American Gas Foundation

THE INGAA FOUNDATION, INC.

"Research and Development in Natural Gas Transmission and Distribution"

Robert Howard
Vice President,
Gas Transmission and Distribution
PG&E

Sponsors

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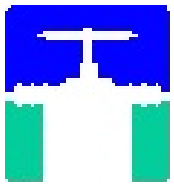
Independent source of information, research and programs on energy and environmental issues that affect public policy

INGAA Foundation

Advances the use of natural gas for the benefit of the environment and the consuming public



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Purpose of the Study

- Assess trends and status of R&D in natural gas transmission and distribution industry
- Compare gas industry R&D funding to similar industries
- Determine if research funding aligns with industry objectives
- Characterize current R&D structures and strategies

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What Was Investigated?

Pipelines: Transmission and distribution R&D

Natural gas storage R&D

R&D funding of today/yesterday from:

- Federal government agencies
- Canadian government agencies
- Pipeline research consortiums
- European and Japanese organization
- Others

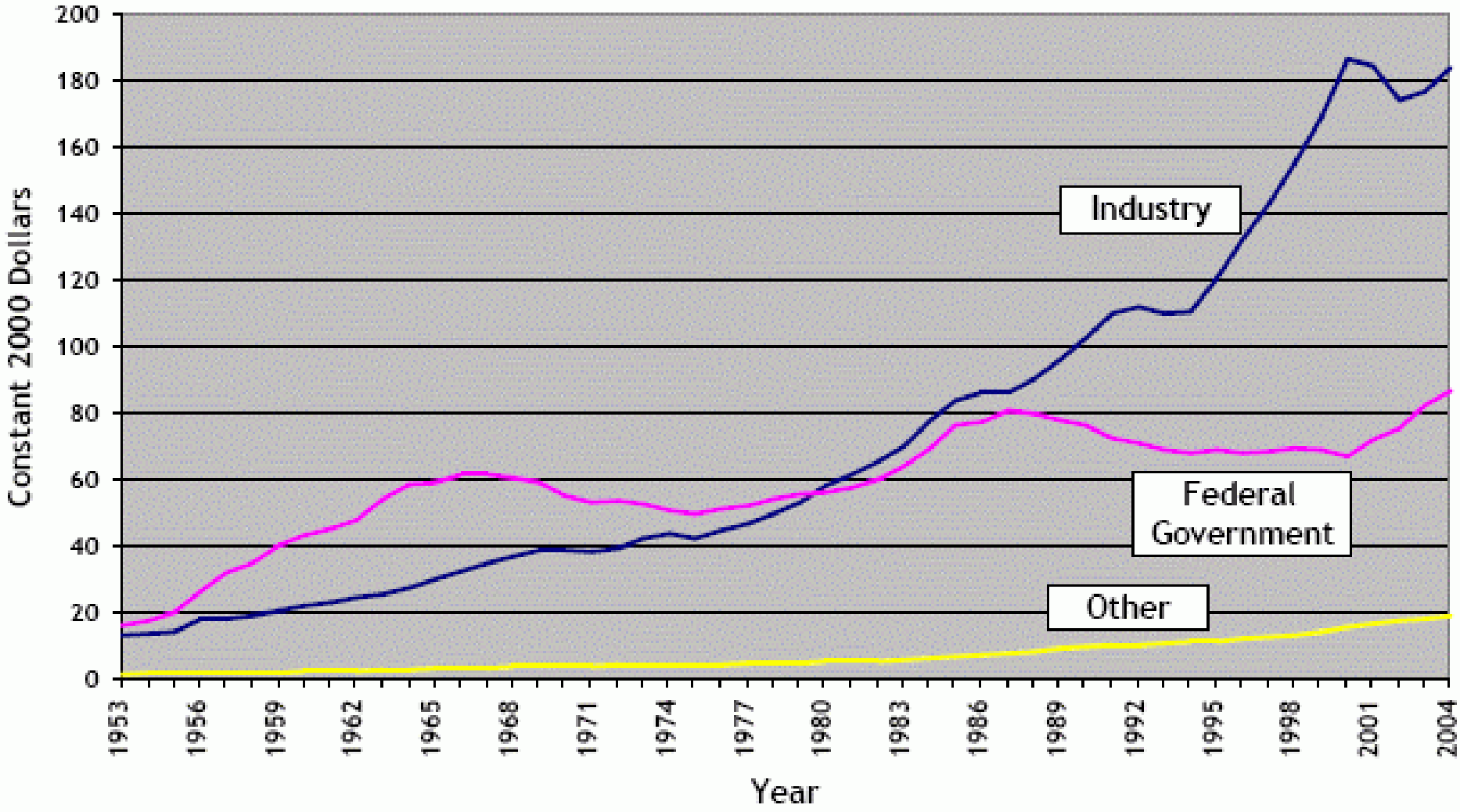
Looked At -

- R&D in U.S. compared to other parts of world
- R&D as a share of Gross Domestic Product: "R&D Intensities"
- Influence of market and business drivers
- Trends in R&D spending
- Current business conditions
- Natural gas R&D compared to other industries
- R&D organizational structures and strategies

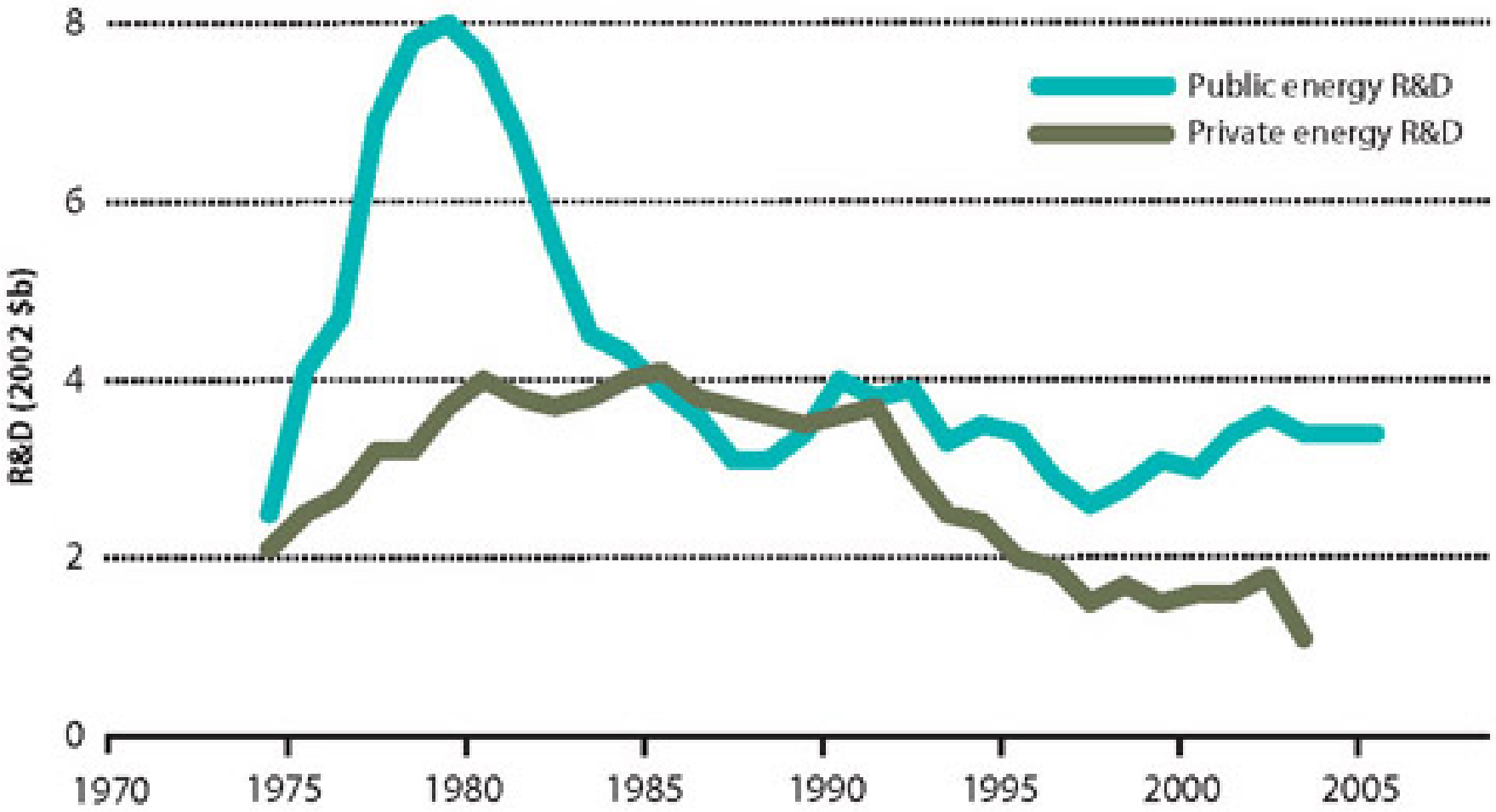
Findings

In contrast to U.S. industry as a whole, natural gas transmission and distribution sector spending on R&D has declined significantly in the last decade. Further, the level of R&D spending in the sector is below comparable industries.

U.S. R&D by funding sector, 1953-2004
Source: NSF, National Patterns of R&D Resources

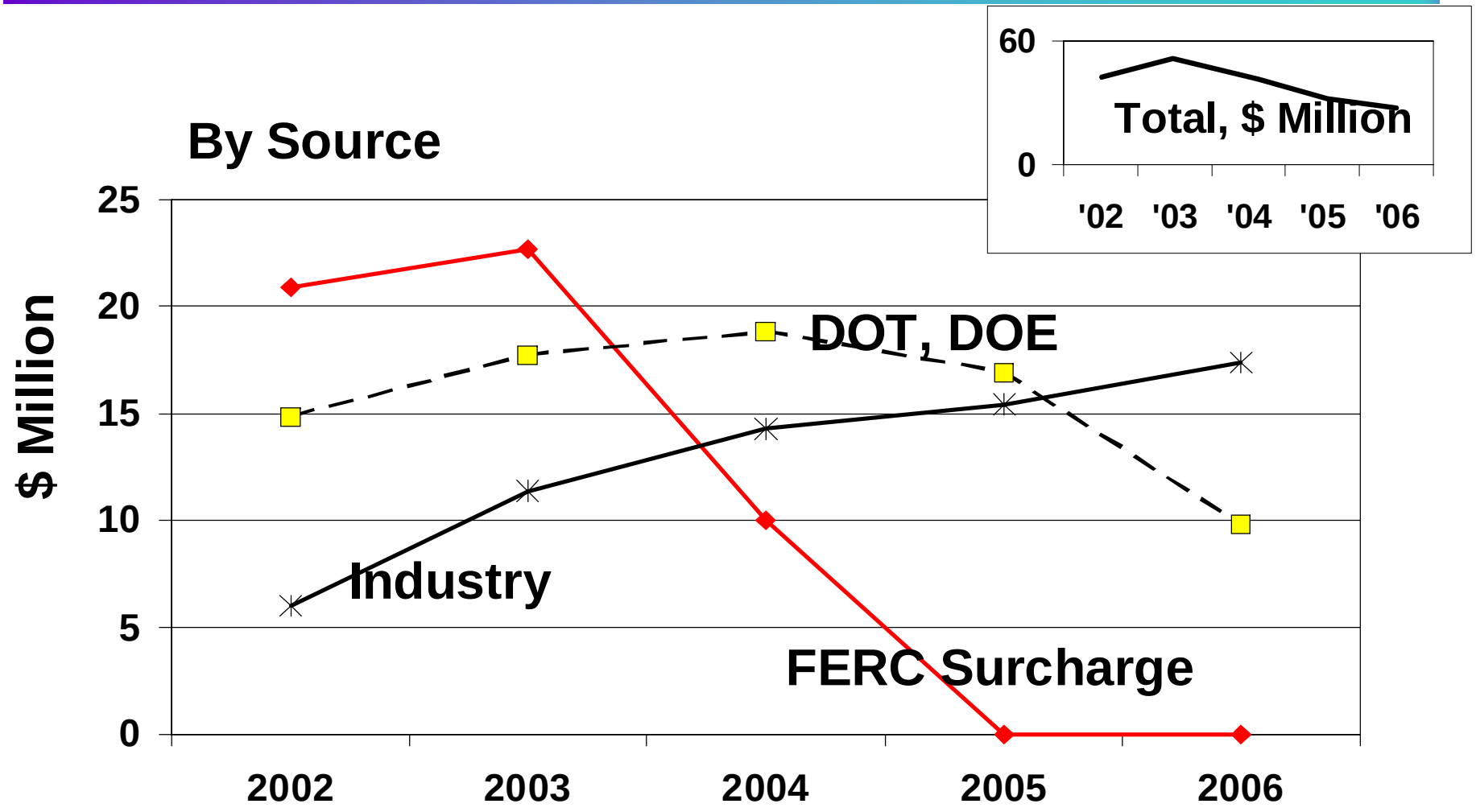


Declining energy R&D investment by both public and private sectors



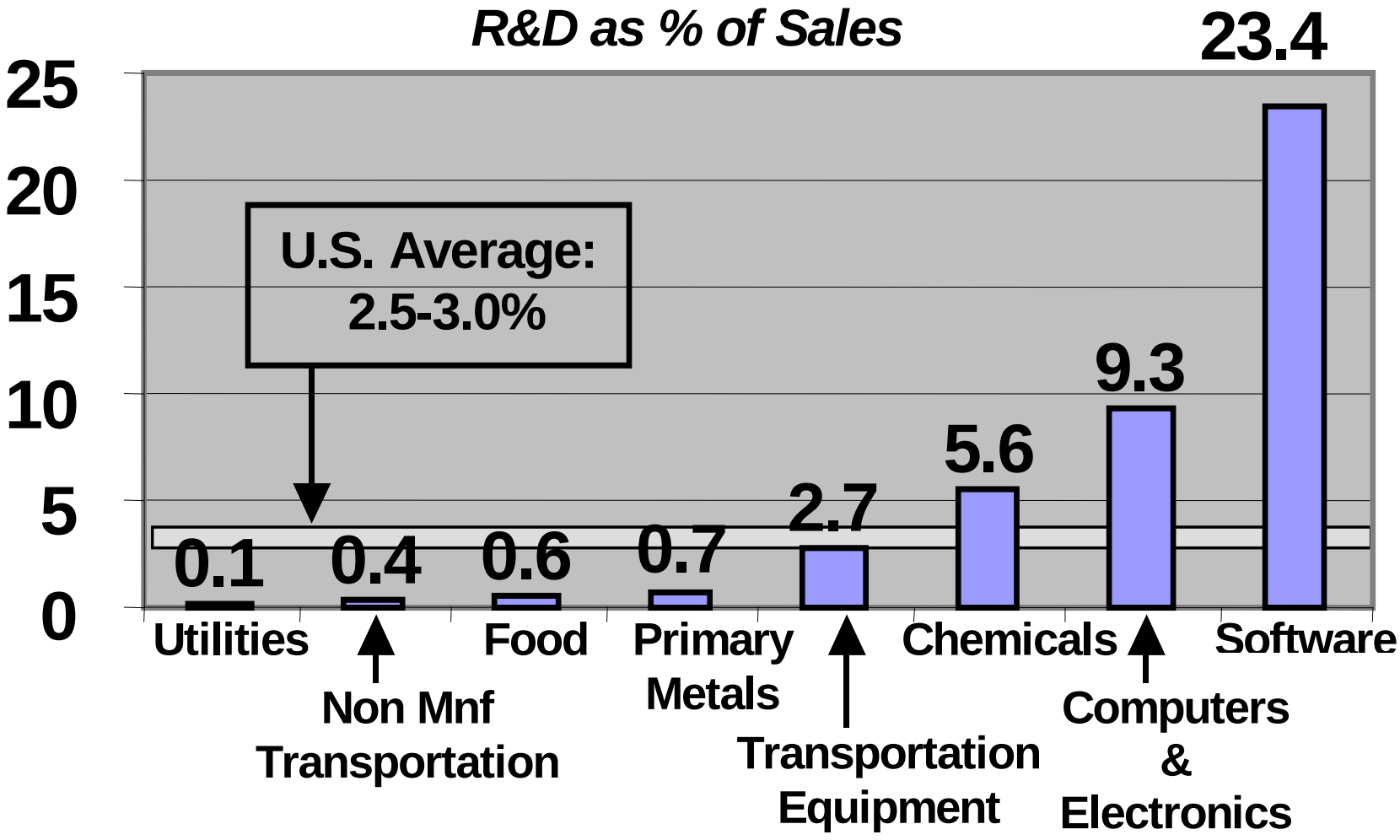
Source: Kammen & Nemet (NSF Data), June2005

Government and Industry Funding of Pipeline Research, 2002-06



Source: The Steering Committee on Energy Pipelines and Research

R&D Intensities of Selected U.S. Industries



Source: 2003 National Science Foundation

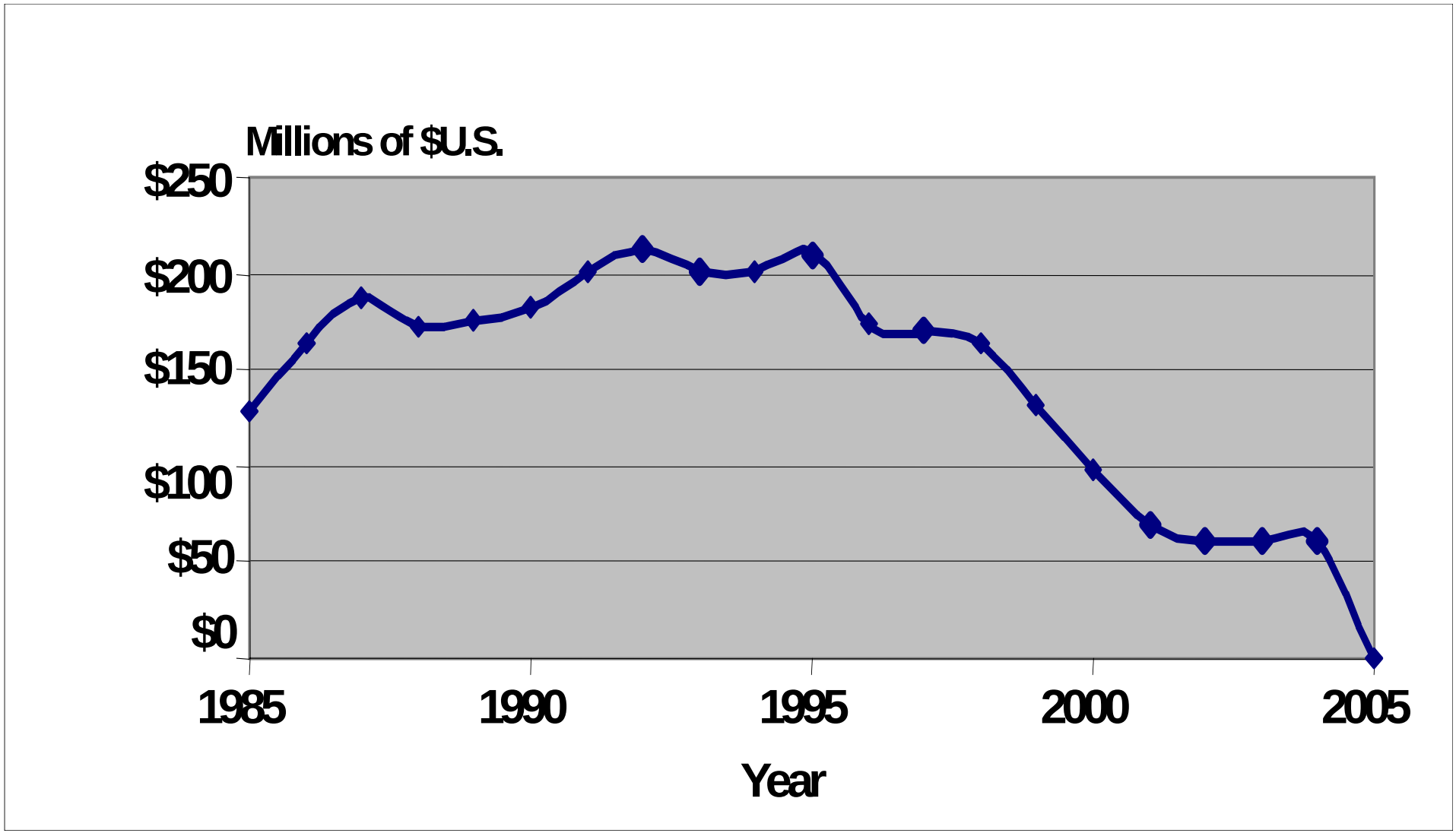
2006 Research Budgets for Trans., Dist., and Storage

SOURCE	Distribution	Transmission	Storage	%
DOE/NETL			1	1.90%
PERDA		2.2		4.30%
Gas In-house	6			11.50%
Gov't CoFunds*	1.2	7.8		17.20%
MMS TA&R		4.3		8.20%
PHMSA	4.1	3.9		15.20%
PRCI		7.8	0.3	15.50%
NYSEARCH	3.8			7.30%
OTD	5.9			11.40%
SGA/GMRC		0.6		1.10%
NGTC	0.9			1.70%
Other Industry	2.3	0.2		4.70%
TOTAL	24.2	26.8	1.3	100%

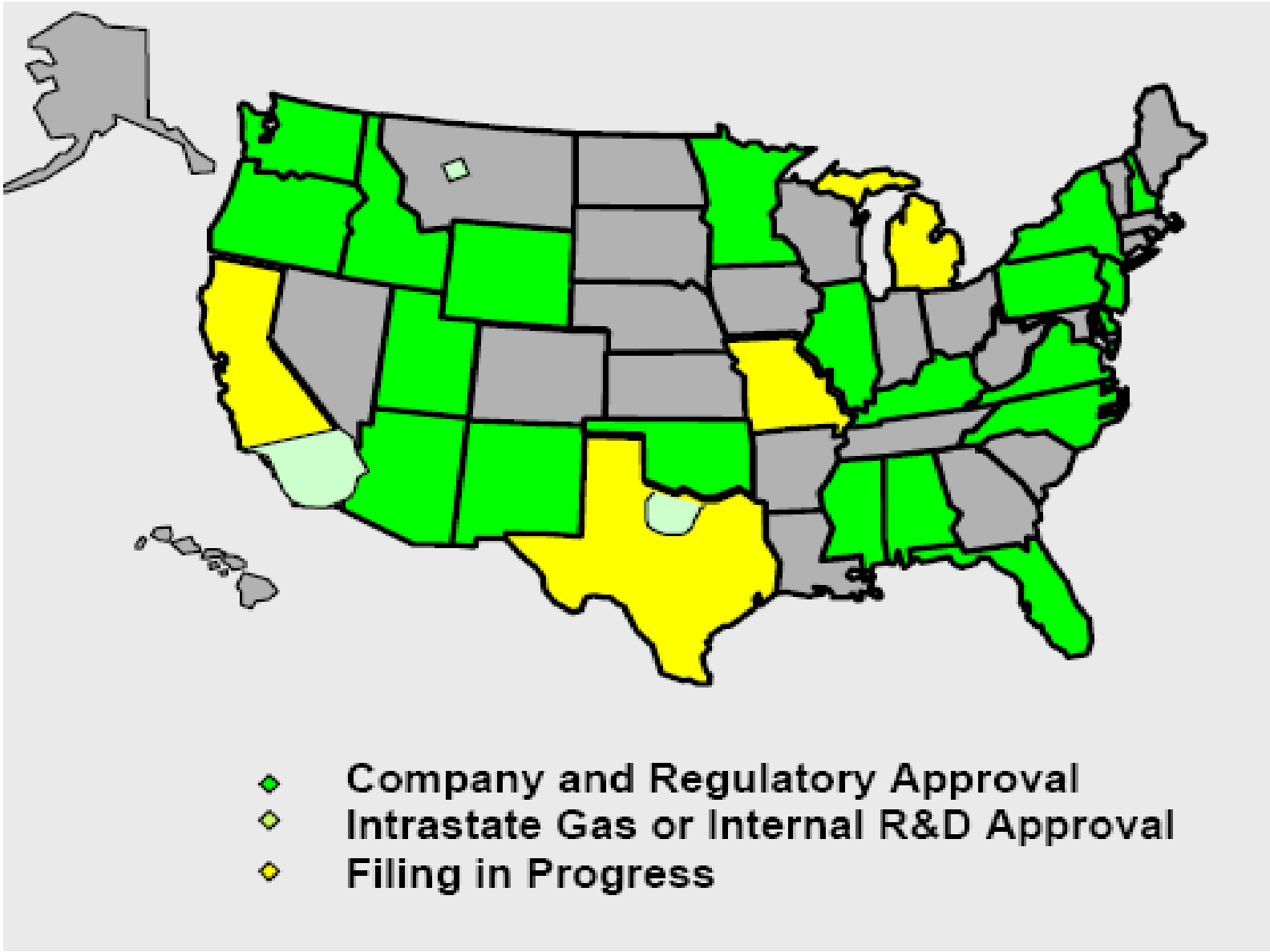
Findings

Five years ago, DOE and GTI managed two significant programs to maintain the safety and reliability of the nation's gas T&D infrastructure. Today, those programs are gone. Funding increases for collaborative industry programs have only partially offset the loss of these programs

Gas Research Institute Funding (1985-2005)



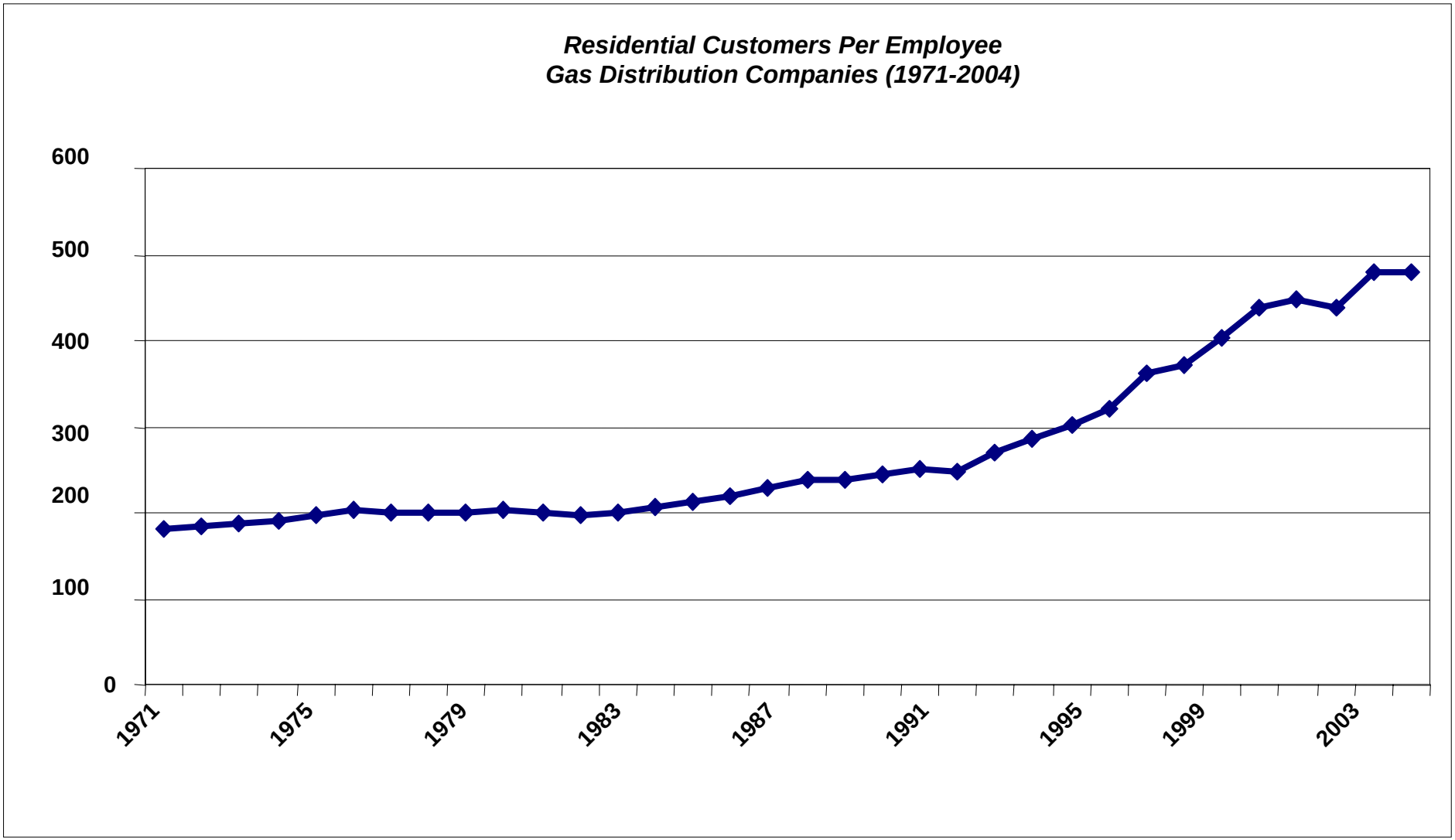
Growth in “Delta Funding”



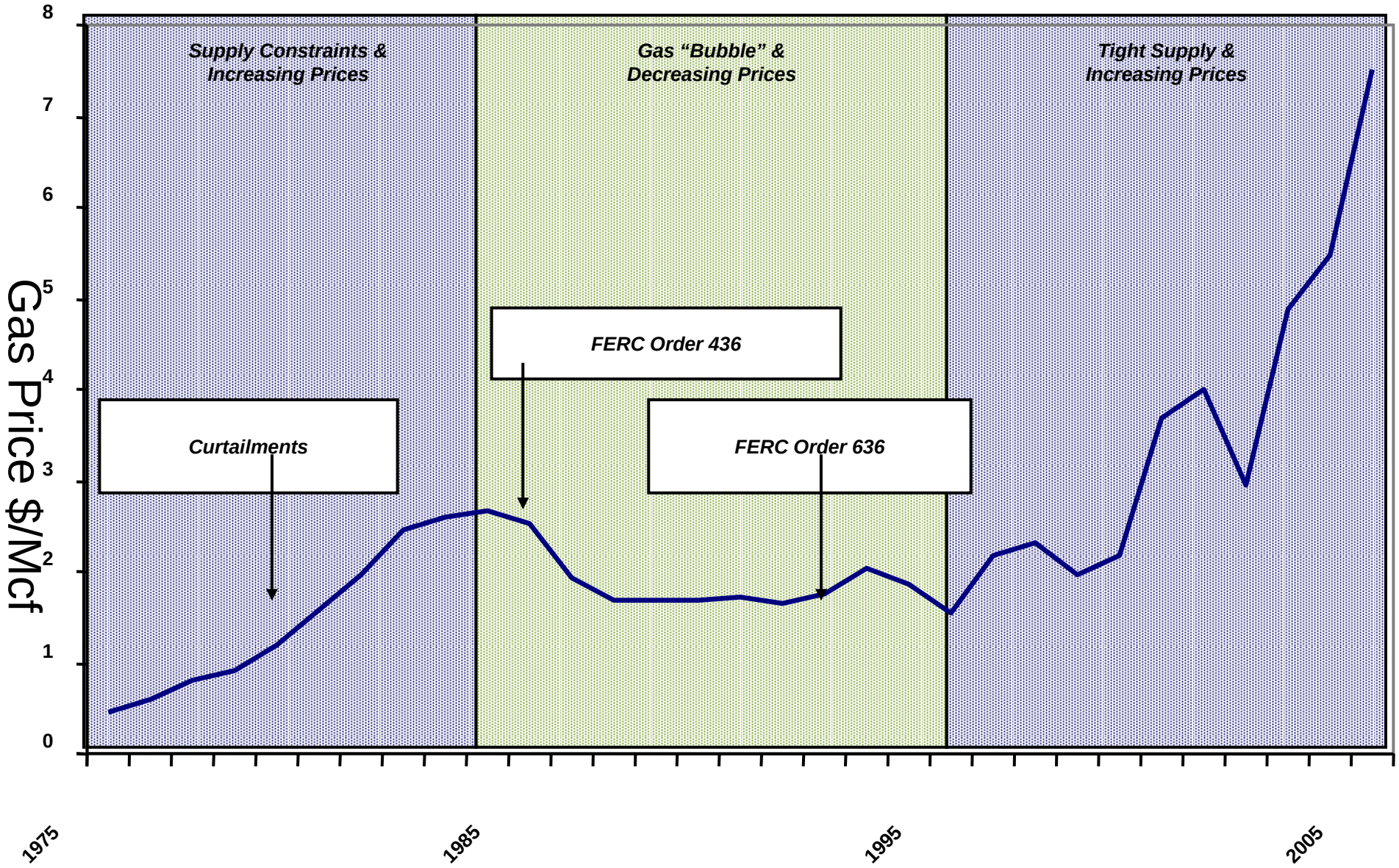
Market and Business Influence on R&D Levels

- Business Conditions– pressure to cut costs, improve productivity, and increase operating efficiency
- Market Conditions– Gas supply, demand, and price
- Market Regulation– Current or anticipated level of competition
- Rate Regulation/R&D expenses– Regulatory treatment effects industry R&D spending

Residential Customers per Employee: Gas Distribution Companies (1971-2004)



Supply/Demand Periods Affecting R&D Programs



Findings

- Key non-manufacturing transportation industries have federal R&D programs similar to PHMSA's
- The R&D intensity of the combined government funding for gas pipelines is 0.05%, which is 1/3 of rail and water and half of airlines.

Sector	***Primary Federal Agency***	***2006 Allocation***	***R&D Intensity***
Gas Pipelines	DOT/DOI	$8 million	0.05%
Airlines	FAA	$130 million	0.10%
Trucking	FHSA	$445 million	0.07%
Rail	RRA	$65 million	0.15%

Sector	***Primary Federal Agency***	***2006 Allocation***	***R&D Intensity***
Distribution R&D			
Gas Distribution	DOT	$ 4 million	0.01%
Water Utilities	EPA	$49 million	0.15%
T&D R&D			
Gas T&D	DOT/DOI	$12 million	0.03%
Electric T&D	DOE	$89 million	0.10%

Findings

Most remaining R&D (90%) is focused on

- improving monitoring and assessment of system integrity;
- enhancing system flexibility and throughput and reliability;
- reducing incidence and cost of subsurface damage;
- improving capability of cost effective construction, maintenance, and repair

R&D Funding	Percent	Objective
$12.6	**24%**	***Improve monitoring and assessment of system integrity***
$17.8	**34%**	***Enhance system flexibility and throughput and reliability***
$4.5	**9%**	***Reduce incidence and cost of subsurface damage***
$11.7	**22%**	***Improve capability of cost effective construction, maintenance and repair***
$3.7	**7%**	***Improve data quality and timeliness for system, operation, planning and regulatory acceptance***
$2.0	**4%**	***Identify and mitigate environmental issues.***
$52.3	**100%**	

Findings

- The reduction in R&D funding has almost eliminated long-term basic research.
- Current natural gas R&D funding is focused on near-term developments
- Differs from electric and water industries who maintain basic R&D programs oriented at longer-term industry goals

Findings

- Current R&D environment places a premium on coordination and communications
- Long term correlation between R&D investment and measures of corporate performance (profits, growth rates, stock $)
- ***There is a need for formal avenues for long term basic research. Other collaborative industries have R&D programs supported by a surcharge or fee***

Impact of Natural Gas R&D Initiatives

- Peoples Energy: From 1996-2001, reduced headcount by 25%, decreased lost time/recordable injury rates by 75%, and reduced O&M expenses by 30% .
- PRCI member companies indicate that typical ROI from long-term participation in the program from 4-7 times the total dollars invested. Similar returns are indicated from other research consortiums

Thank you