

Section 7. Consumption Adjustments for Calculating Expenditures

Expenditures developed in the EIA State Energy Data System (SEDS) are calculated by multiplying the price estimates by the SEDS consumption estimates. The consumption estimates are adjusted to remove process fuel, intermediate petroleum products, and other consumption that has no direct fuel costs, i.e., hydroelectric, geothermal, solar, and wind energy sources, and some wood and waste. Electricity exports to Canada and Mexico are also excluded from the expenditure calculations.

Almost all aspects of energy production, processing, and distribution consume energy as an inherent part of those activities. SEDS industrial and transportation sector consumption estimates include energy consumed in the process of providing energy to the end-use consumer and are called “process fuel.” Familiar examples include energy sources used in drilling for oil and gas and transporting natural gas and petroleum by pipeline. Another “process fuel” is the energy used in generating and delivering electricity to end users. Energy products that are subsequently incorporated into another energy product for end-use consumption are called “intermediate products.” Motor gasoline blending components are familiar examples of intermediate products that are consumed as part of the finished motor gasoline sold at service stations and other outlets.

Process fuel and intermediate products are not purchased by the end user and, therefore, do not have prices. Although the end user does not consume either process fuel or intermediate products directly, he does pay for them, because the cost to the processor or distributor is passed on to the end user in the price of the final end-user product. If their use was left in the consumption estimates and was assigned prices, the expenditures would be counted twice, first as paid by the “processor” (producer, processor, or transporter) and again as included in the price to the end user.

Some renewable energy sources are not purchased. These include hydroelectric, geothermal, wind, photovoltaic, and solar thermal energy. The consumption of these sources, which are measured in SEDS as kilowatthours of electricity produced, are not included in the state energy expenditure estimates because there are no “fuel costs” involved. Wood and waste can be purchased or obtained at no cost. Wood consumption estimates in the residential sector, and wood and waste in the commercial and industrial sectors are adjusted in SEDS to remove estimated quantities that were obtained at no cost.

To estimate energy expenditures in the price and expenditure tables, the consumption of process fuel, intermediate products, and some of the renewable energy sources are subtracted from the end-use sector in which they are included in SEDS, either the residential, commercial, industrial, or transportation sector, and there are no prices associated with them.

Process fuel consumption adjustments include

1. Fuel (petroleum, natural gas, steam coal) and electricity consumed at refineries
2. Crude oil lease, plant, and pipeline fuel
3. Natural gas lease and plant fuel
4. Natural gas pipeline and distribution fuel
5. Electrical system energy losses (i.e., energy consumed in the generation, transmission, and distribution of electricity)
6. Energy losses and co-products from the production of biodiesel and fuel ethanol

Intermediate product consumption adjustments include

1. Aviation gasoline blending components
2. Motor gasoline blending components
3. Natural gasoline (1970 through 1983)
4. Natural gasoline, formerly pentanes plus (1984 through 2009)
5. Plant condensate (1970 through 1983)
6. Unfinished oils
7. Unfractionated streams (1970 through 1983)

Starting in 1984, historical natural gasoline (including isopentane) and plant condensate are reported together as the new product, pentanes plus. In the 2016 cycle of SEDS, the product is renamed natural gasoline and is grouped under hydrocarbon gas liquids (HGL). For 2010 forward, price for natural gasoline consumed by the petrochemical industry is incorporated into the composite price for HGL. Before 2010, natural gasoline is assumed to be an intermediate product.

Renewable energy consumption adjustments include

1. Solar energy in the residential, commercial, industrial, and electric power sectors;
2. Geothermal energy in the residential, commercial, industrial, and electric power sectors;
3. Electricity generated from hydropower in the commercial, industrial, and electric power sectors; and
4. Electricity generated from wind energy in the commercial, industrial, and electric power sectors; and
5. Estimated portions of wood consumed in the residential sector, and wood and waste in the commercial and industrial sectors that were obtained at no cost.

In addition, while consumption of supplemental gaseous fuels (SGF) are removed from SEDS total consumption estimates to prevent double-counting in both natural gas and the fossil fuels from which they are derived, prices and expenditures of SGF cannot be separately identified and are therefore not adjusted for double-counting in total energy average prices and total energy expenditure calculations.

Table TN7.1 shows the quantities of energy, by state, removed from SEDS consumption to calculate expenditures for the most recent year. Table TN7.2 shows the adjustments made to SEDS U.S. consumption estimates to derive the net consumption data used to calculate expenditures for 1970 forward.

State adjustment estimates from 1970 forward are available in the SEDS Internet data file, http://www.eia.gov/state/seds/sep_update/pr_adjust_consum_update.csv.

Adjustment procedures

Hydroelectricity, geothermal, solar, and wind energy. Electricity generated from hydropower and geothermal, solar, and wind energy has no fuel cost. Operation and maintenance costs associated with these energy sources are included indirectly in the prices of the electricity sold by power producers. Therefore, use of these renewable sources for electricity generation is removed from the expenditure calculations. Direct use of geothermal and solar energy also has no fuel cost and is omitted from SEDS energy expenditure calculations.

Residential wood. Some residential wood is purchased and some acquired at no cost. Based on responses to the Form EIA-457, "1980 Residential Energy Consumption Survey," Census division percentages of wood purchased were developed and applied to the residential wood consumption in each state in

the divisions in 1970 through 1989. Based on responses to the Form EIA-457, "1993 Residential Energy Consumption Survey," Census region percentages were developed and applied to the residential wood consumption of the states in each region in 1990 forward. Table TN7.3 shows the percentage of purchased wood for each Census division or region.

Commercial wood and waste. Some commercial wood and waste is purchased and some acquired at no cost. Conventional commercial wood purchased was estimated using the same percentages used for the residential sector (see Table TN7.3). Wood and waste acquired at no cost by commercial combined heat-and-power facilities for 1989 through 2011 was estimated using the U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. For 2012 forward, because of lack of information, these percentages are no longer estimated and are assumed to be zero.

Industrial wood and waste. The cost of wood and waste products used for energy vary widely from more expensive woods to free industrial waste products. Industrial consumption is broken into two segments, manufacturing industries and combined heat and power (CHP) facilities to estimate quantities received at no cost.

Adjustments to manufacturing wood and waste consumption in 1994 forward are based on information gathered on the Form EIA-846, "1994 Manufacturing Energy Survey (MECS)." Adjustments to manufacturing consumption in 1980 through 1993 are based on information gathered on the Form EIA-846, "1991 Manufacturing Energy Survey." Adjustments to industrial wood and waste consumption in 1970 through 1979 are based on the 1980 average ratios for each state. The 1991 and 1994 MECS report the quantities consumed and quantities purchased of five types of wood and waste in each of four (MECS 1991) or five (MECS 1994) SIC categories of industries. The two quantity series are used to calculate SIC category average percentages of wood and waste obtained at no cost. These percentages are applied to the estimated consumption in those SIC categories in each state to estimate the state's manufacturing uncosted wood and waste.

Estimates of wood and waste obtained at no charge by industrial CHP facilities for 1989 through 2011 are estimated using the U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. For 2012 forward, because of lack of information, these percentages are no longer estimated and are assumed to be zero.

Each state's industrial wood and waste consumption quantities acquired at no cost are the sum of the estimated manufacturing and CHP facilities' quantities for each year.

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2018 (billion Btu)

State	Refinery Fuel and Intermediate Products								Total
	Distillate Fuel Oil	Residual Fuel Oil	Hydrocarbon gas liquids ^a	Petroleum Coke	Other Petroleum ^b	Natural Gas ^c	Coal	Electricity ^d	
AK	75	—	—	—	14,409	3,245	—	218	17,948
AL	17	—	15	—	12,432	10,148	—	1,269	23,882
AR	12	—	12	1,345	7,942	6,399	—	809	16,517
AZ	—	—	—	—	—	—	—	—	—
CA	858	63	2,001	68,245	167,578	154,644	—	8,929	402,318
CO	12	—	88	3,263	9,038	5,687	—	1,228	19,317
CT	—	—	—	—	—	—	—	—	—
DC	—	—	—	—	—	—	—	—	—
DE	—	—	—	8,299	15,988	10,791	—	986	36,064
FL	—	—	—	—	—	—	—	—	—
GA	—	—	—	—	—	—	—	—	—
HI	69	1,383	154	—	12,943	—	—	194	14,744
IA	—	—	—	—	—	—	—	—	—
ID	—	—	—	—	—	—	—	—	—
IL	52	31	2,063	30,951	87,477	37,011	—	11,219	168,804
IN	23	13	161	14,523	40,261	17,334	—	5,132	77,446
KS	17	13	138	7,871	34,551	23,174	—	4,146	69,910
KY	12	6	96	7,834	24,368	10,542	—	3,105	45,962
LA	351	19	373	95,154	291,862	137,329	—	33,226	558,314
MA	—	—	—	—	—	—	—	—	—
MD	—	—	—	—	—	—	—	—	—
ME	—	—	—	—	—	—	—	—	—
MI	6	6	50	3,087	12,285	5,297	—	1,566	22,297
MN	23	13	146	9,588	36,726	15,811	—	4,681	66,987
MO	—	—	—	—	—	—	—	—	—
MS	40	—	42	5,627	34,569	28,181	—	3,528	71,988
MT	17	—	177	7,048	17,998	8,791	—	3,245	37,276
NC	—	—	—	—	—	—	—	—	—
ND	6	—	31	2,307	7,898	3,515	—	1,007	14,763
NE	—	—	—	—	—	—	—	—	—
NH	—	—	—	—	—	—	—	—	—
NJ	—	—	—	19,295	36,724	24,696	—	2,262	82,977
NM	12	—	15	2,697	11,934	9,814	—	1,218	25,691
NV	—	—	4	—	176	42	—	3	225
NY	—	—	—	—	—	—	—	—	—
OH	29	19	211	17,340	52,458	20,706	—	6,295	97,057
OK	23	13	184	11,229	45,877	26,143	—	5,343	88,812
OR	—	—	—	—	—	—	—	—	—
PA	—	—	—	20,892	52,739	17,414	—	5,394	96,439
RI	—	—	—	—	—	—	—	—	—
SC	—	—	—	—	—	—	—	—	—
SD	—	—	—	—	—	—	—	—	—
TN	12	6	61	5,275	15,795	6,767	—	2,013	29,929
TX	541	31	1,978	166,983	504,793	303,626	—	47,696	1,025,649
UT	17	—	173	4,954	17,599	7,391	—	1,491	31,625
VA	—	—	—	—	—	—	—	—	—
VT	—	—	—	—	—	—	—	—	—
WA	294	—	684	14,730	57,188	33,925	—	5,592	112,413
WI	—	—	4	855	1,112	480	—	143	2,594
WV	—	—	—	—	1,957	1,381	—	119	3,458
WY	12	—	146	5,885	14,786	9,252	—	2,010	32,090
US	2,528	1,616	9,007	535,275	1,641,463	939,538	—	164,069	3,293,497

See footnotes at end of table.

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2018 (billion Btu) (continued)

State	Residential		Commercial		Industrial					Transportation	Electrical System Energy Losses	Total
	Non-combustible Renewable Energy ^e	Wood	Non-combustible Renewable Energy ^e	Wood and Waste	Crude Oil Lease, Plant, and Pipeline Fuel	Natural Gas Lease and Plant Fuel	Non-combustible Renewable Energy ^e	Wood and Waste	Biofuels Production Losses ^f	Natural Gas Pipeline Fuel		
AK	120	3,394	1,693	517	—	282,399	—	66	—	546	35,187	341,870
AL	199	1,225	67	186	—	13,421	48	26,250	23	26,082	550,086	641,470
AR	984	4,117	68	627	—	3,738	22	12,027	129	7,377	314,153	359,759
AZ	17,183	2,473	6,817	376	—	4	465	148	2,578	12,827	510,945	553,818
CA	90,215	12,668	31,155	1,928	—	41,887	18,552	8,956	11,341	19,500	1,605,100	2,243,620
CO	3,893	6,461	2,476	984	—	82,611	317	221	6,548	10,069	385,568	518,465
CT	3,509	2,447	1,819	373	—	—	228	3,621	31	5,967	167,535	185,529
DC	283	—	389	—	—	—	—	—	—	1,364	81,432	83,469
DE	1,099	374	341	57	—	—	81	17	—	767	73,882	112,682
FL	38,442	173	3,138	26	—	260	120	8,808	25	17,287	1,339,470	1,407,748
GA	798	2,001	341	305	—	—	2,083	22,714	6,206	15,654	902,309	952,412
HI	7,682	13	3,703	2	—	—	339	14	7	2	57,889	84,394
IA	964	3,477	1,501	529	—	—	34	9,862	215,209	12,946	338,623	583,147
ID	402	8,079	661	1,230	—	59	766	662	3,094	6,810	150,744	172,506
IL	3,624	3,980	640	606	—	770	7	4,252	88,180	26,974	1,060,128	1,357,965
IN	4,251	8,901	1,416	1,355	—	313	27	10,025	60,654	8,311	772,281	944,980
KS	484	2,799	908	426	—	12,400	—	105	25,318	29,975	304,179	446,504
KY	2,045	5,577	1,022	849	—	5,399	5	5,703	1,936	14,864	560,512	643,873
LA	2,989	345	985	53	—	165,055	43	16,943	—	135,743	532,814	1,413,284
MA	6,953	3,224	12,694	491	—	—	790	5,839	2	8,929	340,908	379,829
MD	5,970	3,533	2,206	538	—	—	336	662	—	23,664	432,054	468,963
ME	553	7,996	176	1,217	—	—	1,042	11,640	1	851	64,147	87,623
MI	5,141	24,462	1,282	3,724	—	6,228	110	20,048	18,250	22,588	713,499	837,628
MN	1,687	12,716	483	1,936	—	—	923	11,453	63,228	14,241	461,838	635,491
MO	1,457	13,319	1,024	2,027	—	—	35	2,545	13,839	9,567	600,919	644,733
MS	224	884	805	135	—	1,867	43	4,188	2,925	27,206	268,185	378,448
MT	259	8,247	196	1,255	—	3,573	70	451	—	4,494	105,963	161,783
NC	2,052	6,106	2,196	929	—	—	61	12,759	3	2,988	906,076	933,170
ND	540	386	470	59	—	36,819	—	1,030	24,367	22,254	150,203	250,891
NE	577	1,892	756	288	—	81	5	278	113,620	9,837	230,512	357,845
NH	731	4,916	290	748	—	—	65	1,665	4	151	78,285	86,855
NJ	9,811	1,162	9,857	177	—	—	1,195	2,535	—	5,683	477,242	590,639
NM	1,795	6,295	838	958	—	86,658	249	89	—	10,248	155,228	288,049
NV	4,673	1,568	2,645	239	—	3	731	90	—	4,088	205,341	219,603
NY	9,698	13,521	6,439	2,058	—	195	745	12,054	8,482	27,350	901,049	981,591
OH	3,182	14,563	1,920	2,217	—	23,067	650	9,187	29,780	30,556	1,023,909	1,236,088
OK	117	2,516	34	383	—	114,871	3	6,326	61	58,293	383,327	654,743
OR	2,739	13,807	1,459	2,102	—	25	302	9,790	2,187	6,795	275,705	314,909
PA	3,991	13,731	2,229	2,090	—	231,459	599	25,737	5,784	47,021	973,704	1,402,784
RI	500	485	534	74	—	—	—	39	4	2,435	35,551	39,622
SC	2,166	1,040	606	158	—	—	200	19,876	—	2,767	587,391	614,205
SD	661	1,699	970	259	—	26	251	684	55,902	6,950	83,237	150,638
TN	469	4,301	634	655	—	273	57	13,607	11,638	8,540	739,765	809,869
TX	6,995	1,566	3,108	238	—	440,305	96	8,166	19,908	106,708	2,653,447	4,266,187
UT	2,952	2,386	1,075	363	—	21,088	432	115	—	12,837	205,906	278,779
VA	1,890	8,279	1,094	1,260	—	6,644	16	7,333	2,794	10,244	771,574	811,129
VT	859	6,041	430	920	—	—	21	212	—	10	7,508	16,001
WA	1,632	15,936	992	2,426	—	—	3	13,005	137	14,530	576,838	737,913
WI	1,148	20,065	495	3,054	—	—	1,470	28,244	30,101	4,116	498,677	589,963
WV	146	5,833	25	888	—	93,463	6,262	661	—	21,047	234,465	366,248
WY	111	2,405	544	366	—	57,498	68	66	—	16,194	125,373	234,715
US	260,844	293,385	117,644	44,658	—	1,732,456	39,972	360,767	824,295	896,246	25,010,661	32,874,426

^a Propane consumed as refinery fuel.

^b In this table, "other petroleum" consists of: still gas consumed as refinery fuel; and aviation gasoline blending components and motor gasoline blending components used as intermediate products.

^c Natural gas including supplemental gaseous fuels.

^d Electricity is converted at the rate of 3,412 Btu per kilowatthour.

^e Hydroelectric power, geothermal, solar, and wind energy. Solar thermal energy consumed as heat by the commercial and industrial sectors that cannot be separately identified are included in residential consumption.

^f Energy losses and co-products from the production of biodiesel and fuel ethanol.

— = No consumption. NA = Not available.

Source: EIA, State Energy Data System.

Table TN7.2. Energy consumption adjustments for calculating expenditures, selected years, 1970 through 2018 (trillion Btu)

Year	Total (Gross) Consumption	Adjustments													Consumption used in Expenditure Calculations ^c
		Residential		Commercial		Industrial						Transportation	Electrical System Energy Losses	Total	
		Non-combustible Renewable Energy ^a	Wood	Non-combustible Renewable Energy ^a	Wood and Waste	Refinery Fuel and Intermediate Products	Crude Oil Lease, Plant, and Pipeline Fuel	Natural Gas Lease and Plant Fuel	Non-combustible Renewable Energy ^a	Wood and Waste	Biofuels Production Losses ^b	Natural Gas Pipeline Fuel			
1970	67,720	—	298	—	6	2,714	—	1,442	34	789	—	740	11,497	17,520	50,200
1975	71,953	—	316	—	6	2,881	—	1,434	32	824	—	595	14,304	20,392	51,561
1976	75,967	—	357	—	7	2,905	—	1,679	33	944	—	559	15,154	21,638	54,328
1977	77,947	—	402	—	8	3,006	—	1,706	33	991	—	544	15,898	22,587	55,360
1978	79,978	—	462	—	9	2,935	—	1,694	32	1,083	—	541	16,680	23,436	56,542
1979	80,836	—	543	—	10	3,076	—	1,534	34	1,087	—	613	16,879	23,775	57,061
1980	78,048	—	627	—	16	3,051	—	1,058	33	1,283	—	650	17,178	23,896	54,303
1981	76,094	—	651	—	16	2,203	—	959	33	1,354	6	660	17,161	R 23,042	53,225
1982	73,006	—	724	—	16	2,087	—	1,144	33	1,310	16	614	16,835	22,779	50,371
1983	72,879	—	722	—	16	2,120	140	1,010	33	1,480	29	505	17,262	23,318	49,692
1984	76,511	—	733	—	16	2,254	135	1,113	33	1,510	35	545	17,790	24,165	52,456
1985	76,407	—	755	—	18	2,045	128	1,001	33	1,503	42	521	18,164	24,211	52,321
1986	76,592	—	688	—	20	2,285	103	954	33	1,478	48	501	18,135	24,246	52,458
1987	78,960	—	634	—	22	2,485	72	1,194	33	1,472	55	538	18,558	25,063	53,996
1988	82,711	—	676	—	24	2,695	85	1,134	33	1,531	55	633	19,478	26,346	56,464
1989	84,732	57	684	3	73	2,710	59	1,103	30	684	56	650	20,850	26,957	57,879
1990	84,455	60	337	4	59	2,802	51	1,269	33	716	49	682	21,255	27,318	57,255
1991	84,379	62	353	5	60	2,668	39	1,164	32	685	56	621	21,444	27,189	57,296
1992	85,732	65	371	5	66	2,954	27	1,208	33	689	64	608	21,309	27,398	58,446
1993	87,295	67	308	5	68	2,877	21	1,199	32	642	74	643	22,097	28,033	59,375
1994	89,011	68	292	5	66	2,991	19	1,153	65	662	82	706	22,400	28,510	60,606
1995	90,995	69	292	6	66	2,915	15	1,253	58	445	86	723	23,214	29,141	61,959
1996	94,005	70	303	7	77	3,204	14	1,280	64	495	61	734	23,916	30,226	63,884
1997	94,656	70	233	7	80	3,197	5	1,251	61	493	80	781	24,167	30,425	64,330
1998	94,933	69	207	9	71	3,043	—	1,212	58	493	86	657	25,102	31,007	64,022
1999	96,526	69	213	9	66	3,051	—	1,103	53	495	90	663	25,689	31,500	65,119
2000	98,695	66	229	9	67	2,951	—	1,181	47	459	99	661	26,405	32,174	66,606
2001	R 96,039	65	210	10	46	3,152	—	1,139	37	437	108	641	25,663	31,507	64,611
2002	R 97,542	63	213	10	43	3,028	—	1,135	44	312	130	683	26,210	31,871	65,733
2003	R 97,835	65	225	13	46	3,141	—	1,147	46	316	168	609	26,111	31,887	66,012
2004	R 100,014	65	230	14	46	3,123	—	1,123	37	537	201	582	26,601	32,558	67,510
2005	R 100,109	66	249	16	49	3,130	—	1,138	37	336	227	601	27,144	32,994	67,162
2006	R 99,388	71	221	18	46	3,211	—	1,171	34	278	280	602	26,902	32,832	66,584
2007	R 100,916	77	244	19	46	3,180	—	1,257	21	293	369	640	27,536	R 33,683	67,261
2008	R 98,765	85	273	21	47	2,983	—	1,250	23	282	519	667	27,239	R 33,390	65,420
2009	R 93,969	93	292	25	48	2,922	—	1,304	24	457	603	689	25,809	R 32,266	R 61,791
2010	97,516	102	313	32	45	2,972	—	1,316	23	392	727	692	26,826	33,438	64,168
2011	R 96,854	110	304	41	45	3,052	—	1,355	26	370	756	705	26,516	R 33,281	63,660
2012	R 94,370	118	254	54	34	3,105	—	1,433	34	357	711	751	25,545	R 32,396	62,061
2013	R 97,102	131	332	62	40	3,175	—	1,522	46	361	709	857	25,665	R 32,899	64,255
2014	R 98,270	149	336	74	42	3,070	—	1,562	28	370	757	726	25,803	R 32,915	65,412
2015	R 97,367	168	288	78	42	3,057	—	1,633	32	369	776	707	25,076	R 32,226	65,196
2016	R 97,301	201	R 251	85	45	R 3,242	—	1,599	36	366	801	715	24,884	R 32,224	R 65,130
2017	R 97,613	233	R 240	99	44	R 3,290	—	R 1,633	40	366	821	R 751	24,552	R 32,070	R 65,604
2018	101,084	261	293	118	45	3,293	—	1,732	40	361	824	896	25,011	32,874	68,272

^a Hydroelectric power, geothermal, solar, and wind energy. Solar thermal energy consumed as heat by the commercial and industrial sectors that cannot be separately identified are included in residential consumption.

^b Energy losses and co-products from the production of biodiesel and fuel ethanol.

^c Includes adjustments of supplemental gaseous fuels and processed fuels not shown on this table.

Where shown, R = Revised data and — = No consumption.

NA = Not available.

Note: Totals may not equal sum of components due to independent rounding. · All data are available via the full-precision data file (CSV) at <http://www.eia.gov/state/seds/seds-data-fuel.php?sid=US>.

Sources: EIA, State Energy Data System.

Table TN7.3. Percentage of purchased wood in residential wood consumption

1960–1989 Census Division	Percent	1990 forward Census Region	Percent
New England	40%	Northeast	61%
Middle Atlantic	29%	Midwest	32%
East North Central	18%	South	39%
West North Central	17%	West	42%
South Atlantic	30%		
East South Central	18%		
West South Central	38%		
Mountain	12%		
Pacific	31%		

Refinery fuel. Petroleum refinery consumption of distillate fuel, residual fuel, hydrocarbon gas liquids (mainly propane), petroleum coke, still gas, natural gas, steam coal, and electricity is estimated for each state and subtracted from the state’s industrial sector total of each energy source.

Estimation of petroleum coke consumed by the refineries is described in Section 4 of the SEDS Consumption Technical Notes at <http://www.eia.gov/state/seds/seds-technical-notes-complete.php>.

Refinery consumption of still gas, excluding still gas consumed as petrochemical feedstocks, is subtracted from the SEDS industrial sector total for 1970 through 1985. Beginning in 1986, EIA data series no longer report refinery fuel and feedstock use separately, and all industrial still gas consumption is removed. Estimation of still gas consumption is described in Section 4 of the SEDS Consumption Technical Notes at <http://www.eia.gov/state/seds/seds-technical-notes-complete.php>.

Refinery consumption of each of the other fuels is available in the data sources by state or group of states (1970 through 1980) and by Petroleum Administration for Defense (PAD) district (1981 forward). For 2013 forward, SEDS incorporates unpublished state-level refinery fuel consumption data that satisfied two statistical disclosure rules—that there are at least three refineries not of the same company in the state and that no one refinery uses more than 60% of the particular fuel. The number of states with usable data varies by fuel, from zero for coal and residual fuel oil to over 10 for electricity.

For each fuel, consumption for all the usable states within each PAD district is subtracted from the district’s fuel consumption. This remainder is then allocated to the other states in the district according to their operable refining capacities. To reduce the possibility of over-allocating refinery fuel use to

states that do not consume much of the fuel, states where industrial sector consumption of a specific fuel is less than 0.05% (for natural gas, electricity, distillate fuel oil, and propane) or 0.1% (for coal and residual fuel oil) of the U.S. industrial sector total consumption are not included in the allocation.

Before 2013, except for a few states with data available in the earlier years, refinery fuel consumption is available at the regional level. State-level refinery consumption of each of the other fuels is estimated by allocating the regional data (for state groups before 1981 and PAD district for 1981 through 2012) to the states with operating refineries according to their shares of the region’s industrial sector consumption of the fuel.

In some cases, the estimated state refinery fuel consumption of residual fuel or propane exceeds the estimate of the total industrial sector consumption of that fuel for that state. For 1970 through 2006, the refinery fuel consumption for the PAD district, group of states, or individual state is reduced until each state has positive industrial consumption. The excess refinery fuel is reallocated to a different PAD district, group of states, or individual state as shown in Table TN7.4. When this adjustment involves a PAD district or group value, the refineries’ consumption estimates for all states within the PAD district or group are recalculated using these new values. From 2007 forward, this adjustment is no longer made.

Refinery consumption of coal is withheld in the data source for 1999 and 2000 and unpublished estimates developed by the data source office are used for 1999 and 2000. For 2001 and 2002, the U.S. values for refinery consumption of coal are published although the PAD district values are withheld. The PAD district values for 2001 and 2002 are estimated by applying the PAD districts’ percentages of the U.S. total in 2000 to the U.S. totals for 2001 and 2002.

Because crude oil consumption is not an individual fuel in SEDS for 1970 through 1980, the small amounts of crude oil that were used at refineries during those years were allocated to residual and distillate fuels consumed at refineries. The allocation from crude oil refinery use to residual and distillate fuels refinery use was made according to each fuel’s share of the total crude oil used directly (including losses) as residual and distillate fuels from the EIA *Petroleum Supply Annual, Volume 1*, of each year, Table 2.

Intermediate products. Aviation gasoline blending components, motor gasoline blending components, natural gasoline (1970 through 1983), plant condensate (1970 through 1983), unfinished oils, and unfractionated streams (1970 through 1983) are used at refineries and blending plants to make end-use petroleum products, particularly motor gasoline. Accordingly, consumption of these products is completely removed. Through 2009, natural gasoline (formerly pentanes plus) is assumed to be used as intermediate product and

Table TN7.4. Reallocations of excess refinery fuel consumption, 1970 through 2005

Year	Fuel	Thousand Barrels	Excess in:	Reallocated to:
1971	Residual Fuel Oil	294	Kansas	Oklahoma
1973	Residual Fuel Oil	45	Group 4: Kentucky, Tennessee	Illinois
1979	HGL (propane)	173	Montana	Wyoming
1985	Residual Fuel Oil	212	PAD District 4	PAD District 5
1986	Residual Fuel Oil	403	PAD District 4	PAD District 5
1987	Residual Fuel Oil	497	PAD District 4	PAD District 5
1988	Residual Fuel Oil	305	PAD District 4	PAD District 5
1989	Residual Fuel Oil	381	PAD District 4	PAD District 5
1990	Residual Fuel Oil	336	PAD District 4	PAD District 5
1991	Residual Fuel Oil	378	PAD District 4	PAD District 5
1992	Residual Fuel Oil	361	PAD District 4	PAD District 5
1996	Residual Fuel Oil	184	PAD District 4	PAD District 5
1997	Residual Fuel Oil	100	PAD District 4	PAD District 5
1998	Residual Fuel Oil	82	PAD District 4	PAD District 5
1999	Residual Fuel Oil	142	PAD District 4	PAD District 5
2000	Residual Fuel Oil	224	PAD District 4	PAD District 5
2001	Residual Fuel Oil	149	PAD District 4	PAD District 2
2001	Residual Fuel Oil	95	PAD District 5	PAD District 2
2001	Residual Fuel Oil	281	PAD District 5	PAD District 1
2002	Residual Fuel Oil	33	PAD District 5	PAD District 3
2002	Residual Fuel Oil	67	PAD District 5	PAD District 4
2003	Residual Fuel Oil	228	PAD District 5	PAD District 3
2004	Residual Fuel Oil	296	PAD District 5	PAD District 3
2005	HGL (propane)	198	PAD District 5	PAD District 4

Source: EIA calculations based on data from the State Energy Data System and the *Petroleum Supply Annual*.

its consumption is removed in the calculation of expenditures.

Crude oil lease, plant, and pipeline fuel. Industrial crude oil is assumed to be used as lease, plant, and pipeline fuel. Because these are process fuel uses, this crude oil is removed from SEDS industrial sector consumption.

Natural gas lease and plant fuel. Natural gas consumed as lease and plant fuel is process fuel and is subtracted from SEDS industrial sector natural gas totals by state and year.

Natural gas for pipeline and distribution use. Most of the natural gas consumed in the transportation sector is used to power pipelines. As such,

it is a process fuel and is subtracted from SEDS consumption to calculate expenditures.

Electricity exports. Electricity exported to Canada and Mexico is excluded from the calculations of U.S. domestic energy expenditures and U.S. average energy prices.

Electrical system energy losses. The amount of energy lost during generation, transmission, and distribution of electricity (including plant use and unaccounted for electrical energy) is process fuel and is subtracted from sectoral energy consumption estimates used in the price and expenditure tables. The energy losses are “paid for” when residential, commercial, industrial, and transportation sector consumers buy the electricity produced by the electric power sector.

Energy losses and co-products from the production of biofuels. Fuel ethanol and biodiesel are produced from corn, vegetable oil, animal fats, and other biomass inputs that are not included elsewhere as energy sources. The difference in heat content of the feedstock and biofuels is considered process fuel and is subtracted from sector energy consumption estimates used in the price and expenditure tables.

Data sources

Capacity of petroleum refineries. 1982 forward: EIA, *Refinery Capacity Report*, <http://www.eia.gov/petroleum/refinerycapacity/> or *Petroleum Supply Annual, Volume 1*, <http://www.eia.gov/petroleum/supply/annual/volume1/> tables titled “Number and Capacity of Operable Petroleum Refineries,” columns titled, “Crude Capacity, Barrels per Calendar Day, Operating” (1982-1985), “Atmospheric Crude Oil Distillation Capacity, Barrels per Calendar Day, Operating” (1986-2012), and “Atmospheric Crude Oil Distillation Capacity, Barrels per Calendar Day, Total” (2013 forward), adjusted with information on “New, Shutdown and Activated Refineries” (2011 forward).

1979-1981: EIA, Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories*, table titled “Number and Capacity of Petroleum Refineries,” column heading, “Crude Capacity, Barrels per Calendar Day, Operating.”

1978: EIA, Energy Data Reports, *Petroleum Refineries in the United States and Puerto Rico*, table titled “Number and Capacity of Petroleum Refineries,” column heading, “Crude Capacity, Barrels per Calendar Day, Operating.”

1970-1977: Bureau of Mines, U.S. Department of the Interior, Mineral Industry Surveys, *Petroleum Refineries in the United States and Puerto Rico*, table titled “Number and Capacity of Petroleum Refineries,” column heading, “Crude Capacity, Barrels per Calendar Day, Operating.”

Fuel consumed at refineries. 2013 forward: EIA unpublished data on fuels consumed at refineries for selected states.

1981-1994, 1996, and 1998 forward: EIA, *Petroleum Supply Annual, Volume 1*, <http://www.eia.gov/petroleum/supply/annual/volume1/> table titled "Fuels Consumed at Refineries by PAD District." Data for 1991 are from a separately published EIA *Errata* dated November 10, 1992, GPO Stock No. 061-003-00758-9.

1995, 1997: EIA, *Petroleum Supply Annual, Volume 1*, table titled "Fuels Consumed at Refineries by PAD District." Data for coal, electricity, and natural gas are not published, and values for the previous year are repeated.

1976-1980: EIA, Energy Data Reports, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, table titled "Fuels Consumed for All Purposes at Refineries in the United States, by States."

1970-1975: Bureau of Mines, U.S. Department of the Interior, Mineral Industry Surveys, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, table titled "Fuels Consumed for All Purposes at Refineries in the United States, by States."

Intermediate products. 1970 forward: EIA, State Energy Data System, industrial sector consumption estimates for aviation gasoline blending components, crude oil, motor gasoline blending components, natural gasoline (1970-1983), natural gasoline (formerly pentanes plus) (1984 through 2009), petroleum coke, plant condensate (1970-1983), still gas (excluding still gas consumed as petrochemical feedstocks, 1970-1985), unfinished oils, and unfractionated streams (1970-1983).

Natural gas lease, plant, and pipeline fuel use. 1997 forward: EIA, *Natural Gas Annual*, Tables 26 through 76. Also available at http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

1993-1996: EIA *Historical Natural Gas Annual 1930 Through 2000*, http://www.eia.gov/oil_gas/natural_gas/data_publications/historical_natural_gas_annual/hnga.html Table 15.

1970-1992: EIA *Natural Gas Annual 1994, Volume II*, Table 14.

Residential wood. 1990 forward: EIA, unpublished data from the "1993 Residential Energy Consumption Survey," Form EIA-457 <http://www.eia.gov/consumption/residential/index.php>.

1970-1989: EIA, unpublished data from the "1980 Residential Energy Consumption Survey," Form EIA-457.

Commercial wood and waste. 1990 forward: EIA, unpublished data from the

"1993 Residential Energy Consumption Survey," Form EIA-457 <http://www.eia.gov/consumption/residential/index.php>.

1989-2011: EIA, SEDS, U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. See data sources for estimating wood and waste prices for the electric power sector in Section 5.

1970-1989: EIA, unpublished data from the "1980 Residential Energy Consumption Survey," Form EIA-457.

Industrial wood and waste. 1994 forward: EIA, unpublished data from the "1994 Manufacturing Energy Consumption Survey" (Form EIA-846) <http://www.eia.gov/consumption/manufacturing/>.

1989-2011: EIA, SEDS, U.S. annual average percentages of wood and percentages of waste acquired at no cost by the electric power sector. See data sources for estimating wood and waste prices for the electric power sector in Section 5.

1970-1993: EIA, unpublished data from the "1991 Manufacturing Energy Consumption Survey" (Form EIA-846).