

Benchmarking Study of European Gas Transmission Networks

*Prepared for the Council of European
Energy Regulators (CEER)*

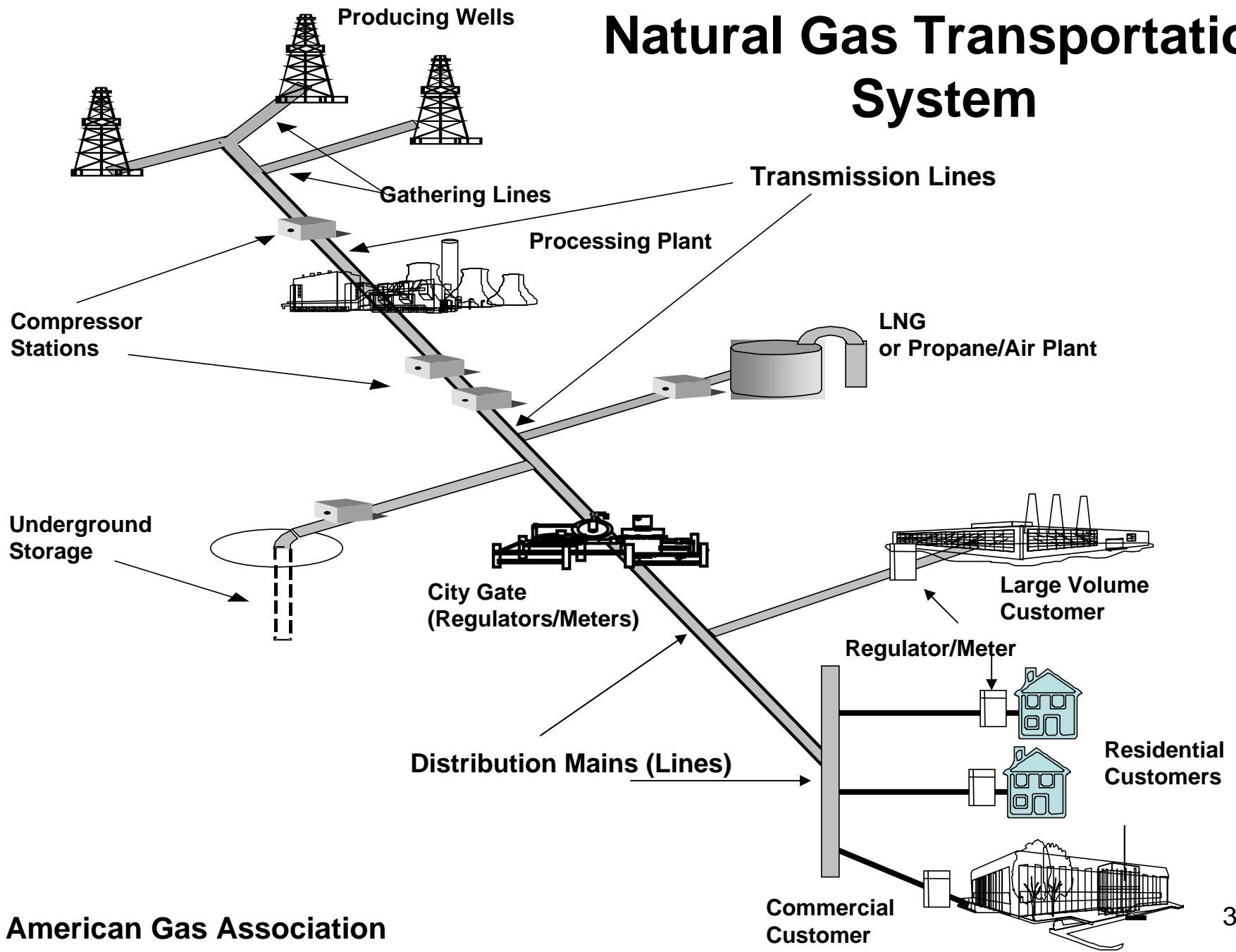
EPRG Winter Seminar, 15 December 2006

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Objective

- Develop more knowledge and experience in using benchmarks for cost regulation of gas transmission systems

Natural Gas Transportation System



Approach: issue option

- Few European comparators  US firms
(two functions for US data: make techniques feasible, world best practice?)
- (International) comparability  data
standardization, controlling for differences
- Few relevant studies  cost-driver
analysis
- Robustness of results 
SFA, DEA, COLS / consistency tests

Approach: data

- Pooled cross section - panel better but not possible today
- FERC data – detailed and fairly standardised, but requires cleaning. Not collected for benchmarking
- Standardization – separate transmission from storage, balancing

Data: Observations

Table 1: Number of observations

Country	Years	No. of companies	No. of obs.
A	2002-2004	1	3
B	2004-2005	1	2
C	2000-2004	1	5
D	2004	1	1
US	1996-2004	43	317
TOTAL (before any outlier removal)		47	328

Data: Cost measures

Table 6: Cost measures and their composition

Name	Composition	Remarks
O&M	O&M	includes labour, excludes fuel, taxes and rents
Totex1	O&M, depreciation	
Totex2	O&M, depreciation, cost of capital	Cost of capital equals the written down value (historic asset base less accumulated depreciation) multiplied by a cost of capital percentage (7%)
Revenue	Revenue (less fuel)	Revenue is not built up from components but given as reported.

Data: output measures

Table 7: List of cost drivers

Name	Composition (unit)	Remarks
Delivery	Total yearly throughput of gas transmitted (m ³ /year)	For US, only gas owned by others
Mains	Total length of pipelines (km)	
Horsepower	Total amount of compressor horsepower on pipelines (HP)	
Stations	Total number of compressor stations (#)	
Units	Total number of compressor units (#)	
Capacity	The maximum of all past and present measures of daily peak delivery times the number of days per year (m ³ /year)	This measure is not precise as technical capacity is likely to be greater than peak delivery
Load factor	Delivery over capacity (%)	(see remark on capacity)

Cost-driver analysis: Output correlations

Table 14: Correlations among outputs

	Delivery	Mains	HP	Stations	Units	LF	Capacity
Delivery	1.00						
Mains	0.76	1.00					
HP	0.87	0.85	1.00				
Stations	0.64	0.88	0.83	1.00			
Units	0.64	0.89	0.81	0.92	1.00		
Load factor	0.38	0.11	0.27	0.04	-0.00	1.00	
Capacity	0.94	0.78	0.84	0.67	0.69	0.04	1.00

Cost-driver analysis: OLS

Table 17: Regression results for final Cobb-Douglas models

	O&M	Totex1	Totex2	Revenue
Capacity	0.508**	0.693**	0.779**	0.728**
	(0.048)	(0.043)	(0.050)	(0.050)
Mains	0.688**	0.325**	0.224**	0.278**
	(0.036)	(0.032)	(0.037)	(0.037)
<i>adj. R Squared</i>	0.86	0.82	0.77	0.77

** p<0.01; * p<0.05; ^ p<0.10 two tailed

Outlier treatment

- SFA: none
- COLS: Frontier through 90th percentile
- DEA: Removal of 10% of most efficient firms

Results: mean scores by country

Confidential

Results: SFA scores

Confidential

Consistency: *rank corr.*

Table 31: Rank correlation for SFA, COLS, and DEA (VRS) scores

		SFA				COLS			
		O&M	Totex1	Totex2	Revenue	O&M	Totex1	Totex2	Revenue
COLS	O&M	0.99	0.58	0.36	0.21				
	Totex1	0.57	0.99	0.91	0.68				
	Totex2	0.35	0.91	0.99	0.77				
	Revenue	0.21	0.68	0.76	0.99				
DEA (VRS)	O&M	0.91	0.52	0.32	0.19	0.92	0.52	0.31	0.19
	Totex1	0.54	0.89	0.81	0.66	0.53	0.88	0.81	0.66
	Totex2	0.38	0.84	0.91	0.75	0.37	0.82	0.89	0.74
	Revenue	0.27	0.65	0.72	0.92	0.25	0.63	0.70	0.92

Discussion

- US data fulfils its purpose
 - Similar ranking of European firms as in tariff benchmark?
- SFA not readily applicable
- Environmental variables
- Revenue benchmarking might catch all (cost *and* tariff)!
- Data collection and standardization are key!
- Start European data collection ASAP

Thank you!