



U.S. DEPARTMENT OF ENERGY

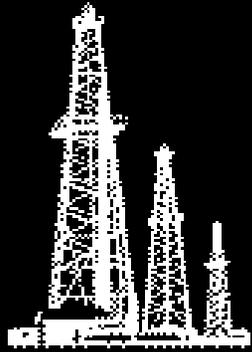
OFFICE OF INDUSTRIAL TECHNOLOGIES

FOURTH INDUSTRIAL ENERGY EFFICIENCY SYMPOSIUM AND EXPOSITION

PANEL: OUTLOOK FOR BASIC MATERIALS INDUSTRIES

TOPIC: OIL AND NATURAL GAS

JOHN B. PARRY
V.P. RESEARCH
JOHN S. HEROLD, Inc.
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John S. Herold, Inc.

Founded in 1948, John S. Herold, Inc. provides its clients with key financial, operational and capital markets data together with independent, analysis of the valuation and performance of the world's energy companies.





CURRENT FACTORS IMPACTING OIL AND NATURAL GAS INDUSTRY

OPEC's OIL PRODUCTION CUTBACKS HAVE ELIMINATED EXCESS U.S. OIL PRODUCT INVENTORIES AND COULD LEAD TO TIGHT GASOLINE MARKET THIS SUMMER.

BARRING A MAJOR RECESSION, OPEC PRODUCTION CONTROLS LIKELY TO HOLD OIL PRICES ABOVE NOMINAL HISTORICAL LEVELS IN 2001.

OIL AND NATURAL GAS PRICES IN U.S. BECAME SIGNIFICANTLY DECOUPLED IN LATE 2000. RESTORATION TO A MORE TRADITIONAL RATIO IS ANTICIPATED OVER THE NEXT 12-18 MONTHS.

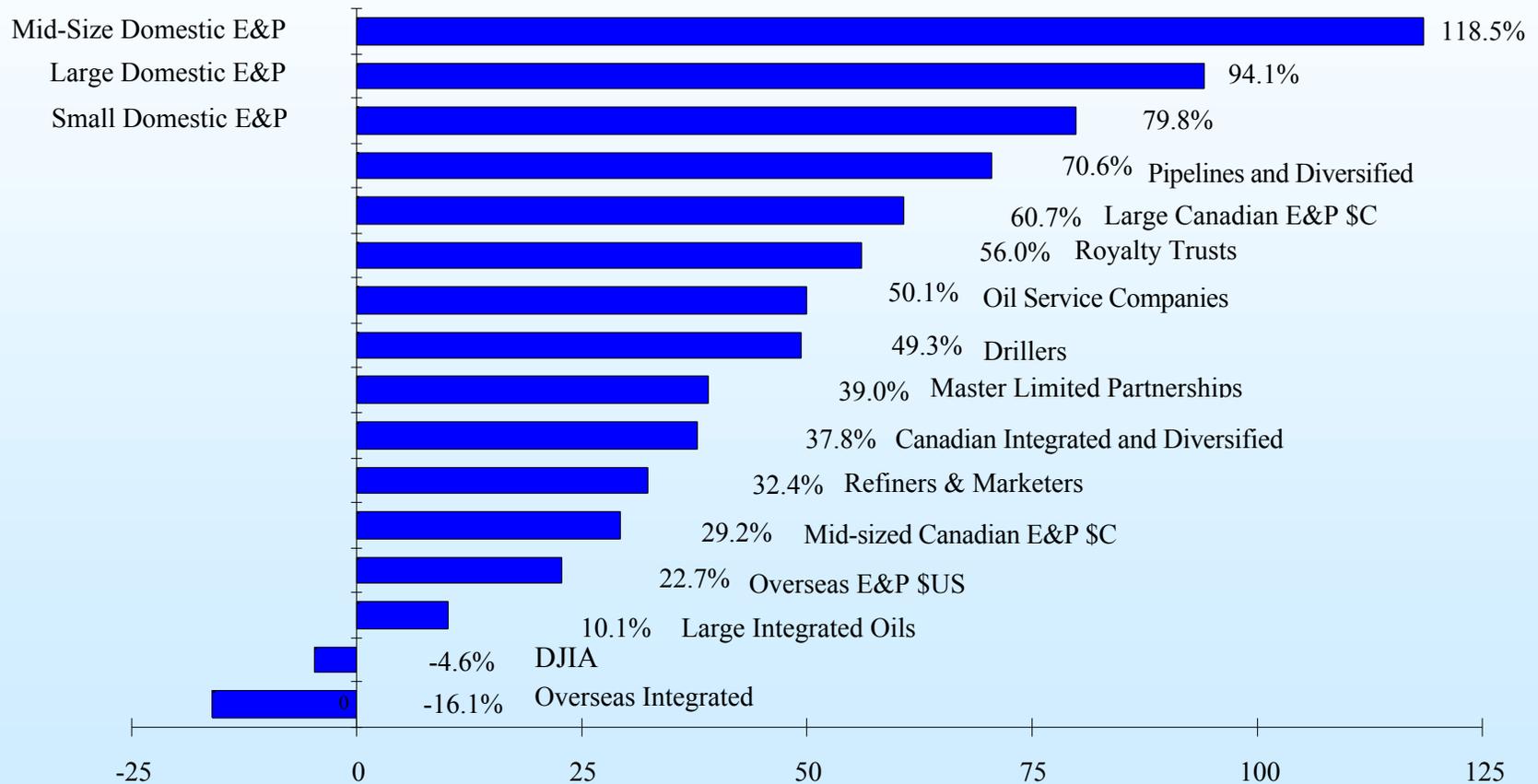
NORTH AMERICA NATURAL GAS CONTINUES TO FACE SUPPLY UNCERTAINTIES WITH CURRENT DRILLING ACTIVITY UNLIKELY TO MEANINGFULLY BOOST TRADITIONAL SUPPLIES.

GROWTH OF NORTH AMERICA GAS MARKET TO 30 TCF BY 2010-2015 WILL REQUIRE A SIGNIFICANT CONTRIBUTION FROM MORE EXPENSIVE ALASKA, CANADIAN ARCTIC, DEEPWATER GOM, EASTERN CANADIAN OFFSHORE AND LNG SUPPLIES. THE COST ASSOCIATED WITH THESE SOURCES COULD WELL SET A PRICE FLOOR FOR NATURAL GAS IN THE \$3.50/MCF RANGE.

NATURAL GAS GROWTH WILL BE DOMINATED BY THE PRICE-SENSITIVE ELECTRIC POWER AND INDUSTRIAL END-USE MARKETS (OVER 60% OF CURRENT U.S. DEMAND) OWING TO ENVIRONMENTAL ISSUES. AVAILABILITY OF COMPETITIVELY PRICED SUPPLIES WILL BE A KEY DRIVING FORCE.

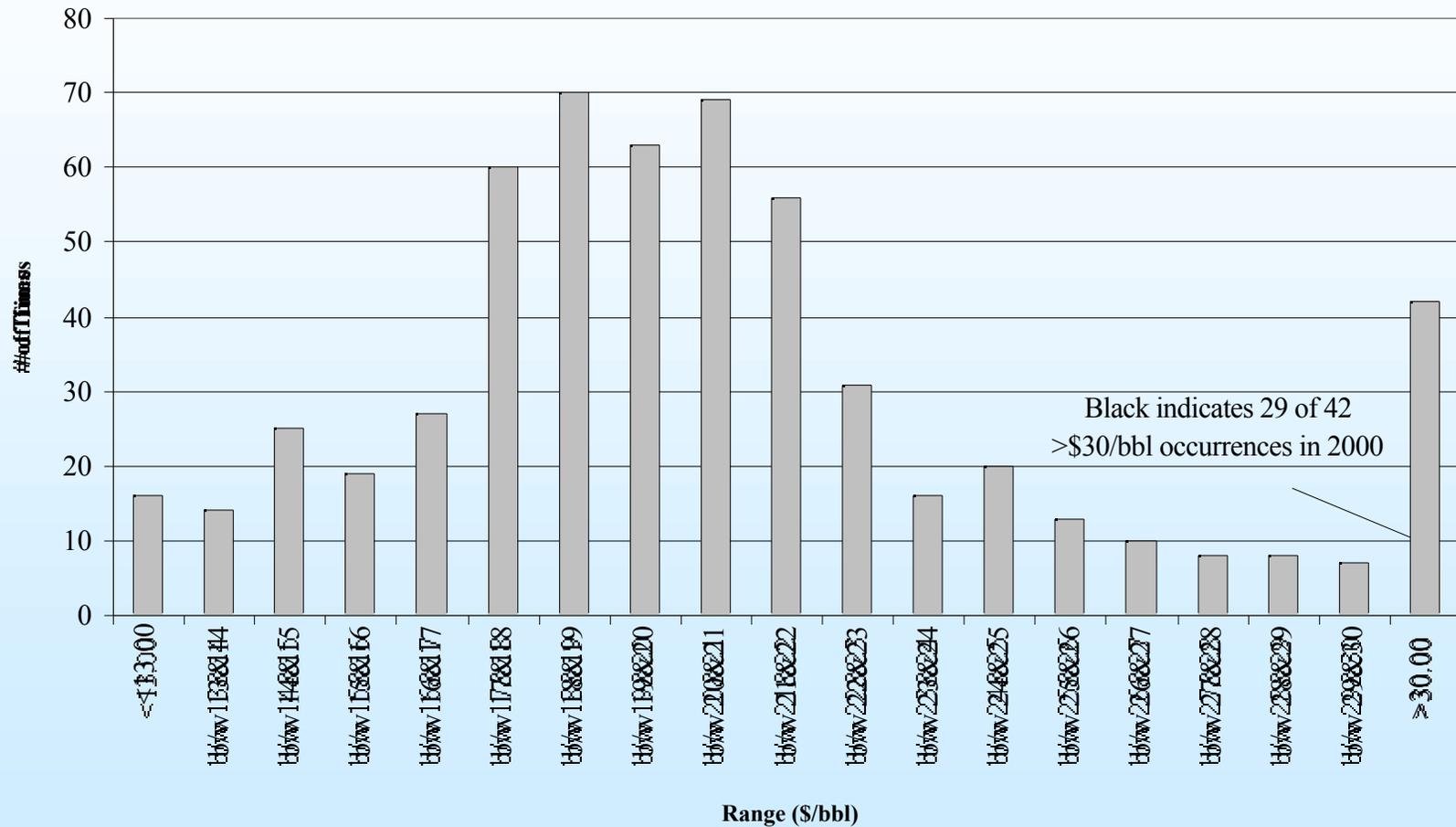


Total Shareholder Return for 2000



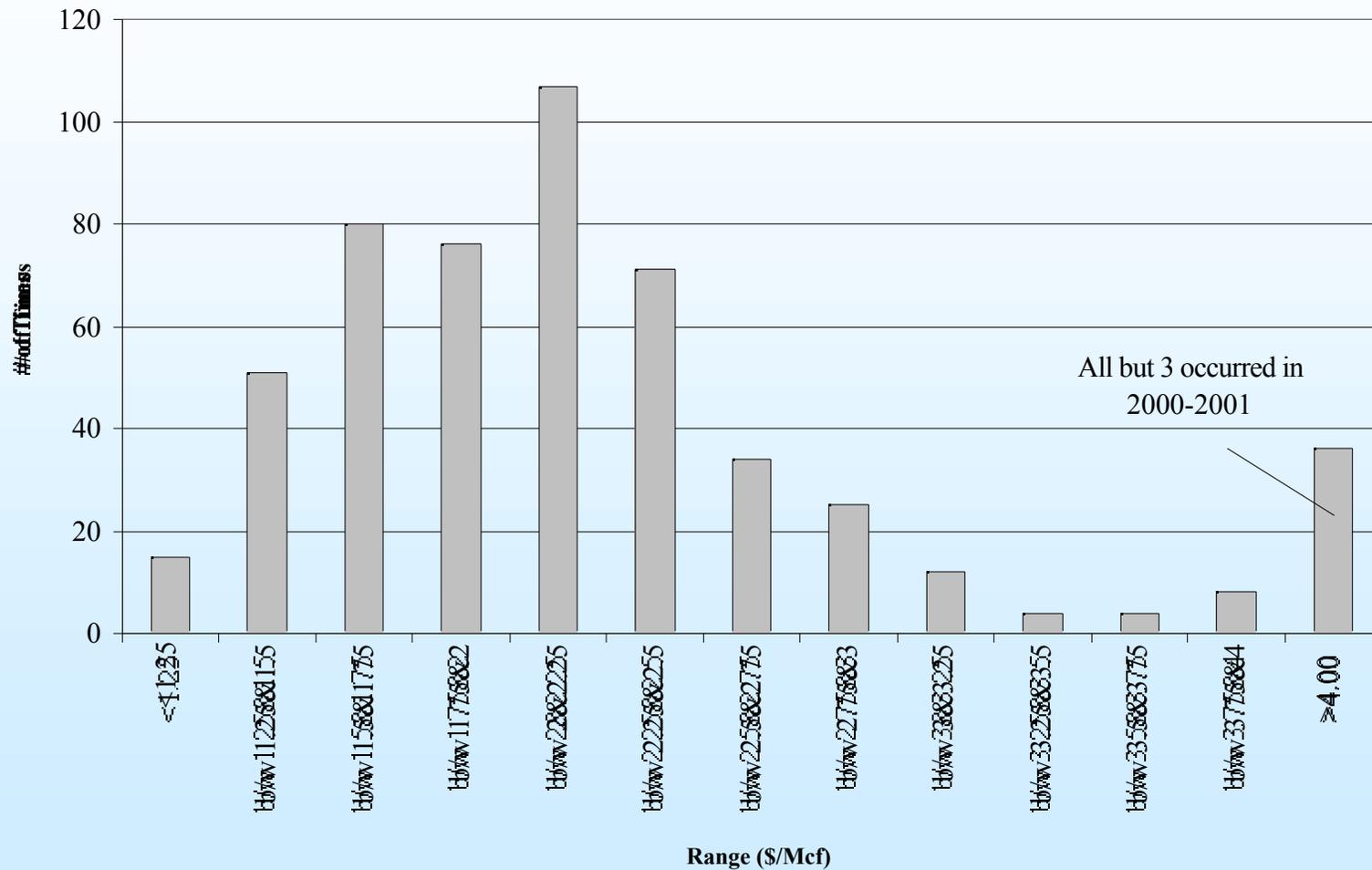


10 Year Frequency Distribution of Weekly WTI Oil Prices



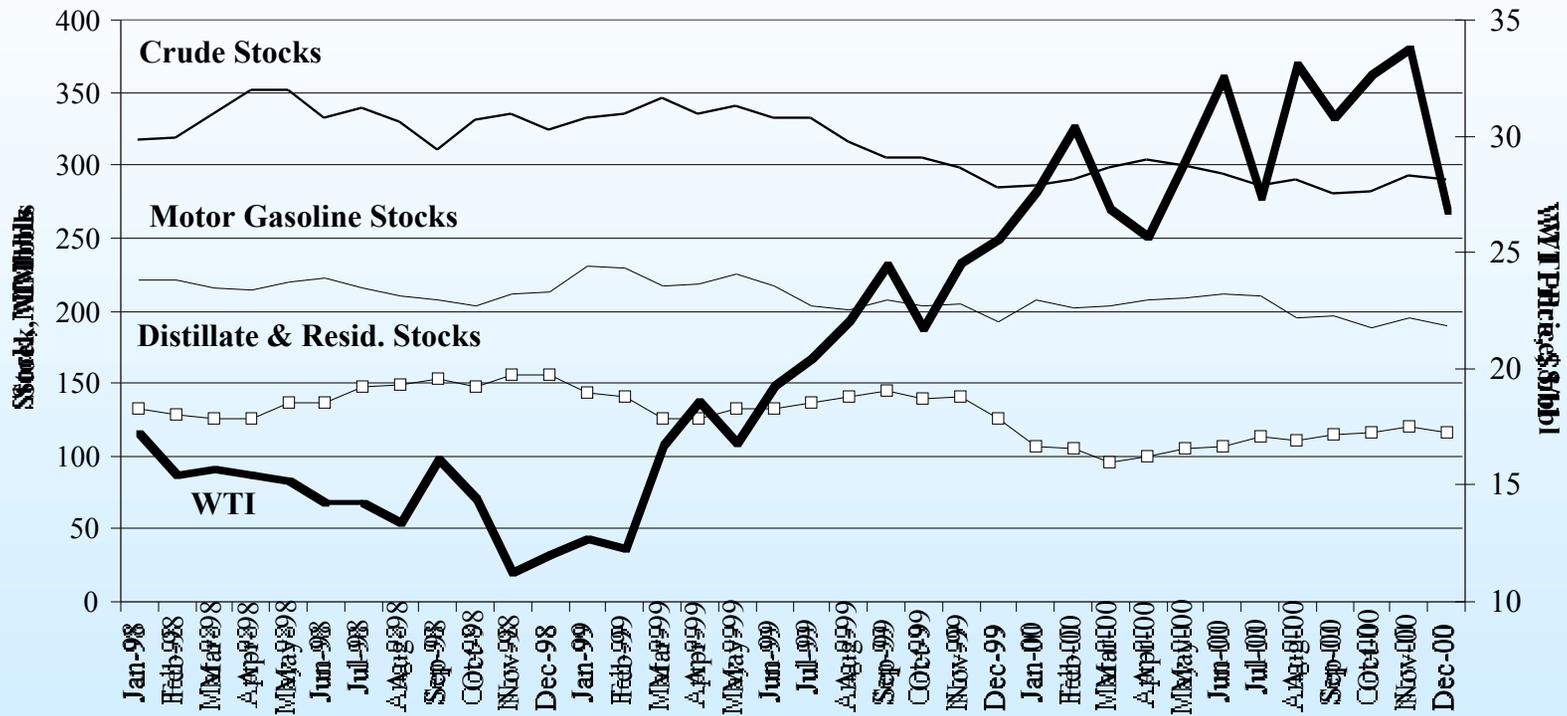


10 Year Frequency Distribution of Weekly Henry Hub Natural Gas Prices





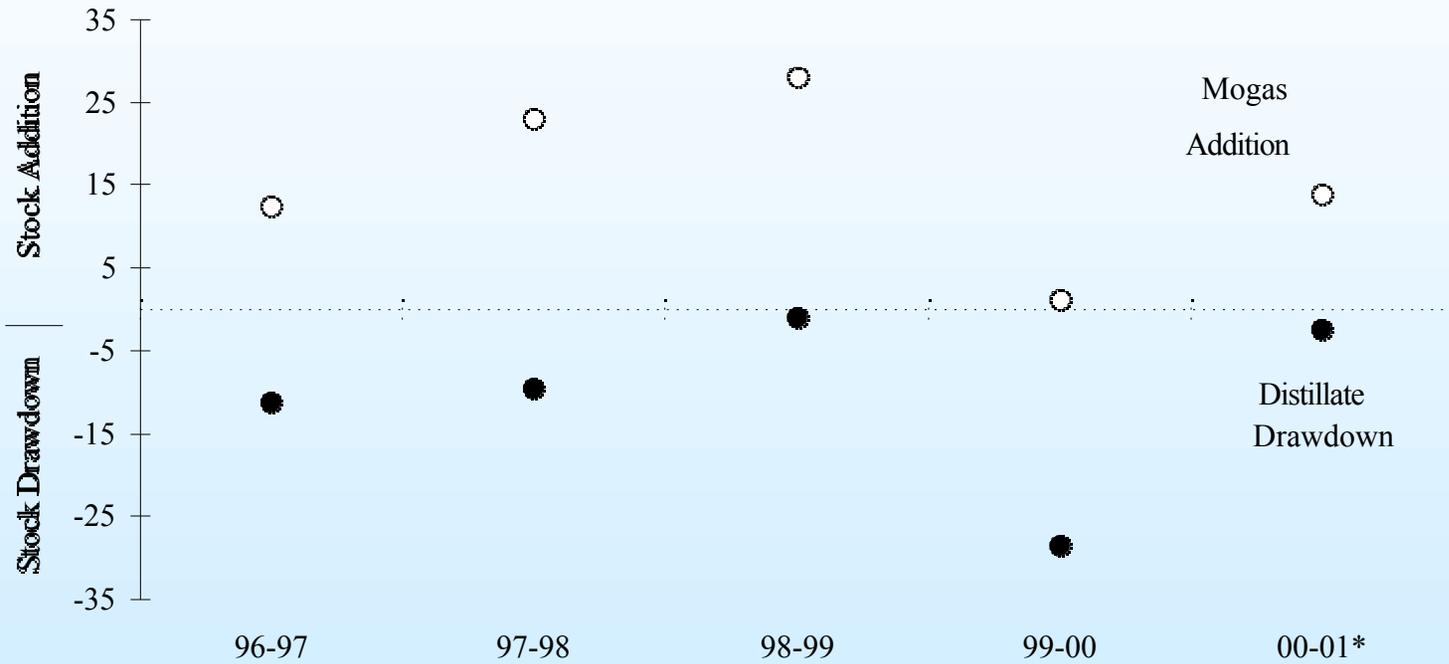
U.S. Crude and Product Stocks VS. WTI Price



Source: DOE/EIA



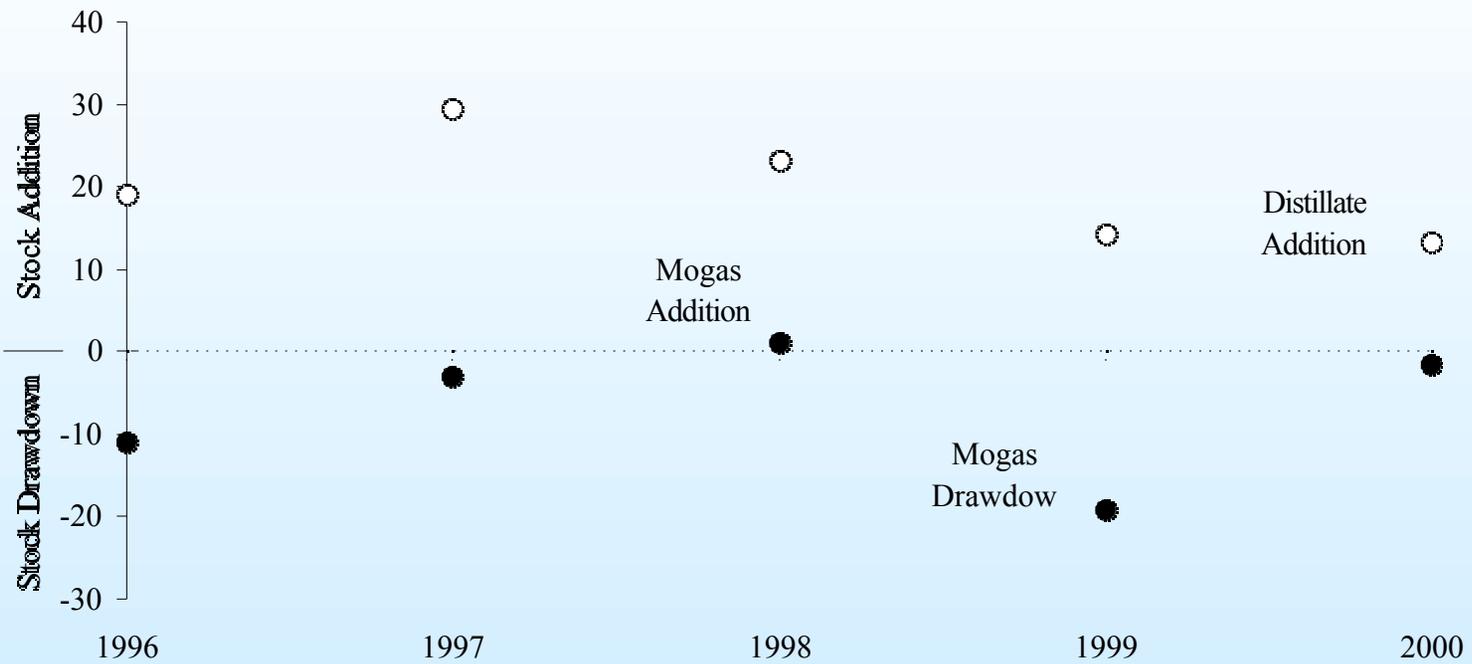
US Distillate & Gasoline Stock Changes from Nov-Feb, (MMbbl)



*00-01 heating season spans 11/3/00-2/2/01

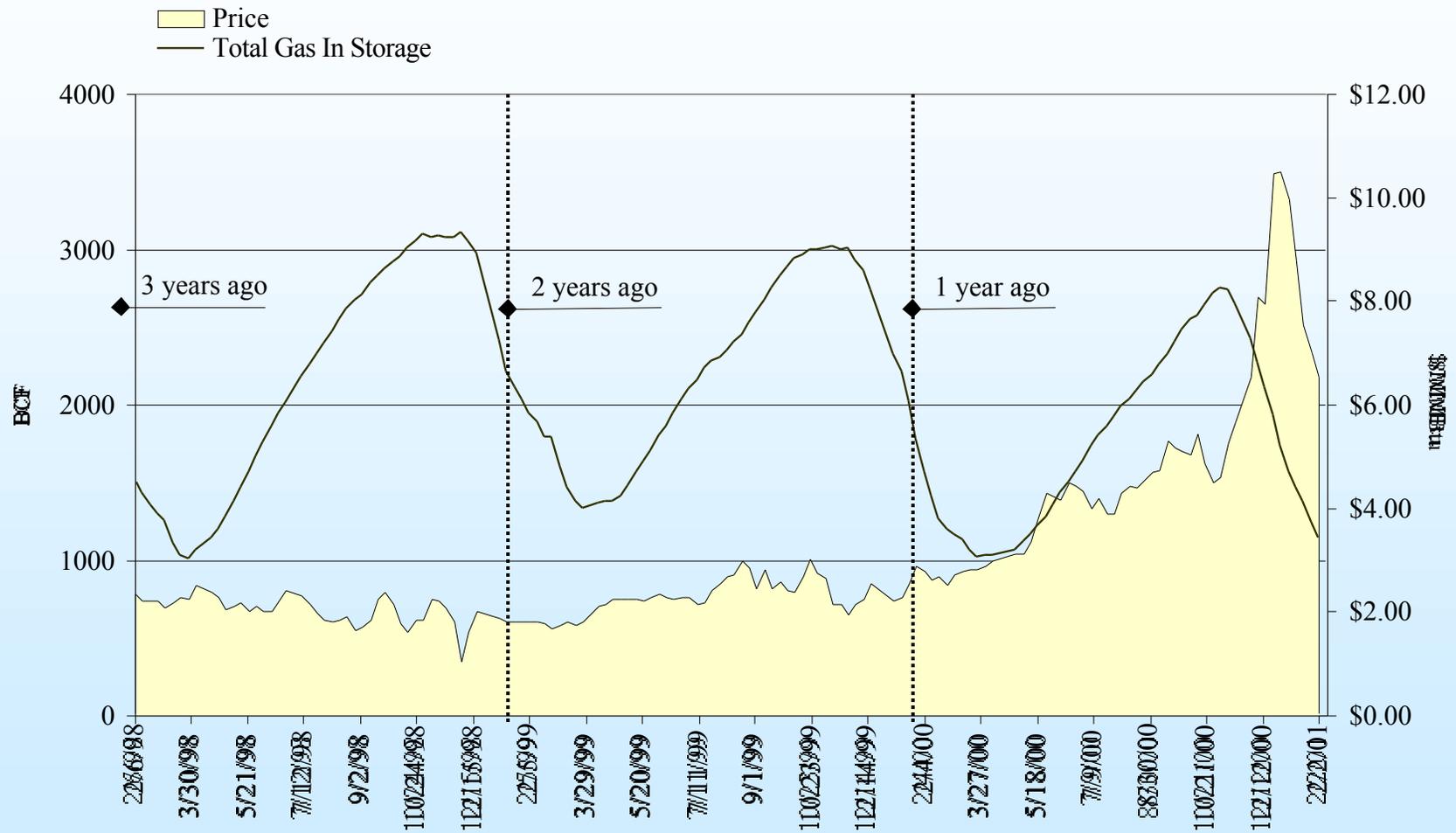


US Distillate and Gasoline Stock Changes from May-August, (MMbbl)



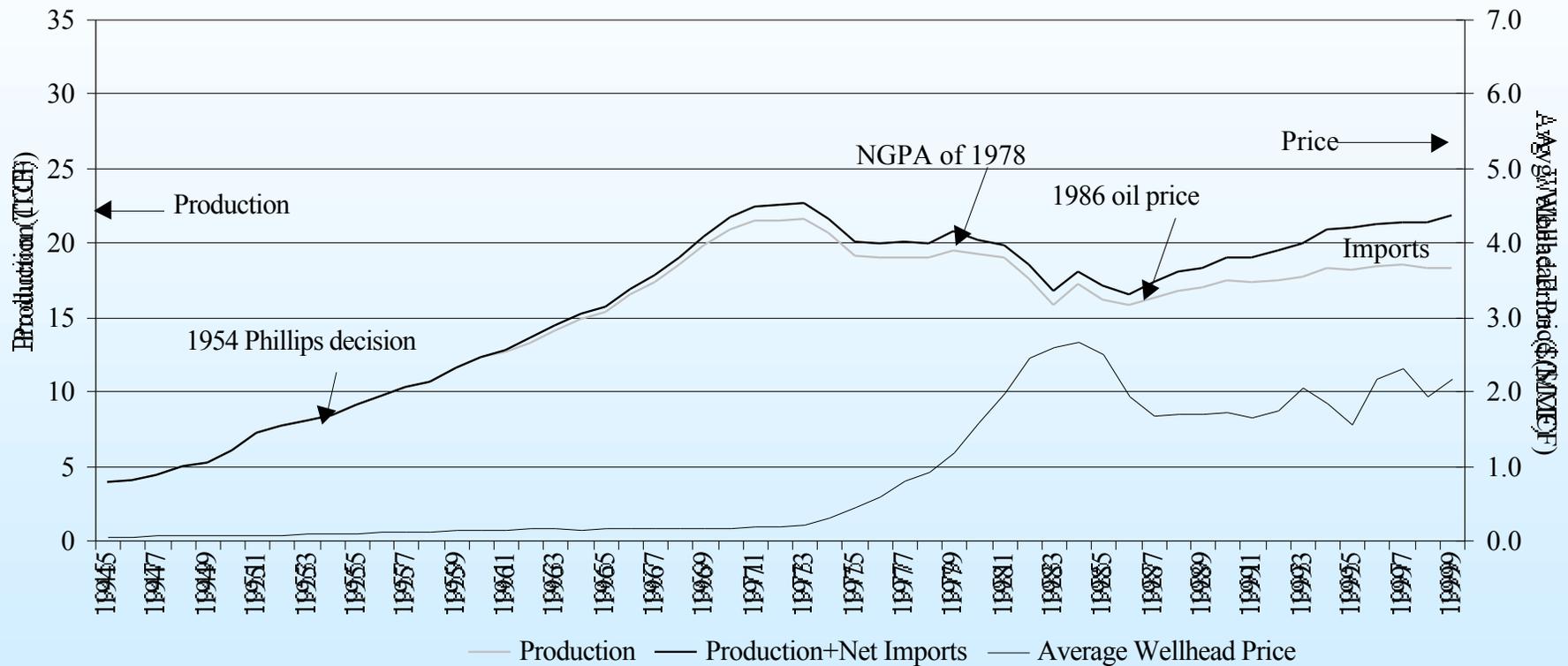


Working Gas in Storage and Henry Hub Price





Historical Lower 48 Prod., Net Imports & Avg. Nat. Gas Wellhead Price (1945-1998)

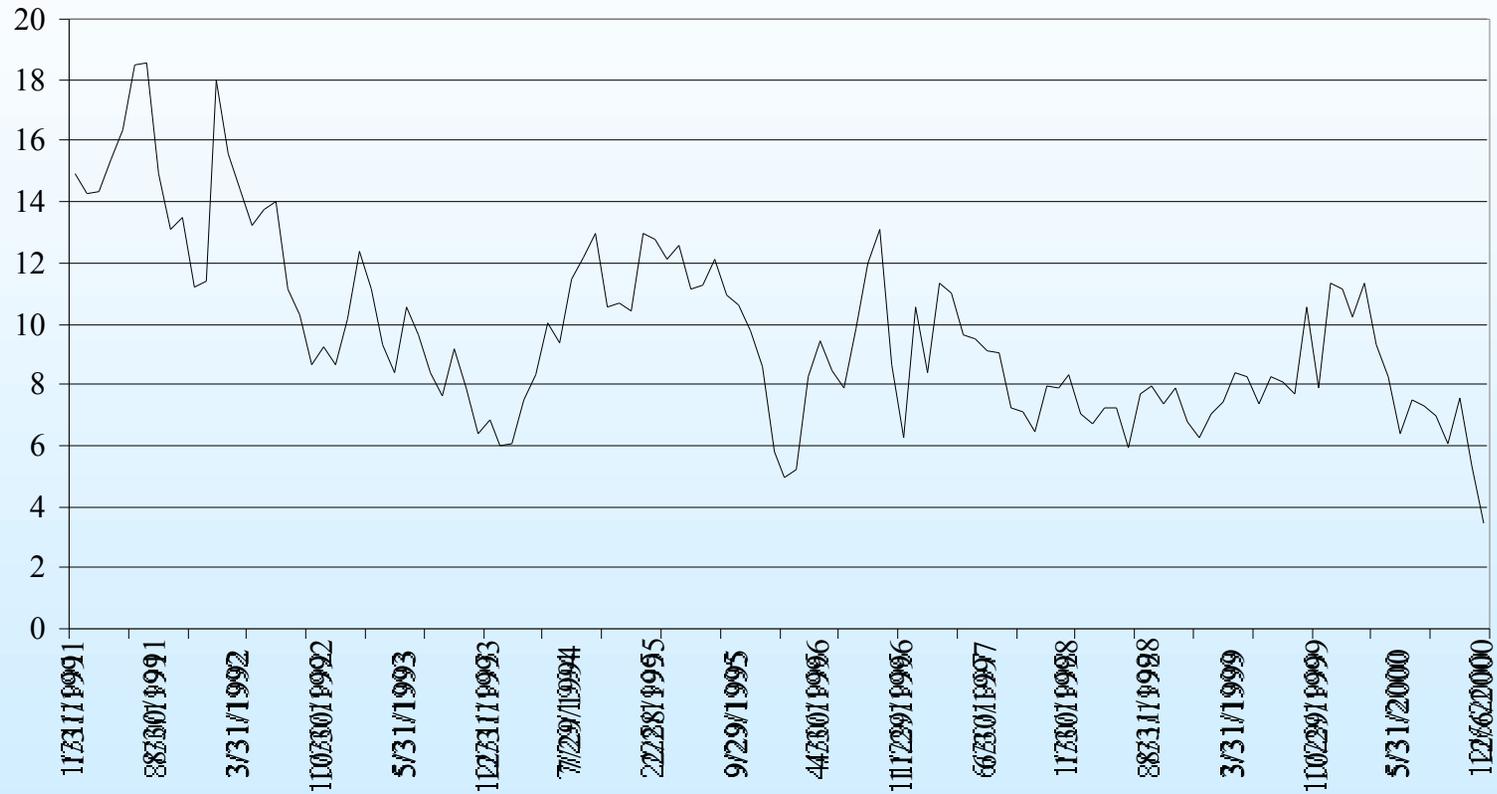


Gas that moved in interstate commerce was under Federal price controls from 1954 to 1978; price controls were phased out by 1985

Excess supply was as much as 5 Tcf/year during the “gas bubble” of 1981-1992

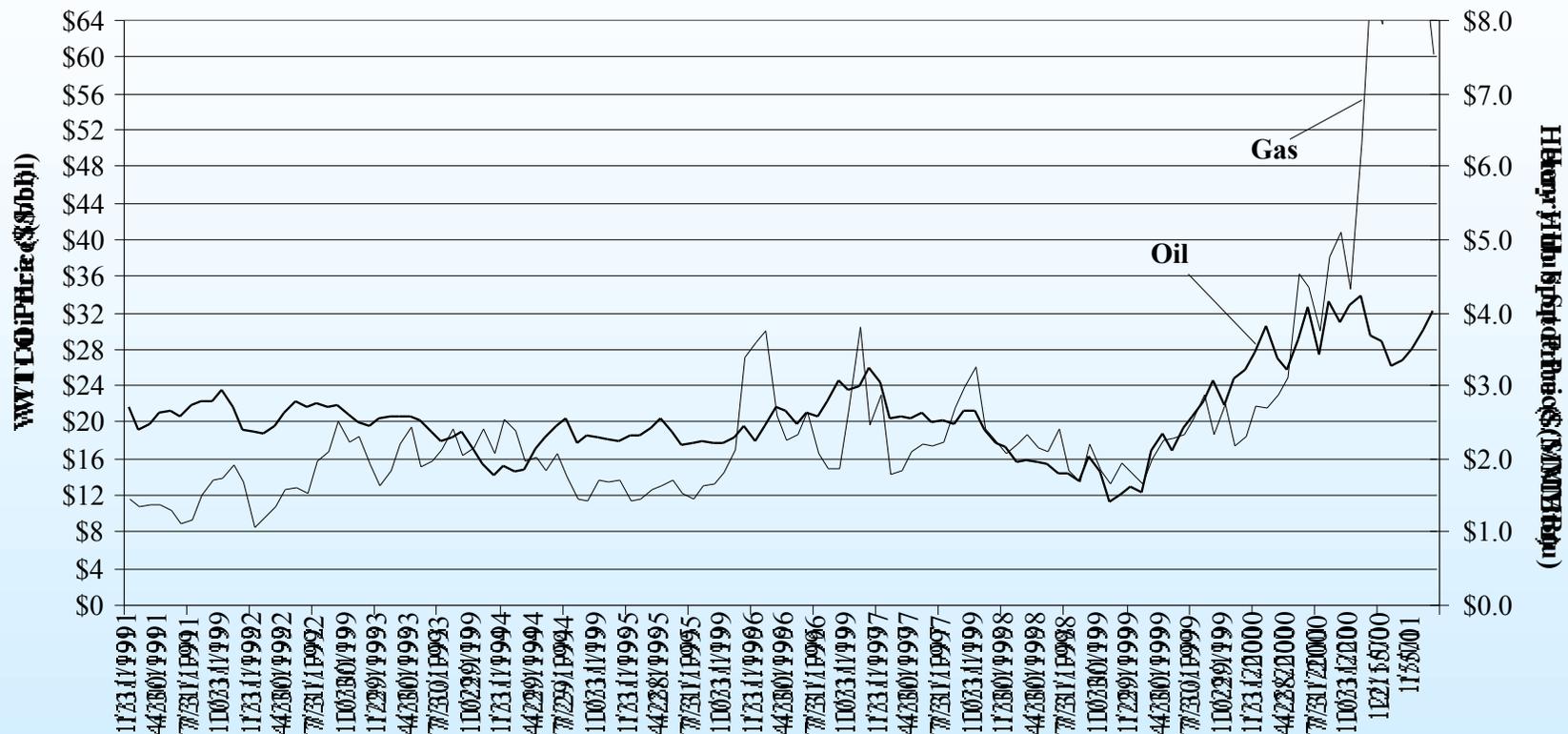


Price Ratio: WTI Oil Divided by Henry Hub Natural Gas





WTI & Henry Hub (January '91-Present)

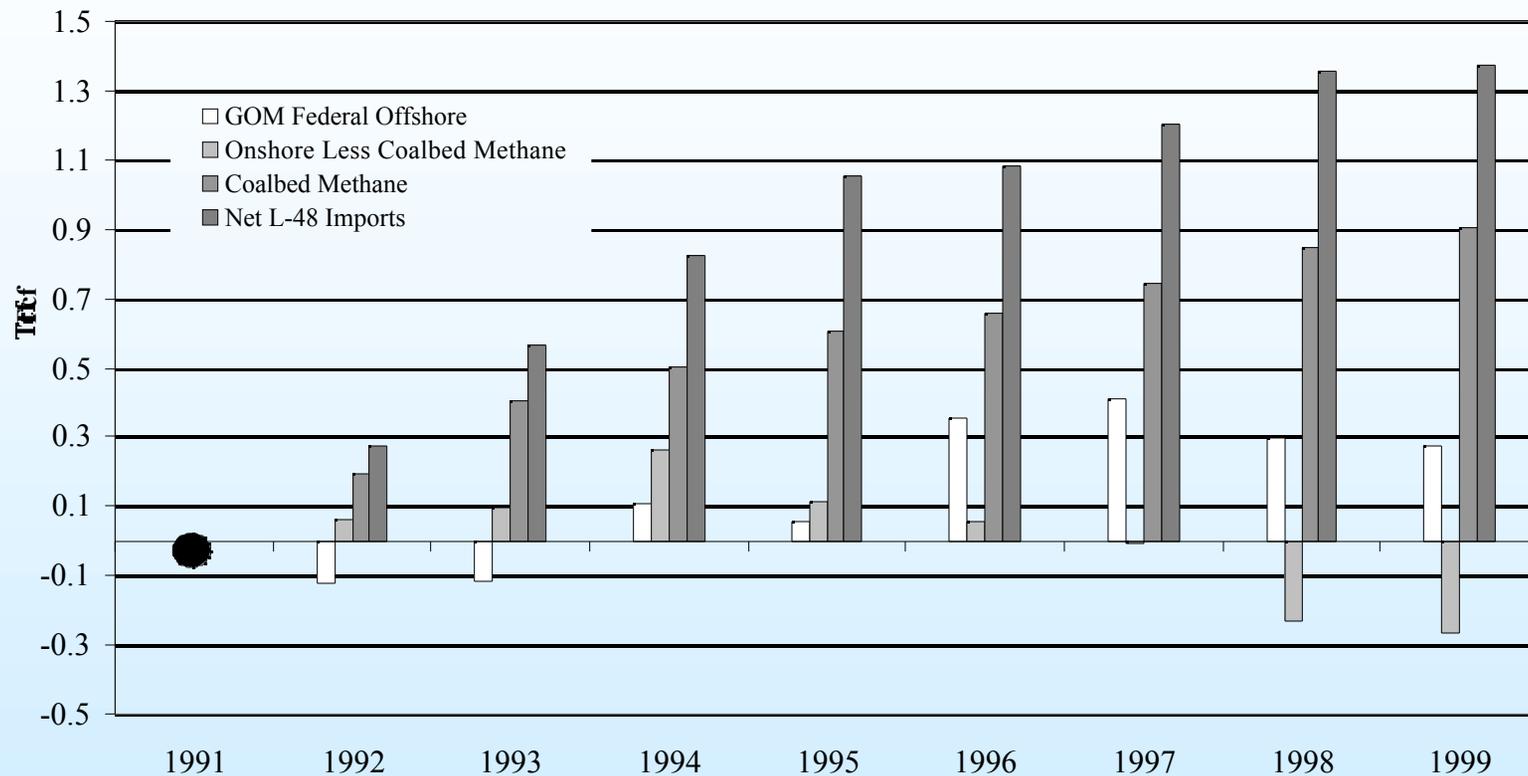


This graph is scaled at an oil price to gas price of eight to one, i.e. when oil price per barrel is eight times gas price per million Btu the curves are super-imposed

A rough measure of when significant fuel switching occurs is at the 8-to-one level. Note the relative “bargin” in natural gas in 1994-1995 and that for a large part of the time since the oil price increase in 1999, gas has not been over-priced even at levels above \$3.00 per million Btu.



Incremental Gas Production & Imports Since 1991

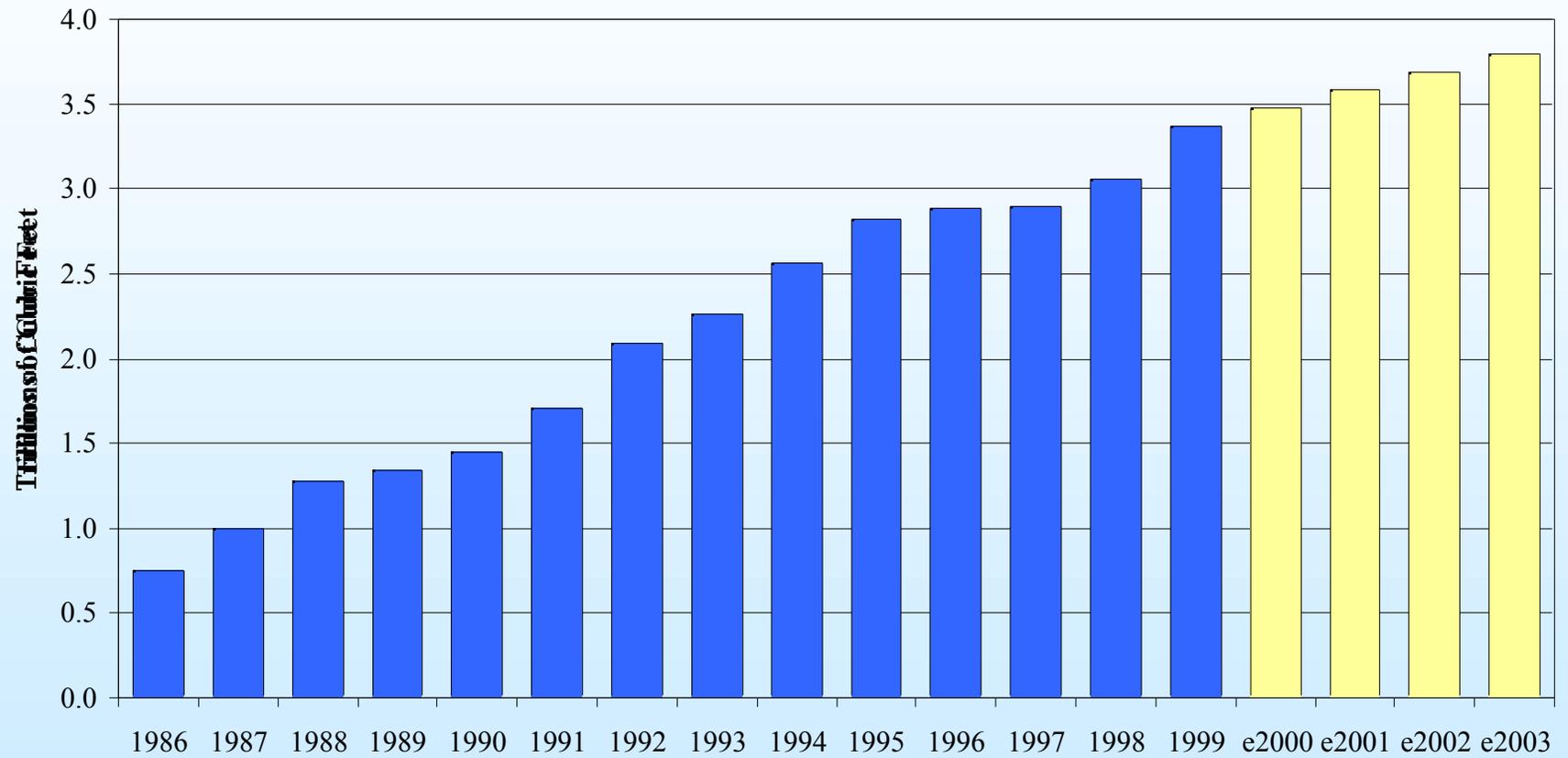


Source: DOE/EIA

Between 1991 and 1999, imports accounted for 67% of the increase in U.S. consumption
 Imports increased more than the combined increases of the Gulf of Mexico and coalbed methane
 Imports now account (1999) for 16.5% of U.S. consumption

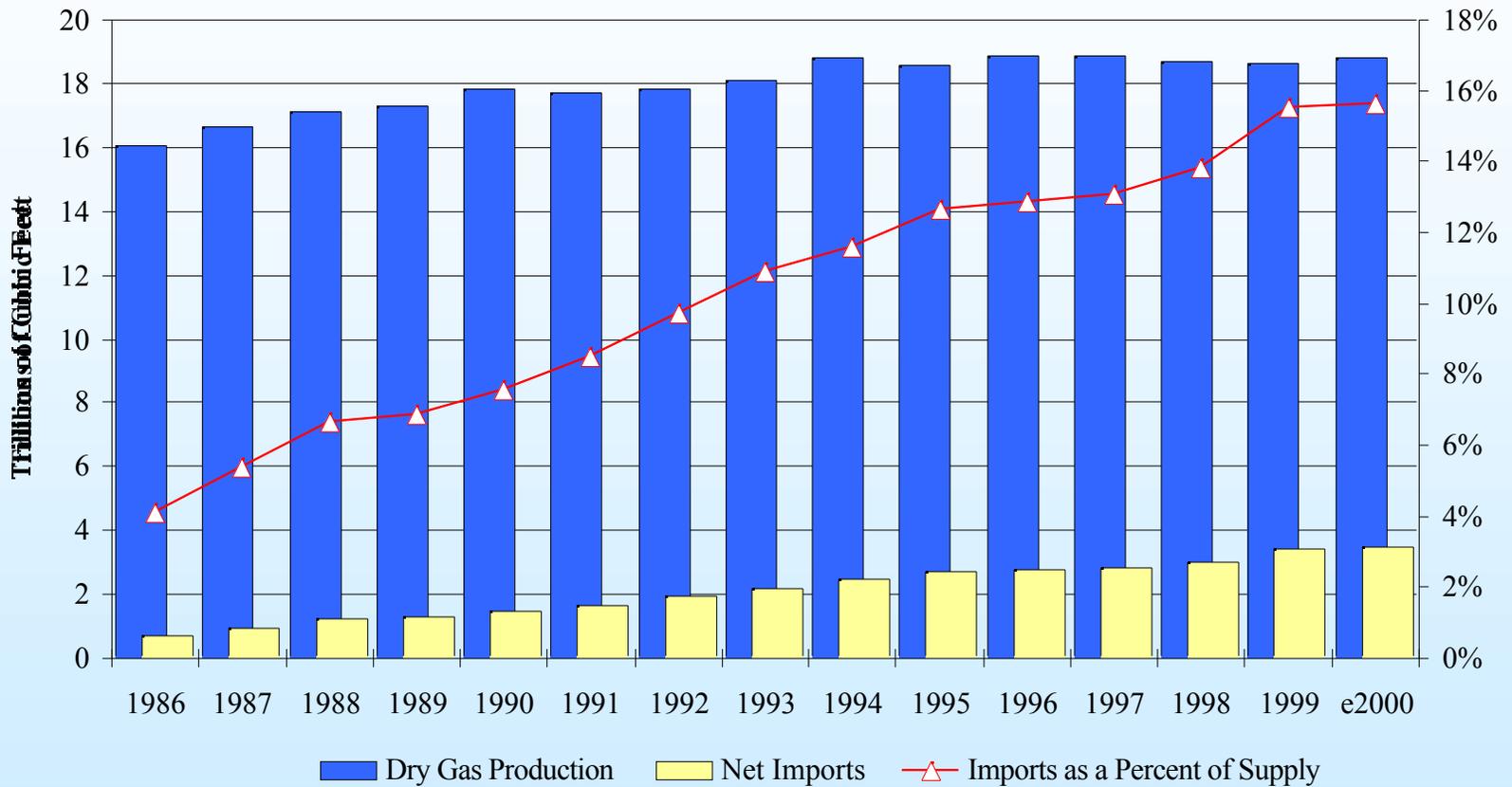


Canadian Natural Gas Imports 1986-e2003



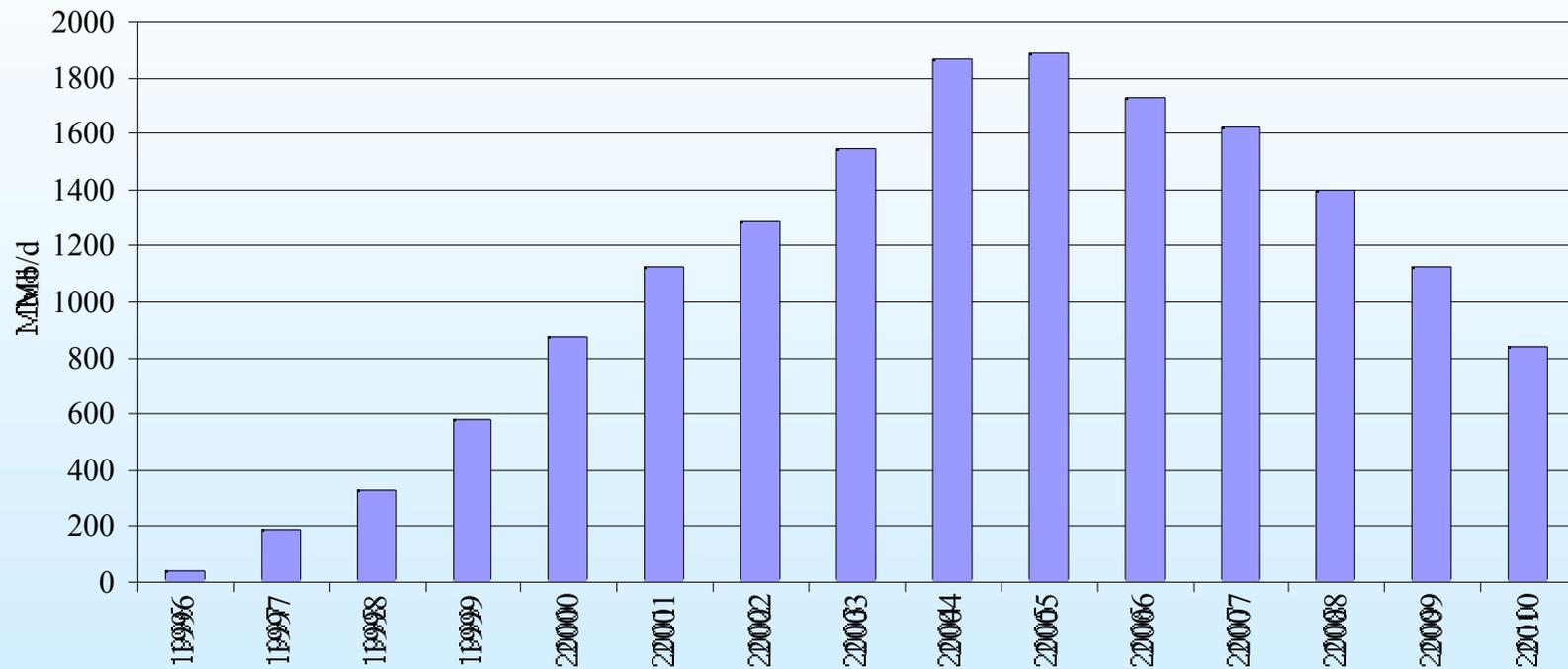


U.S. Natural Gas Supply 1986-e2000





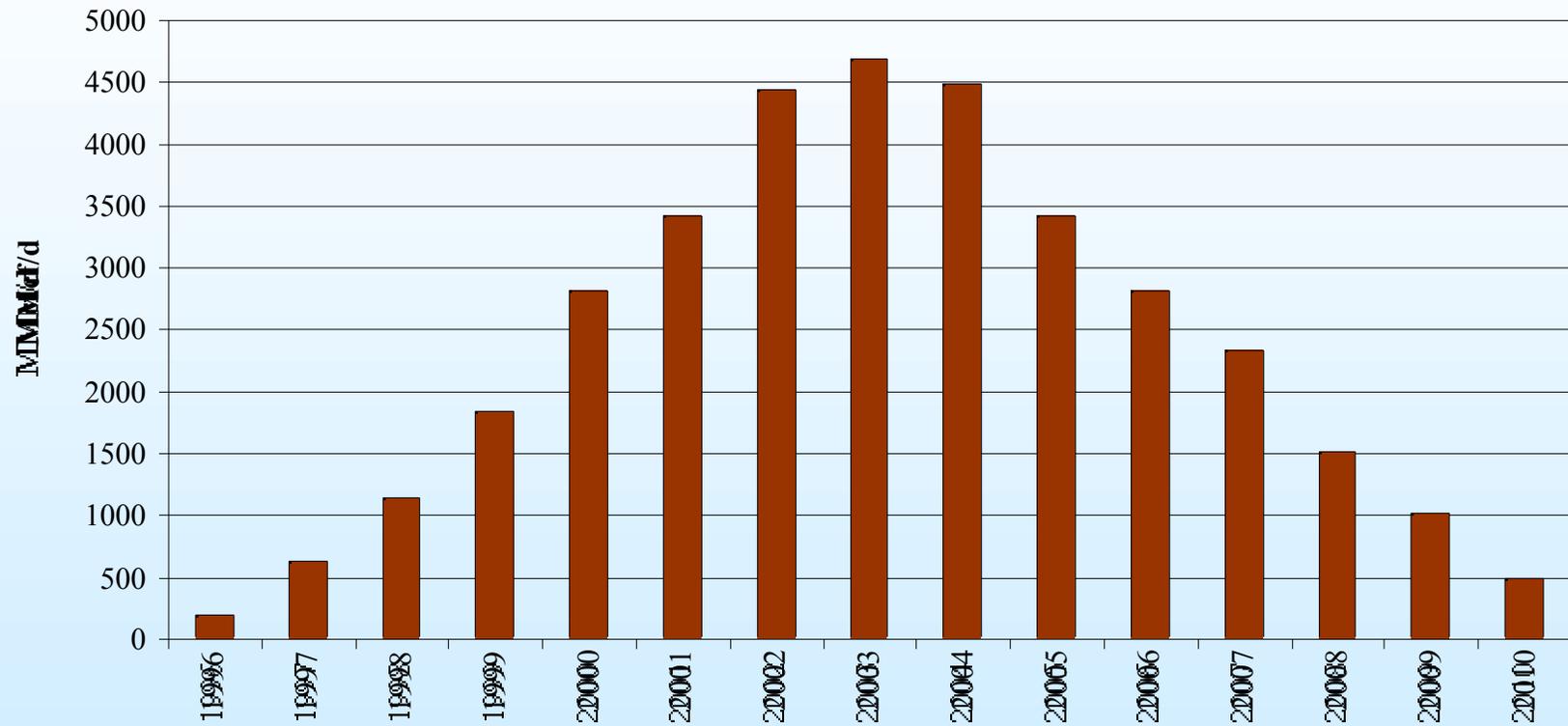
Identified New Deep Water Gulf of Mexico Oil Production



Source: JSH Global E&P Strategies Projections



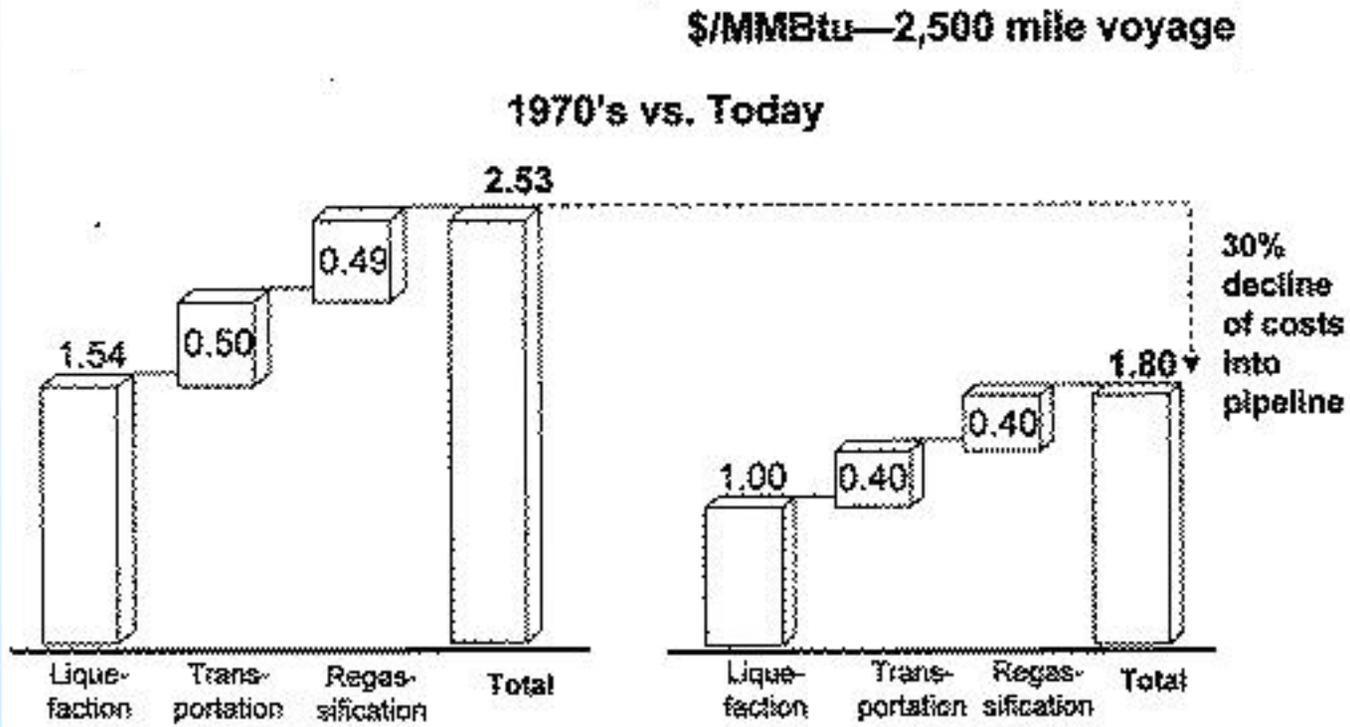
Identified New Deep Water Gulf of Mexico Gas Production



Source: JSH Global E&P Strategies Projections



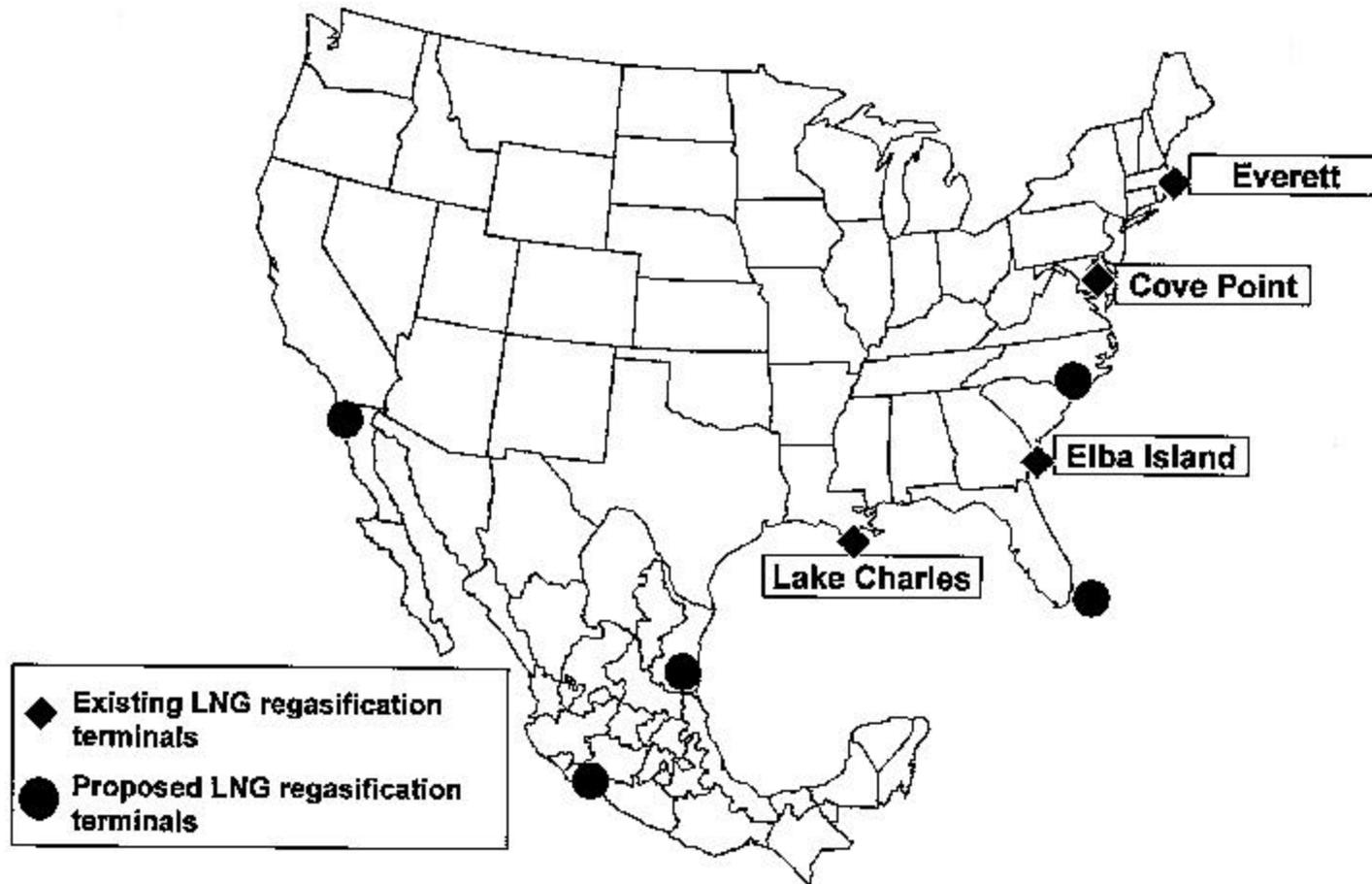
Estimate of LNG Cost Reductions



Note: Does not include feedstock prices
Source: McKinsey & Company

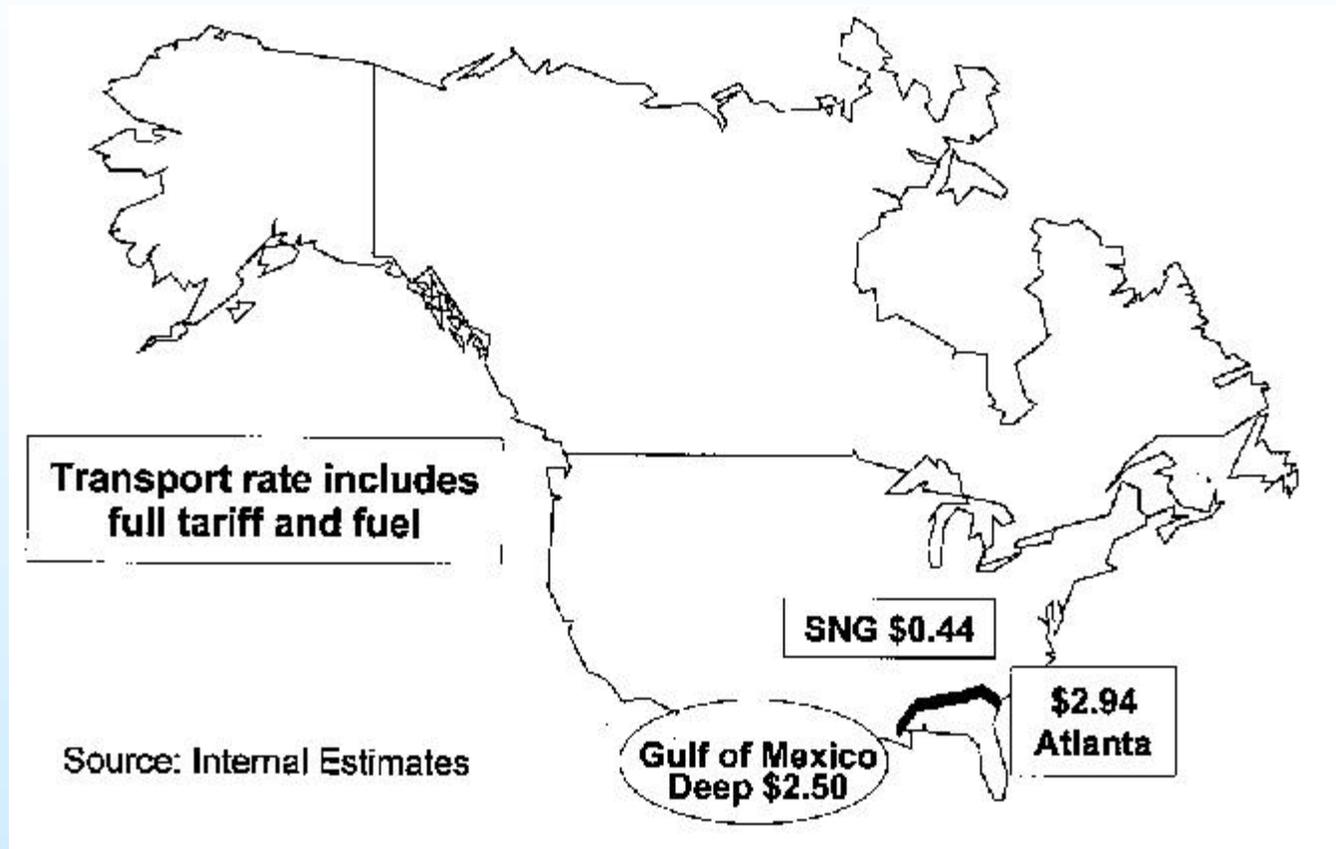


First Tier North American LNG Terminals



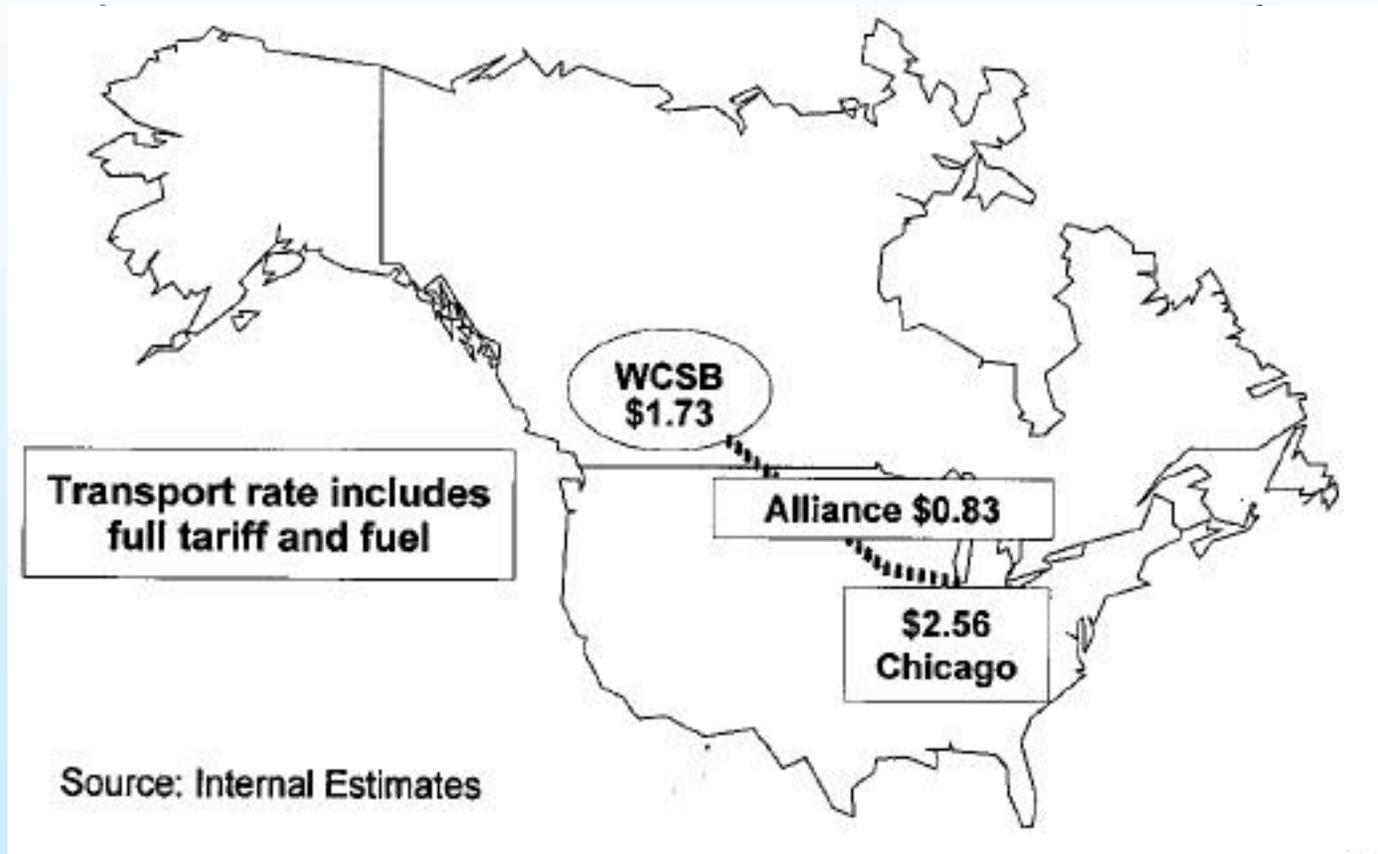


Full Cycle Gas Costs-Gulf of Mexico Deepwater



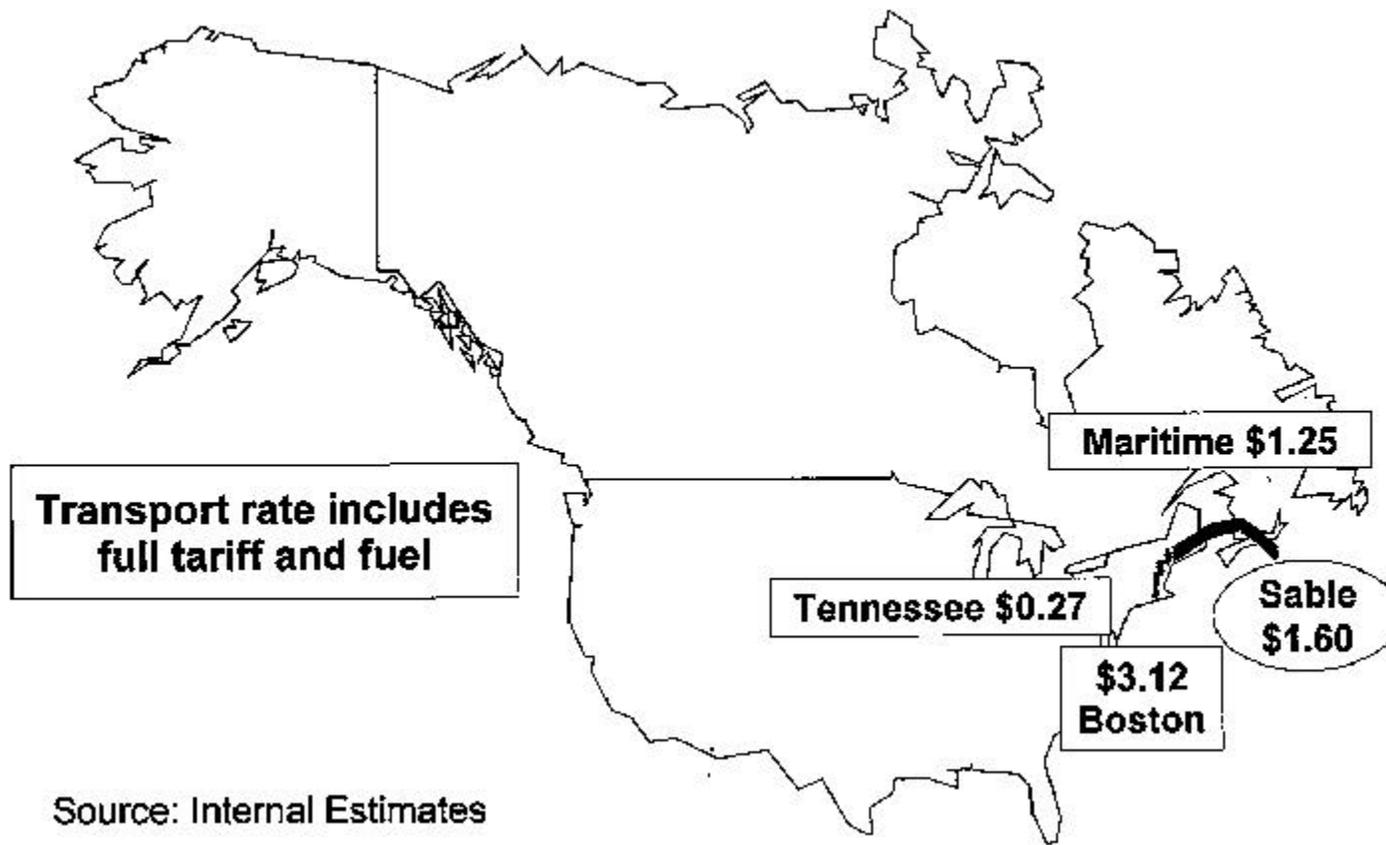


Full Cycle Gas Costs-Western Canada Sedimentary Basin



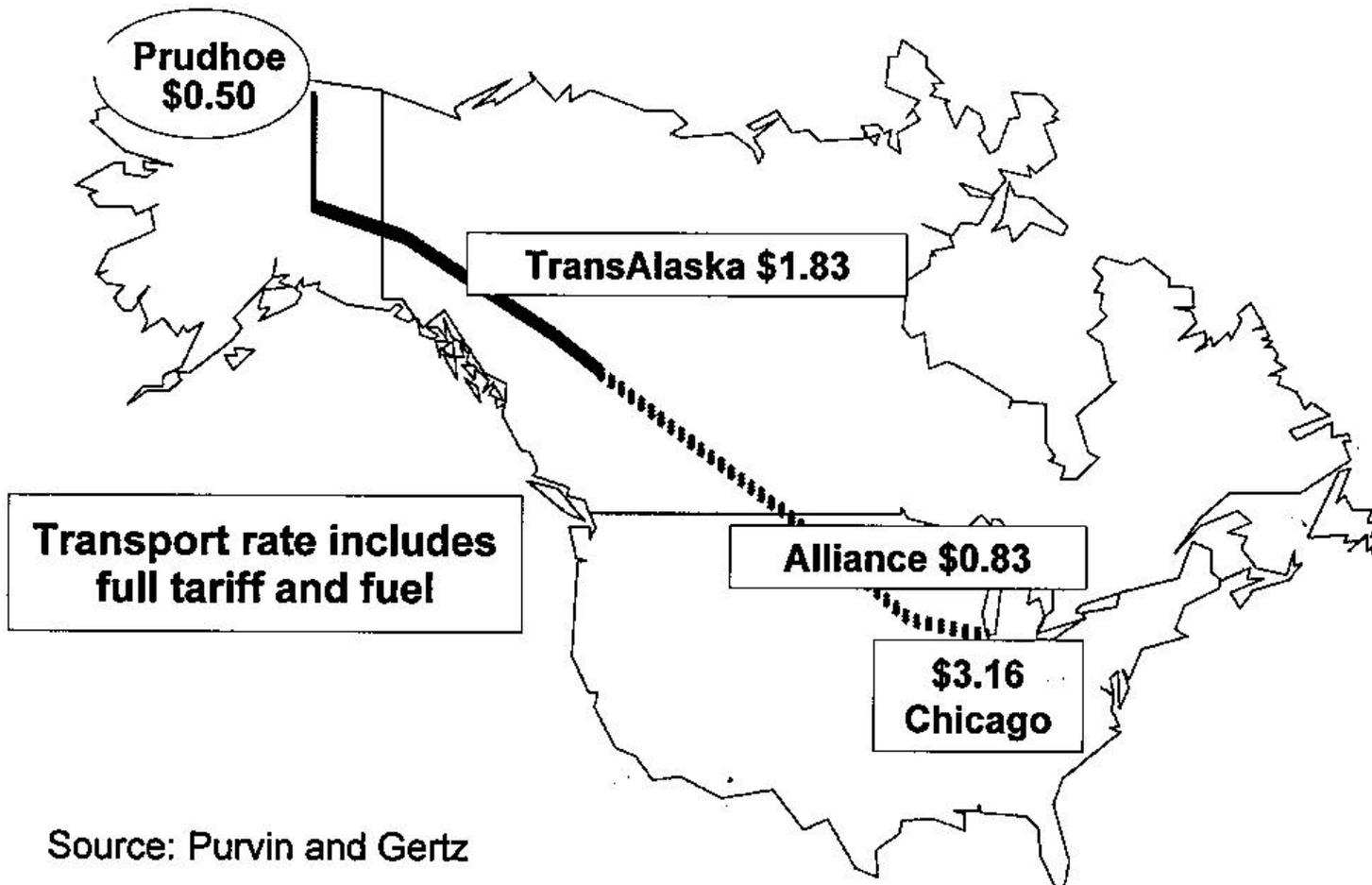


Full Cycle Gas Costs-Sable Island (Offshore Eastern Canada)





Full Cycle Gas Costs-Alaska





BAKER HUGHES INCORPORATED WORLDWIDE RIG COUNT

2000	Latin America	Europe	Africa	Middle East	Far East	Total Foreign	Canada	U.S.	Total World
Jan	186	65	39	140	130	500	502	775	1837
Feb	183	72	38	141	128	562	544	763	1869
Mar	199	82	45	149	131	606	394	773	1773
Apr	199	79	42	153	129	602	146	805	1553
May	215	76	46	156	134	627	189	844	1660
Jun	225	90	46	159	137	657	291	878	1826
Jul	233	85	45	160	139	662	308	942	1912
Aug	249	90	50	164	152	705	319	987	2011
Sep	259	95	47	158	155	714	314	1011	2039
Oct	265	96	50	162	154	727	353	1055	2135
Nov	257	80	49	165	149	700	362	1067	2129
Dec	257	89	49	164	146	705	410	1097	2212
Avg.	227	83	46	156	140	652	344	916	1913

1999	America	Europe	Africa	East	East	Foreign	Canada	U.S.	World
Jan	193	91	58	145	148	635	341	587	1563
Feb	178	81	52	150	151	612	332	542	1486
Mar	170	89	50	146	158	613	198	526	1337
Apr	178	86	41	143	150	598	62	496	1156
May	190	82	37	140	142	591	64	516	1171
Jun	187	94	40	137	144	602	187	558	1347
Jul	179	80	38	141	143	581	215	588	1384
Aug	184	74	40	137	121	556	270	639	1465
Sep	190	77	36	130	124	557	275	696	1528
Oct	195	66	38	134	132	565	289	564	1418
Nov	199	77	36	136	127	575	336	782	1693
Dec	196	74	38	139	127	574	385	798	1757
Avg.	187	81	42	140	139	588	246	608	1442

1998	Latin America	Europe	Africa	Middle East	Far East	Total Foreign	Canada	U.S.	Total World
Jan	276	109	82	165	187	819	481	993	2293
Feb	269	114	81	165	180	809	507	974	2290
Mar	271	102	82	165	186	806	390	932	2128
Apr	266	105	83	169	182	805	128	866	1810
May	258	98	86	169	187	798	157	855	1810
Jun	260	107	79	164	180	790	238	854	1882
Jul	241	86	68	171	165	731	217	816	1764
Aug	227	91	67	169	168	722	211	792	1725
Sep	219	108	61	170	174	732	187	774	1693
Oct	209	91	67	160	159	686	153	734	1573
Nov	212	87	68	164	158	689	201	688	1578
Dec	213	85	62	160	151	671	248	647	1566
Avg.	243	99	74	166	173	755	260	829	1843



DOE/EIA Forecast, AEO 2000

U.S. Sectoral Gas Consumption (Reference Case)

	<u>1998</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>	<u>2020</u>
Residential	4.48	4.90	5.07	5.30	5.49	5.69
Commercial	3.03	3.20	3.34	3.48	3.61	3.65
Industrial (a)	9.47	9.50	10.07	10.65	11.21	11.66
Electric Generators	3.67	4.12	4.53	6.45	8.37	9.26
Pipeline and Transport	0.75	0.77	0.90	1.06	1.20	1.28
Total	21.39	22.49	23.91	26.95	29.88	31.53

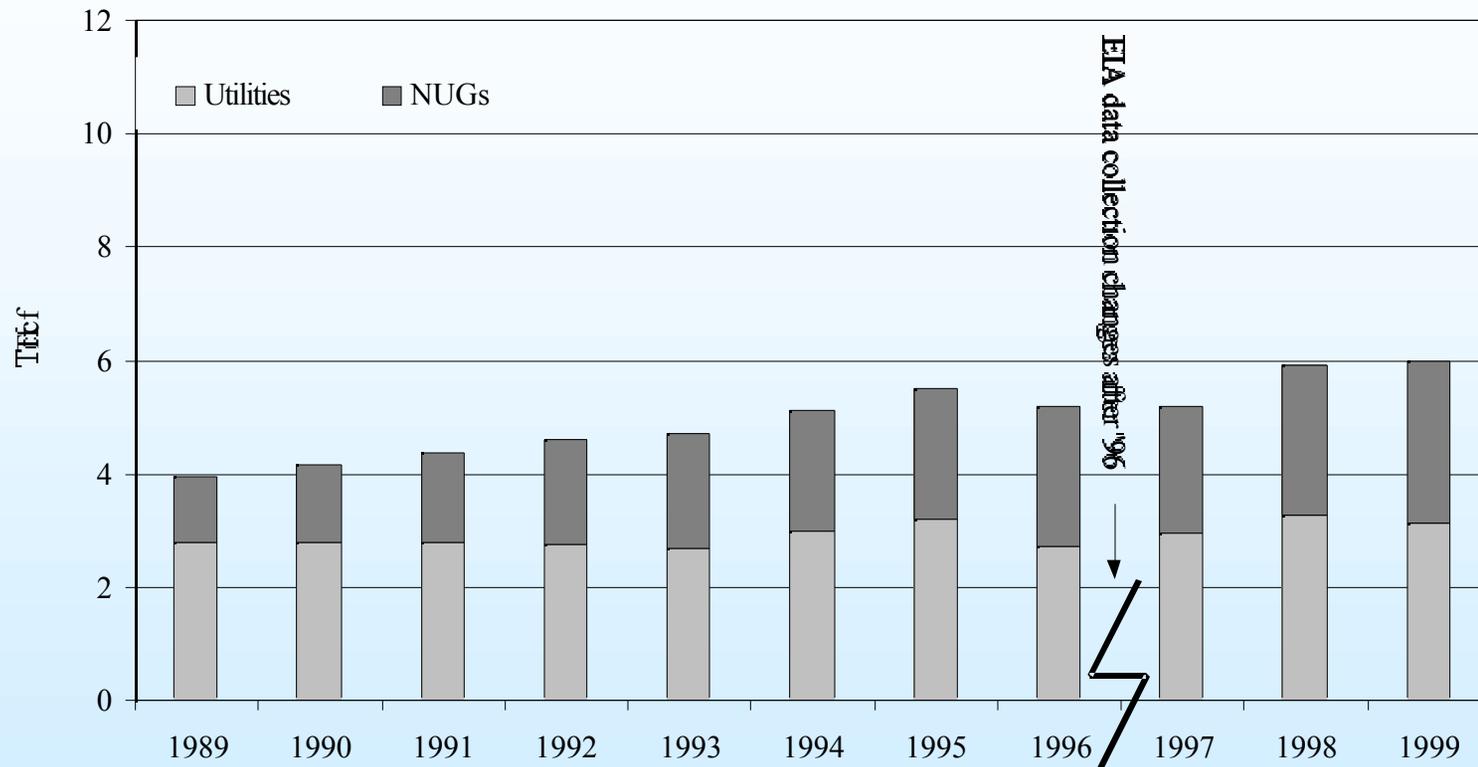
(a) Includes lease and plant fuel and gas used by cogenerators

L48 Production (Dry) and Net Imports -- Tcf

	<u>1998</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>	<u>2020</u>
L48 Production	18.47	18.47	19.24	21.97	24.52	25.86
Net L48 Imports	3.20	3.58	4.12	4.45	4.78	5.07



Consumption of Natural Gas for Electrical Generation (Tcf)



Source: DOE/EIA

Because of deregulation and the sales of generating assets among the utilities and the NUGs, trend lines of each group are no longer meaningful. The meaningful statistic is the total amount of gas consumed by both groups

Total consumption of gas for generation of electricity has increased about 50% between 1989 and 1998



Major Gas Subdivisions

L-48 Historical Prod., Natural Gas Annuals (DOE/EIA)							
(Bcf/year, Wet)							
	1993	1994	1995	1996	1997	1998	1999
Texas(state only)	4,974	5,046	5,047	5,132	5,167	5,211	4,958
Gulf of Mexico Fed/OCS	4,679	4,907	4,853	5,152	5,206	5107	5,073
Oklahoma	2,050	1,935	1,812	1,735	1,704	1645	1,571
New Mexico	1,409	1,558	1,626	1,554	1,559	1501	1,512
Louisiana (state only)	1,674	1,691	1,683	1,628	1,505	1552	1,567
Wyoming	635	696	674	666	738	761	823
Colorado	401	453	523	572	637	696	739
Kansas	686	713	721	713	687	604	553
Alabama (state only)	301	395	376	379	389	393	382
Michigan	205	223	238	246	306	278	277
California	316	309	280	286	286	316	383
Utah	225	271	241	251	257	277	263
Arkansas	196	188	187	222	209	188	170
All Other	800	796	777	795	746	813	862
Total	18,551	19,181	19,038	19,331	19,396	19,342	19,133

Texas reached a plateau from mid-1996 to mid-1998 and has declined since then but recovered about half of the '98 to '99 loss in 2000. From 1994 to 1999, Gulf of Mexico "Shelf" production declined 475 Bcf (1.3Bcf/d) while production from water depths greater than 1000 ft. increased 685 Bcf (1.9Bcf/d).

Oklahoma is in slow decline.

New Mexico increase from 1993 to 1999 was due entirely to coalbed methane production. Coalbed methane production in 1999 provided 38% of New Mexico's production.

Louisiana production has declined an average of about one percent per year for the past 15 years.

Wyoming has steadily increased production during the 1990s and has potential to increase production significantly.

Colorado's production increase has been almost entirely due to San Juan Basin coalbed methane

Kansas is now in long-term decline. The increase in production during the early 90s was due to in fill drilling in Hugoton field.



Major Gas Subdivisions

L-48 Historical Prod., Natural Gas Annuals (DOE/EIA)								Projected L- 48 Prod.						
(Bcf/year, Wet)								(Bcf/year, Wet)						
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Texas(state only)	4,974	5,046	5,047	5,132	5,167	5,211	4,958	Texas(state only)	5,050	5,000	4,900	4,696	4,641	4,562
Gulf of Mexico Fed/OCS	4,679	4,907	4,853	5,152	5,206	5107	5,073	Gulf of Mexico Fed/OCS	5,300	5,600	5,850	6,110	6,255	6,335
Oklahoma	2,050	1,935	1,812	1,735	1,704	1645	1,571	Oklahoma	1,600	1,570	1,535	1,500	1,470	1,440
New Mexico	1,409	1,558	1,626	1,554	1,559	1501	1,512	New Mexico	1,580	1,530	1,505	1,730	1,780	1,780
Louisiana (state only)	1,674	1,691	1,683	1,628	1,505	1552	1,567	Louisiana (state only)	1,400	1,375	1,340	1,300	1,270	1,250
Wyoming	635	696	674	666	738	761	823	Wyoming	850	850	875	875	900	900
Colorado	401	453	523	572	637	696	739	Colorado	750	750	750	800	850	850
Kansas	686	713	721	713	687	604	553	Kansas	570	530	500	475	475	475
Alabama (state only)	301	395	376	379	389	393	382	Alabama (state only)	380	380	380	380	380	380
Michigan	205	223	238	246	306	278	277	Michigan	310	310	310	310	325	325
California	316	309	280	286	286	316	383	California	375	350	325	275	275	275
Utah	225	271	241	251	257	277	263	Utah	325	325	330	330	330	330
Arkansas	196	188	187	222	209	188	170	Arkansas	185	180	175	170	165	160
All Other	800	796	777	795	746	813	862	All Other	850	850	800	800	800	800
Total	18,551	19,181	19,038	19,331	19,396	19,342	19,133	Total	19,525	19,600	19,575	19,751	19,916	19,862

Our projection is for an increase in Lower 48 production of 737 Bcf (2 Bcf/d) in 2004 as compared to 1998

This 2004 projection is 300 Bcf (.8 Bcf/d) higher than DOE/EIA's projection for 2004

Starting in 2004, however, DOE/EIA projects an increase of 540 Bcf (1.5 Bcf/d) for 2005 and an average increase of 528 Bcf (1.45 Bcf/d) each year between 2005 and 2015. EIA's total for 2005 is 19.24 Tcf (52.7 Bcf/d) and 24.52 Tcf (67.2 Bcf/d) for 2015

Note: The JSH numbers in the table above, are on a wet basis whereas EIA's number are on a dry basis. Our JSH numbers would be approximately 4 % smaller on a dry basis