by Rita Tubb ■ Managing Editor

Strong Demand

Drives Gas Distribution Spending To All-Time High

Early forecasts have the outlook for gas distribution construction looking strong through not only 2007, but for the next several years as well. Although total natural gas consumption declined by 1.1 percent in 2006 primarily due to warmer-than-average January 2006 weather, consumption is expected to rebound in 2007. The Energy Information Administration projects natural gas demand will increase from 22.17 Tcf in 2006 to 22.28 Tcf in 2007.

Domestic dry natural gas production is also expected to increase by 0.8 percent in both 2006 and 2007 due in large part to restored production capacity from the major disruptions caused by Hurricanes Katrina and Rita in the Gulf of Mexico in 2005.

Prices will rise as well. The Henry Hub natural gas price is expected to average about $6.90 per Mcf in 2006 and $7.53 per Mcf in 2007. In October 2005, the Henry Hub price averaged close to $14 per Mcf. Natural gas prices this winter are expected to be significantly lower than last winter. Not only because of any hurricane-induced production losses, but the record levels of natural gas in storage is expected to put downward pressure on prices this season.

Depending on the region of the country, residential natural gas prices are projected to generally decline in 2006 on an annual average basis, but nevertheless remain more than 20 percent higher than in 2004.

Spending trends

Looking at the longer term, the prospects for adding significant amounts of distribution pipelines seems promising given that LDCs comprise the largest and most familiar part of the 1.4 million-mile natural gas delivery system.

Moreover, the National Petroleum Council reports that natural gas distribution utilities must construct more than 255,000 miles of new pipeline – enough to go roundtrip between New York and Los Angeles more than 50 times – in order to bring gas to consumers, expanding the current distribution system by about 25 percent. Additionally, utilities must sustain a spending level of about $5 billion per year - for each of the next 20 years - to build the distribution pipelines that will bring natural gas to homes and businesses.

Near-term new construction spending and spending to rehabilitate, repair and replace existing systems, is expected to rise. An in-depth survey by *Underground Construction's* sister publication, *Pipeline & Gas Journal*, indicates gas utilities spending next year to serve new customers will total an estimated $4 billion, compared to $3.9 billion this year, while spending to rehabilitate, repair and replace the nations 1.8 million miles of mains and services, meters, valves, regulators, cathodic protection, SCADA networks and peak shaving facilities will total an estimated $6.5 billion.

Looking longer term, the outlook for adding significant amounts of new gas mains and services seems promising as well, given the increasing demand for natural gas and the fact that much work is still needed to reconstruct and repair areas along the Gulf Coast devastated by Hurricanes Katrina and Rita.

A case in point is New Orleans. Shortly after Hurricane Katrina, Entergy New Orleans was dealing with 1.1 million customers without service in Louisiana and Mississippi. After Rita, the company reported 611,000 customers in Louisiana, Texas, Arkansas and Mississippi without service.

Entergy New Orleans spokesman Morgan Stewart said, "Entergy New Orleans, which is the smallest subsidiary of Entergy Corporation, was forced into bankruptcy because of the entire city being forced to evacuate for months following Hurricane Katrina. Today, less than half of Entergy's electric customers and only about 40 percent of its 145,000 gas customers have returned to the city.

"Given the financial situation of the company, we've made the repairs possible and are providing services to those who can take it in the majority of the city. However, in terms of the larger scale replacement of damaged systems, that work has not begun in any significant material manner. This includes replacing 840 miles of gas mains that were damaged by saltwater intrusion with 2-and 4-inch high pressure polyethylene and 100,000 feet of 1-inch high-pressure polyethylene services.

"The rebuild project will be preformed utilizing directional boring. In addition 110,000 meters and regulators are needed along with repair or replacement of 12 of 14 city gates and 64 of 73 regulator stations plus the entire rectifier system used to cathodically protect the steel piping system."

NATURAL GAS DISTRIBUTION PIPELINE ANNUAL MILEAGE

Year	Number of Records	Distribution Main Mileage	Distribution Number of Services	Distribution Est. Service Mileage
1984	1,538	750,168	41,258,268	454,369
1985	1,610	784,852	44,309,5 28	498,697
1986	1,562	780,401	45,036,343	472,555
1987	1,542	802,335	45,848,965	512,360
1988	1,590	866,639	48,246,973	504,981
1989	1,558	838,237	47,591,804	544,450
1990	1,504	945,964	48,755,074	566,763
1991	1,569	890,876	52,665,539	589,345
1992	1,545	891,984	50,103,974	594,105
1993	1,570	951,750	52,009,967	590,917
1994	1,586	1,002,669	56,816,569	685,091
1995	1,524	1,003,798	55,518,341	669,746
1996	1,481	992,860	54,644,300	651,869
1997	1,466	1,002,942	54,865,221	640,800
1998	1,458	1,040,765	55,755,294	666,722
1999	1,469	1,035,946	56,538,415	697,563
2000	1,446	1,050,802	57,690,459	675,084
2001	1,450	1,102,235	58,442,340	720,501
2002	1,424	1,136,440	59,906,285	748,879
2003	1,430	1,107,392	60,238,425	758,287
2004	1,472	1,154,766	62,361,327	763,511
2005	1,427	1,117,591	60,845,213	747,323

FY 2005 data continues to be updated as reports are obtained by PHMSA Pipeline Safety.

Historical totals may change as PHMSA receives additional information.

PE pipe demand

About 600,000 miles of PE pipe are now in service and GTI reports more than 90 percent of new mains and services installed each year (about 40,000 miles) are PE pipe.

As to supply, Stephen Boros, technical director, Plastics Pipe Institute, said PE pipe demand for the gas industry seems to be very strong. "As far as I know, there is no shortage of any PE pipe and there is no expectation for any shortage this year," he said.

Boros noted that repairs to gas distribution systems following the hurricanes along the Gulf Coast are coming along. However, these are not repairs to PE gas piping systems, but other types of pipe. "PE systems have historically performed very well in natural disasters - earth-

quakes, floods, hurricanes, etc.," he said. "So, these systems held up very well. Other types of piping, such as older cast iron piping, does not typically hold up in these conditions."

As to the main new "thing" coming to plastic gas piping, Boros said it is the new material designation codes that now recognize high-performance PE materials. "Materials that meet these increased performance requirements will be able to be designed utilizing more of these performance benefits. This typically means that the pipe can be used at higher working stresses - meaning higher pressures for a given pipe, or a thinner wall pipe for a given operating pressure. There is still work to be done to get the federal DOT to recognize these material benefits, but all other consensus standards, like ASTM, are being revised to include these new material designation codes."

Safety performance

The safety of the nation's 1.9 million miles of local utility distribution lines, 1.1 million miles of utility mains, plus 800,000 miles of utility service lines and 300,000 miles of transmission lines is of paramount importance to the gas utility industry. Gas utilities monitor their systems 24/7 and a pipeline's flow and pressure are monitored and regulated around the clock.

Extensive emergency response plans are in place, as required by the federal Office of Pipeline Safety at the Department of Transportation. Gas utility companies coordinate response and supply needs with emergency response and law enforcement officials, as well as with neighboring utilities, pipeline companies and other energy companies.

Finally, providing gas infrastructure security is costly. Gas utilities spend an estimated $3.4 billion annually to comply with rules and regulations covering the design, construction, installation, operation, maintenance, testing, inspection and safety of gas distribution systems, including gas storage, metering and regulating stations, mains and services up to the outlet of the customer's meter set assembly.

Corrosion

Corrosion continues to be a problem in all facets of the oil and gas industry. The most extensive study on corrosion costs was conducted several hears ago by CC Technology in cooperation with NACE international and funded by the Federal Highway Administration. The report placed direct corrosion costs in gas distribution at $ 5 billion a year.

With corrosion costs a major issue, ways to control steel pipe corrosion is a top priority at GTI and has resulted in the successful field-testing of a flamespray field-applied coating system and application method, designed to control steel-pipe corrosion. The technology is designed to help control costs, improve safety, and meet regulatory requirements for pipeline systems.

GTI is in discussion with potential manufacturing partners to bring this technology to market.

The flamespray/liquid epoxy system provides technically and economically practical pipeline protection for field applications on pipeline girth welds, repair sites and

PHMSA OFFICE OF PIPELINE SAFETY DISTRIBUTION PIPELINE INCIDENT SUMMARY BY CAUSE 1/1/2006 - 09/18/2006

Cause	% of Number of Incidents	% of Total Incidents	Property Damages	Total Damages	Fatalities	Injuries
Body of pipe	1	1.1	$0	0	0	0
Butt weld	0	0	$0	0	0	0
Car, truck or other vehicle not related to excavation activity	11	11.6	$2,487,037	16.5	1	3
Component	1	1.1	$60,000	.4	0	0
Corrosion, external	1	1.1	$200,000	1.3	1	0
Corrosion, internal	0	0	$0	0	0	0
Earth movement	0	0	$0	0	0	0
Fillet weld	0	0	$0	0	0	0
Fire/explosion as Primary cause	19	20	$2,623,409	17.4	2	1
Heavy rains/floods	3	3.2	$251,210	1.7	0	0
High winds	1	1.1	$98,000	.7	0	0
Incorrect Operation	1	1.1	$1,000	0	0	2
Joint	2	2.1	$105,000	.7	0	0
Lightning	4	4.2	$186,165	1.2	4	1
Malfunction of Control/relief Equipment	0	0	$0	0	0	0
Miscellaneous	9	9.5	$2,360,975	15.7	0	5
No data	0	0	$0	0	0	0
Operator excavation damage	3	3.2	$101,750	.7	0	1
Pipe seam weld	0	0	$0	0	0	0
Rupture of Previously damaged pipe	1	1.1	$904,050	6	0	0
Ruptured or leaking Seal/pump packing	0	0	$0	0	0	0
Temperature	0	0	$0	0	0	0
Third party Excavation damage	31	32.6	$3,198,810	21.2	1	5
Threads stripped, Broken pipe Coupling	0	0	$0	0	0	0
Unknown	7	7.4	$2,491,102	16.5	0	1
Vandalism	0	0	$0	0	0	0
Total	**95**	**100.0**	**$15,068,508**	**100.0**	**9**	**19**
Average			**$158,616**		**0**	**0**

irregularly shaped fittings. It combines a brushed-on epoxy primer with a sprayed-on thermoplastic (polyethylene [PE] or polypropylene [PP]) topcoat that provides superior impact resistance.

Testing indicates excellent adhesion of the epoxy primer to the steel substrate and, through a patented GTI mechanical interlock (US Patent 6,146,709), a superior intercoat adhesion between the epoxy and the topcoat. In addition, the system will bond with fusion bonded epoxy (FBE) plant-applied, mainline coatings, which are the industry standard. The system provides protection comparable to FBE, and a cost analysis indicates that the cost of applying the flamespray system to a single 36-inch girth weld is one-fifth the field-applied costs of FBE.

The basic coating materials and flamespray applicators tested are all commercially available, allowing flexibility in liquid primer choices to meet the environmental needs of the particular application. GTI's work has focused on tailoring the materials and equipment for the best combination of performance and ease of application.

Much of the research took place under real-world field conditions at GTI's Pipeline Coatings Facility in Des Plaines, IL.

Survey results

As in past years, survey recipients were asked to comment on proposed legislation, the cost of finding and repairing leady mains and a host of other questions. The cost figures and comments from industry participants on these and other topics follow.

Integrity management legislation - To the question on what impact proposed pipeline integrity management legislation would have on the LDC, almost all respondents said they felt the legislation had a good chance of being enacted and anticipated it having a negative impact on the LDC. One LDC with 38,000 customers said it anticipated the legislation being enacted and expected it to mandate the use of excess flow valves. They also said they expected this and other rules to ultimately increase maintenance costs which would lead to higher rates for customers.

Pipe replacement programs - Once again, response to this question indicates that the gas utility industry is focused on replacing leaking, inadequately sized, structurally deficient and aging steel and cast iron mains and services. Although a representative of an Ohio gas utility with 1,450,000 customers indicated its replacement program would not start until 2008, this is not the norm. Instead, more than 65 percent of those surveyed reported long-term replacement programs in progress, while 10 percent indicated they had no cast iron or bare steel in existing systems. The remainder reported ongoing programs with completion dates stretching to 2050, although the majority point toward completion dates between 2010 and 2015.

Main costs - The figures provided by survey participants on main costs report that 2- to 4-inch diameter PE pipe is being widely used in the gas utility industry and accounts for 95 percent of all new main installations in developed area. As to cost, the following figures reflect the average cost per foot and pipe diameter reported to install plastic and steel mains: Plastic main installation costs ranged from $2.68 to $9 for 2-inch; $4 to $28 for 3-inch; $5 to $10 for 4-inch; and $7 to $26 for 6-inch.

Companies reporting steel main installation costs reported the following: $4.50 to $10 for 2-inch; $7 to $45 for 4-inch; and $10 to $20 for 6-inch

Leaky main repair costs - As in past years, the response shows that leak location dictates the finding and repair cost of leaky mains. Those reporting finding and repair costs per occurrence, regardless of size, placed costs between $1,000-3,500 per occurrence. However, 44 percent of this year's respondents gave $2,000 as the average cost for finding and repairing leaky mains.

A gas utility in Texas with 46,000 customers that provided costs by pipe diameter said the following represented its average costs for finding and repairing leaky mains: 2-inch $ 178; 4-inch $295; and 6-inch $405.

In-service pipe failure - The response to this question indicates that those surveyed have not experienced a high level of failure of plastic pipe in-service. Of those surveyed, 87 percent reported no in-service pipe failures. Of the remaining 13 percent, 10 percent attributed failures to third-party damage, while the remainder said the damage occurred because of human error or following improper procedures.

Fusion technology - LDCs continue to have a high regard for both butt fusion and electrofusion technology. Approximately 90 percent of those surveyed said they used electrofusion for making repairs, live main tie-ins and dealing with work in confined spaces.

Nevertheless, the higher cost of electrofusion continues to cause concern. Several indicated that they opted to use butt fusion because of the higher cost electrofusion. Moreover, because of cost, they relied on electrofusion only when it became impractical to use butt fusion.

As to problems associated with the technology, 99 percent of those surveyed indicated they had not experienced problems with either technology. Those identifying specific problems said the difficulties they had experienced with butt fusion could be traced back to poor installation practices or human error.

One respondent who has been using electrofusion for many years for construction and repair of PE pipe said they had experienced fewer problems with electrofusion than with conventional fusion methods. They also indicated that conventional butt fusion methods had proven less problematic than other fusion techniques.

Work by contractors - Contractors are projected to continue to provide a sizeable portion of the nation's new distribution construction to install gas utilities. Of the gas utilities surveyed, 60 percent reported using contractors to carry out 75 percent or more of all new construction on projects, while 25 percent indicated they relied on contractors to perform up to 45 percent of this work. Of the remaining 15 percent, 10 percent said they didn't use contractors at all and 5 percent reported using contractors to perform about 20 percent of their work.

What's needed - From an equipment and technology stand point, survey respondents said they would most like to see additional development of trenchless technology and advances in leak detection equipment. Several indicated a need for guided moles that were more consistent in all types of soil conditions. Others indicated they would most like to see improvements to trenchless systems that made the work easier and safer for the public.

On the wish list of one gas utility with 62,000 customers was a repairable SONDE for its directional boring equipment that they said burns out frequently and is expensive to replace. ■