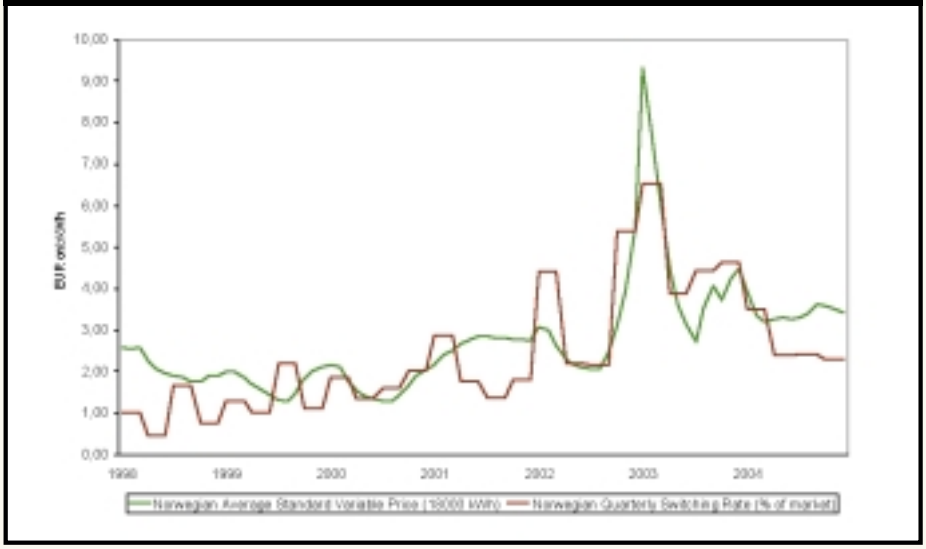
Dormant markets are those that have reached full retail competition, with all customers having choice of retail energy supplier, but which do not exhibit any significant customer switching activity. In fact there are more fully open dormant markets than active ones. Eighteen of the 30 markets considered in the research reside in the dormant category and exhibit customer switching levels below one per cent per year. This includes a large number of U.S. state markets, such as Massachusetts and Ohio, which have taken similar structural approaches to market opening and energy customer choice, and a number of European markets such as Germany, which are considered to lack a consistent method for switching or any centralized market registry infrastructure.

Excessive market concentration, a lack of regulatory control or coordination, an absence of effective unbundling and extreme barriers to new market entrants are just some of the other factors seen as hindering customer activity in these markets.

Other Findings

Not only has the research facilitated the identification or clarification of hundreds of factors determining customer loyalty and switching, it also has enabled the modelling of customer switching behaviour. For example, in many markets there is a pronounced seasonal variation in switching. Switching is typically far higher at certain times of year, partly due to marketing cycles, psychological saliencies and weather variations. Seasonality can be seen in most active markets including Britain, Australia and New Zealand, but nowhere is it more pronounced than in Norway (*Figure 3.*) and Sweden where switching closely follows seasonal and other retail price changes. This kind of price elasticity can develop over time and indicates that successful liberalization can lead to additional benefits such as efficient demand-side management.

Figure 3 Switching Elasticity to Price in Norway.



Source: NVE (Norwegian Water Resources and Energy Directorate), Norwegian Competition Authority.

There is even a sense of self-fulfilling prophecy in the behaviour of customers. They switch in response to the marketing around them, which is in turn determined by their behaviour. For instance, in most markets the marketing cycle, and thus switching, is most active in autumn when marketers assume customers' energy thoughts are most salient, but in the world's most active market, Britain, most marketing and switching takes place in the summer months. Through the research and modelling of such trends, some suppliers are already challenging their preconceptions regarding customer switching behaviour and the role of marketing. They can thus more precisely and objectively target customers, no longer missing opportunities by simply following the crowd.

Other switching influencers include the importance and role of kick-starts such as PR crises, high prices and short-term retailer offers; the necessity of critical awareness, as opposed to absolute levels of awareness; the long-term cyclical nature of liberalized energy markets; the role of price volatility and bill predictability; the multiplier effect on customer re-switching; and, the importance of billing reliability as has been seen recently in Great Britain.

Models for Successful Competition

Overall the picture is clear. Switching activity is not a rarity as indicated by the research results. Successful energy retail competition does exist around the world and evidence clearly indicates that the global switching trend is on the upwards curve. With the right conditions all markets can succeed. ■

Footnotes

1. The annual customer switch rate, which is the main metric used by this project for measuring energy retail market activity, is calculated by dividing the number of customers switching suppliers in a period by the total number of customers in the market. This is then converted to an annual customer switch »

rate. Re-switching and switch-back data and estimations are incorporated in this metric, but switches within the same supplier are not. Data primarily concerns residential customers.

2. Hot markets have been designated, by looking at global switching level distributions, as those with an annual customer switch rate of over 12.5%. Active markets are those between 5% and12.5%, Slow are those between 1% and 5% and dormant markets are those with less than 1%. The latter group is typically not measurable to any significant degree of accuracy, due to the low levels of activity.

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Natural Gas Quality

(Continued from p. 2)

address concerns of various stakeholders. Specifically, the NGLs are non-methane hydrocarbons, and when they are included in the gas stream they can cause hydrocarbon liquids to drop out of the gas phase, resulting in operational and safety problems. The temperature and pressure point at which hydrocarbons begin to condense and drop out of the gas stream is known as the hydrocarbon dew point (HDP).

The report says that a control parameter is needed to be put in place to reign in hydrocarbon liquid drop out. It points to two possible methods for determining the temperature where appreciable amounts of NGLs condense: (1) the cricodentherm HDP (CHDP) method; and (2) the C6+ GPM methods. It found that the CHDP method offered the greatest flexibility, and industry comments as well support use of that method.

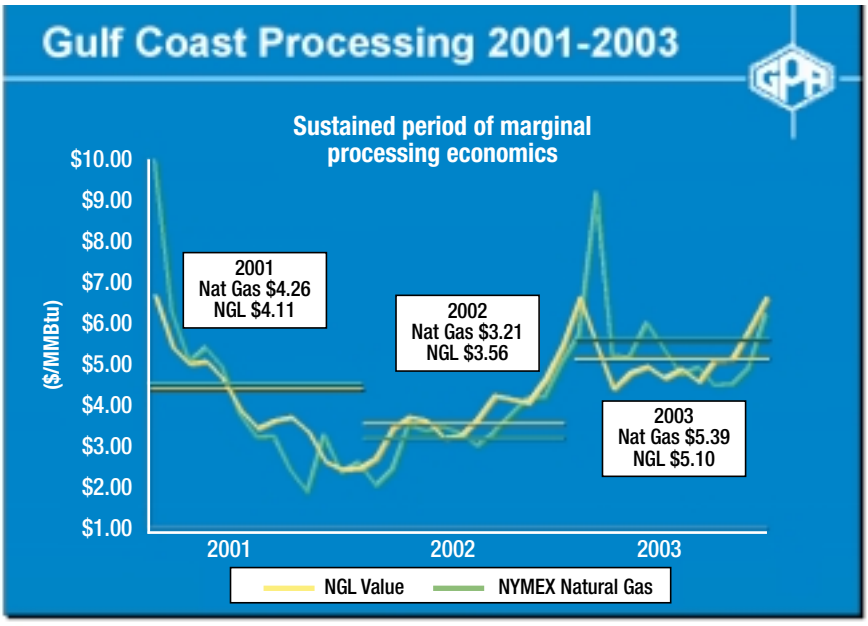
The AGA said in filed comments that it wants FERC to require pipelines to include a CHDP limit in their tariffs. It disagrees strongly with the competing proposal offered by the Natural Gas Supply Association (NGSA) to require a deliverability CHDP of 15 degrees Fahrenheit (F). NGSA says that number is based on industry research, is low enough that in almost all parts of the country it will not result in any significant fallout problem, and should be reflected in a pipeline's tariff where an HDP standard is not in place on May 1, 2005. Instead, AGA advocates flexibility, noting that different solutions for different pipelines or regions of the country are needed.

AGA points out that some interstate pipelines are exploring a safe harbor approach relying on three components: (1) operational postings to restrict the CHDP temperatures of gas to be received by an interstate pipeline at specified points or areas; (2) the posting of CHDP data by the pipeline so that customers can monitor values for specific points across the pipeline system; and (3) the ability of the interstate pipeline OFOs (operational flow orders) or operational postings to keep gas merchantable—by either directing gas be injected into the system below the safe harbor or otherwise.

Another method, says AGA, is to take a regional approach to CHDP, by establishing different CDHP limits for different segments of the interstate pipeline delivering into different cities, as long as all customer needs are met. A third approach could involve the interstate pipeline requiring establishing a CHDP at both its receipt and delivery points—requiring gas delivered into the system at specific receipt points to have a specific CHDP while it is delivered at its delivery points at another specific CHDP.

NGSA says that it would set a floor temperature, or safe harbor, of 15 degrees F. This 15-degree level would keep temperatures high enough to prevent any significant liquid fallout. At the same time, the floor would remain lower than the hydrocarbon dew »

Figure 1



Source: Gas Processors Association.

point specifications that a number of pipelines already have in their tariffs. Thus the floor level would not be set so high as to require large numbers of pipelines to redesign their tariffs.

NGSA says a rule should allow any pipeline with an existing hydrocarbon dew point specified in its tariff on May 1, 2005 to have the option to recalculate its hydrocarbon dew point to a lower level, consistent with the White Paper's methodology, if needed for safety reasons, so long as the new CHDP it set at or above 15 degrees F. Also, if a pipeline is setting a CHDP for the first time, or recalculating an existing dew point specification, and finds that the result of that calculation is a CHDP above 15 degrees F, then that level above 15 degrees F would be appropriate for that system. [*Re Natural Gas Interchangeability*, comments filed in *Docket No. PLO4-3-000.*]

Gas Interchangeability

The *Gas Interchangeability Report* attempts to define acceptable ranges for natural gas that can be used by the public while ensuring safety, reliability and environmental performance. In addition to the related subject of hydrocarbon dew point, natural gas when produced contains inert gases such as carbon dioxide and nitrogen that lower heating value. That means gas produced from different domestic regions has varied heating values, while for example, imported LNG has a higher heating value than does domestic gas.

The report lists 28 specific findings and 11 recommendations on this subject, one of the most important concerning the "Wobbe" number, which is based on heating value and specific gravity of a gas, and provides the best single index and measure of gas interchangeability. The report recommends interim interchangeability guidelines be applied during a transition period up to three years, so that data gaps can be closed and long-term standards developed. Interim guidelines proposed include a plus or minus 4 percent Wobbe variation from local historic averages subject to a maximum Wobbe limit of 1,400, and a maximum heating value of 1,110 Btus/scf.

NGSA in comments to FERC requests that it adopts specific interchangeability specifications set forth in the white paper of 1,400 maximum Wobbe, plus limits on maximum concentrations of butane and inert gases. Pipelines with such specifications already in their tariffs would not need to alter them, and those without any would adopt these numbers.

But NGSA disputes the technical findings in the paper that references a plus or minus Wobbe tolerance band relative to the local historical average Wobbe, arguing that the use of a tolerance band is not workable as realistic policy. It adds that nationally the local historic Wobbe is a vague concept without definition and cannot be the basis for setting specific operational parameters without further definition. It argues in favor of perhaps using the plus or minus 4 percent band on an as needed, case-specific basis, if there is evidence of an interchangeability problem, to allow parties to argue the relevant historical benchmark and geographic area to be defined. Further, the existing »

Gas Quality Issues By Sector

Speaking at a Natural Gas Roundtable in Washington, D.C., hosted by the American Gas Association (AGA) on Feb 24 of this year, FERC commissioner Suedeen G. Kelly, outlined where the industry segments align on the challenges of natural gas interchangeability and quality. According to Kelly:

LDCs—are concerned that gas with high Btu content or with high levels of liquefiables in the gas stream will damage equipment and appliances or will require equipment modifications and retrofits that will be prohibitively expensive.

Pipelines—are concerned with hydrocarbon drop out and thus have instituted "must process" contract provisions and the sort of critical notices that have led to complaints. When liquids condense out of the gas stream, compressors can become damaged and pipelines can corrode, particularly at low points on the system, and so pipelines tend to want to develop bright lines in terms of prescribed hydrocarbon limits.

Gas Processors—do not want to be forced to run their plants on an uneconomic basis and believe the costs of any industry solution should be born by all.

LNG Operators—point out that interchangeability and condensate issues are different. While burners will tolerate a broad range of Btu content, the relative density of gas depending on hydrocarbon content is a greater concern to end users. They endorse a pipeline-by-pipeline, LNG facility-by-LNG facility approach to standard setting.

Producers—would like to sell as much natural gas—as opposed to liquids—as is possible and point out that the nation is demanding more gas as production is declining.

Industrial End Users—do not want to bear the brunt of changing their burner-tip or process equipment to meet changing gas requirements, or in the alternative they do not want to shut down their equipment to "off spec" gas.

Turbine Manufacturers—testified that they can design equipment to tolerate a wide range of heating values, but these variations sometimes necessitate equipment modifications, some of which can be quite costly. Also, as gas quality changes, so do NOx emissions, and emissions performance is critical in new electric generating facilities. Because manufacturers warranty emissions performance, that relationship must be taken into account in any solution to interchangeability and quality issues.—***LB***

OFO mechanism would act as another further operational safety value that could be used after specific CHDP and interchangeability standards have been adopted if required because of emergency conditions on the pipeline.

But with its focus on LDCs, AGA however, argues that NGSA's positions on hydrocarbon dew point and gas interchangeability would result in maximization of supplier profits at the expense of the end-use customers.

Who Pays?

Of course changes to gas infrastructure would cost a lot to implement. All parties along the natural gas supply chain are worried over who will be forced to pay for any changes that are made. And of course, those companies at one end of the chain want the companies at the other end to pay.

The American Public Gas Association (APGA), an association of some 600 municipal LDCs, believes that any steps taken to allay safety, reliability and efficiency concerns must be taken upstream of the natural gas consumer and rolled into the price of LNG. That ensures the true cost of the commodity is made transparent, and it would be a "grave injustice" to make those in the immediate geographic area who may both be purchasing the LNG or directly benefiting from it, to underwrite the costs of making LNG merchantable for consumption by others, APGA argues. That is a cost of doing business for LNG importers, it believes.

Because the interchangeability white paper finds that increasing LNG imports could necessitate retrofits to a large range of equipment, including LNG peak-shaving facilities, some gas turbines and industrial machinery, Consolidated Edison of New York turned to the FERC's certificate review process for pipeline expansion projects for deciding who pays for LNG interconnections. That process requires pipelines to demonstrate that their proposed expansions will not be subsidized by system shippers. ConEd recommends FERC extend the logic of that policy to its consideration of certificate and interconnection applications of LNG import terminals by adopting a "no-subsidy" test for such applications.

The Gulf South Pipeline Co., LP, is an interstate pipeline that competes with interstate and intrastate pipelines to connect new gas supply and service end users. It points out that a pipeline's gas-quality specifications directly affect how competitive a pipeline will be in connecting wellhead production to its system. "In some cases, a pipeline's quality specifications can have a greater economic effect on whether a producer connects to a particular pipeline than its gathering or transportation rates," it says. It argues that if it must modify its quality specifications to meet standards reflective of distant consumers in other regions of the nation, the delicate balance developed to meet the operating and competitive characteristics of the production area of the Gulf Coat and East Texas will be destroyed.

Gulf South explains that its gas quality standards carefully balance its operational needs with what is required to attract and maintain wellhead supplies. It argues that if required to meet some average nationwide gas-quality standards, then its supplies may no longer be economic for the producers/processors to deliver into Gulf South for its customers' benefit, because they tend to have higher hydrocarbon dew point levels than other supply sources do that are located behind a processing plant. Elimination of these supply sources will increase these customers' gas costs. Also, Gulf States says it will disadvantage interstate pipelines vis-a-vis intrastate pipelines, whom will be relatively unaffected by a gas quality change in the interstate market. ■

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