

## 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, electricity exports, and other consumption that has no direct fuel costs, i.e., hydroelectric, geothermal, wind, solar thermal and photovoltaic energy sources, and some wood and waste.

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 since 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 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 fuel ethanol

*Intermediate product consumption adjustments include:*

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

Starting in 1984, natural gasoline (including isopentane) and plant condensate are reported together as the new product, pentanes plus, and the components of unfractionated streams are reported separately under liquefied petroleum gases.

*Renewable energy consumption adjustments include:*

1. Photovoltaic and solar thermal 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 2014. Table TN7.2 shows the adjustments made to SEDS national consumption estimates for 1970 through 2014 to derive the net consumption data used to calculate expenditures.

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](http://www.eia.gov/state/seds/sep_update/pr_adjust_consum_update.csv).

### *Adjustment procedures*

#### **Hydroelectricity, geothermal, wind, photovoltaic, and solar thermal energy.**

Electricity generated from hydropower and geothermal, wind, photovoltaic, and solar thermal 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 in order 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.

**Refinery fuel.** Petroleum refinery consumption of distillate fuel, residual fuel, liquefied petroleum gases, 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

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2014 (billion Btu)

State	Refinery Fuel and Intermediate Products							Total
	Distillate Fuel Oil	Residual Fuel Oil	LPG	Other Petroleum <sup>a</sup>	Natural Gas <sup>b</sup>	Coal	Electricity <sup>c</sup>	
AK .....	46	—	—	17,369	3,752	—	444	21,610
AL .....	12	—	—	9,572	8,992	—	1,280	19,855
AR .....	6	—	10	8,722	6,757	—	966	16,461
AZ .....	—	—	—	—	—	—	—	—
CA .....	445	—	1,346	221,393	152,460	—	9,854	385,497
CO .....	—	—	80	11,560	4,663	—	1,071	17,374
CT .....	—	—	—	—	—	—	—	—
DC .....	—	—	—	—	—	—	—	—
DE .....	—	—	—	23,166	9,572	—	1,314	34,052
FL .....	—	—	—	—	—	—	—	—
GA .....	—	—	—	—	—	—	—	—
HI .....	35	1,616	—	13,850	—	—	92	15,592
IA .....	—	—	—	—	—	—	—	—
ID .....	—	—	—	—	—	—	—	—
IL .....	46	38	1,588	109,044	31,306	—	10,918	152,940
IN .....	23	19	727	48,483	16,924	—	5,026	71,201
KS .....	17	13	—	34,406	22,324	—	3,839	60,599
KY .....	12	13	408	27,227	9,577	—	2,822	40,058
LA .....	289	69	405	372,752	158,453	—	31,472	563,440
MA .....	—	—	—	—	—	—	—	—
MD .....	—	—	—	—	—	—	—	—
ME .....	—	—	—	—	—	—	—	—
MI .....	6	6	215	13,247	4,998	—	1,484	19,956
MN .....	17	13	595	37,239	14,017	—	4,111	55,993
MO .....	—	—	—	—	—	—	—	—
MS .....	35	—	45	35,343	27,428	—	3,876	66,726
MT .....	—	—	—	21,847	8,821	—	2,945	33,613
NC .....	—	—	—	—	—	—	—	—
ND .....	6	—	152	9,608	3,717	—	1,058	14,541
NE .....	—	—	—	—	—	—	—	—
NH .....	—	—	—	—	—	—	—	—
NJ .....	—	—	—	57,400	24,429	—	3,371	85,200
NM .....	12	—	—	12,935	9,658	—	1,358	23,962
NV .....	—	—	—	159	35	—	—	195
NY .....	—	—	—	—	—	—	—	—
OH .....	29	19	917	60,313	22,698	—	6,186	90,161
OK .....	23	19	—	50,672	29,735	—	5,377	85,827
OR .....	—	—	—	—	—	—	—	—
PA .....	—	19	—	69,362	11,973	350	4,292	85,996
RI .....	—	—	—	—	—	—	—	—
SC .....	—	—	—	—	—	—	—	—
SD .....	—	—	—	—	—	—	—	—
TN .....	12	6	—	19,395	6,962	—	2,054	28,429
TX .....	652	107	996	667,418	277,647	—	46,547	993,367
UT .....	—	—	—	19,742	8,641	—	1,273	29,656
VA .....	—	—	—	—	—	—	—	—
VT .....	—	—	—	—	—	—	—	—
WA .....	64	—	429	64,732	34,972	—	5,664	105,861
WI .....	—	—	62	3,821	1,479	—	433	5,795
WV .....	—	—	—	1,777	1,197	25	160	3,160
WY .....	—	—	—	19,903	8,043	—	1,846	29,791
US .....	1,784	1,955	7,975	2,062,456	921,231	375	161,132	3,156,909

See footnotes at end of table.

Table TN7.1. Energy consumption adjustments for calculating expenditures by state, 2014 (billion Btu) (continued)

State	Residential		Commercial		Industrial					Transportation	Electrical System Energy Losses	Total
	Non-combustible Renewable Energy <sup>d</sup>	Wood	Non-combustible Renewable Energy <sup>d</sup>	Wood and Waste	Crude Oil Lease, Plant, and Pipeline Fuel	Natural Gas Lease and Plant Fuel	Non-combustible Renewable Energy <sup>d</sup>	Wood and Waste	Ethanol Production Losses <sup>e</sup>	Natural Gas Pipeline Fuel		
AK .....	111	1,430	85	169	—	256,688	—	30	—	310	40,600	321,033
AL .....	250	4,672	—	553	—	16,907	42	14,052	—	19,130	587,448	662,908
AR .....	945	6,714	—	795	—	7,476	12	6,477	—	11,822	327,855	378,556
AZ .....	17,044	1,910	272	226	—	3	247	74	2,313	13,878	515,170	551,138
CA .....	86,123	24,844	1,586	2,942	—	58,080	1,277	5,432	9,883	23,475	1,578,948	2,178,088
CO .....	5,447	6,203	401	735	—	109,497	299	114	6,940	8,790	383,611	539,410
CT .....	3,601	2,674	—	317	—	—	—	1,932	—	4,771	180,581	193,875
DC .....	329	17	—	2	—	—	—	—	—	1,353	84,270	85,971
DE .....	1,127	910	64	108	—	—	—	9	—	1,094	74,738	112,102
FL .....	57,266	10,223	2,096	1,211	—	6,977	—	5,663	—	3,546	1,368,073	1,455,056
GA .....	1,500	8,525	31	1,009	—	—	178	14,288	5,575	7,118	916,860	955,083
HI .....	10,277	228	6	27	—	—	500	7	—	1	59,822	86,459
IA .....	918	4,356	777	516	—	—	—	8,752	205,187	13,127	350,168	583,801
ID .....	201	2,573	613	305	—	—	758	311	3,318	3,975	166,231	178,284
IL .....	4,667	11,022	64	1,305	—	366	—	3,403	68,576	30,907	1,069,420	1,342,669
IN .....	4,234	9,539	826	1,129	—	181	—	8,223	54,515	7,165	873,261	1,030,273
KS .....	369	3,554	672	421	—	17,188	—	78	28,187	23,063	315,846	449,979
KY .....	2,049	9,824	852	1,163	—	4,794	—	3,188	1,966	8,658	615,555	688,107
LA .....	2,445	1,652	852	196	—	177,306	42	11,350	76	47,122	544,845	1,349,324
MA .....	11,499	4,627	1,139	548	—	—	82	3,108	—	6,454	364,012	391,469
MD .....	3,944	6,996	34	828	—	1	—	827	—	6,644	473,203	492,479
ME .....	420	6,480	—	767	—	—	3,727	6,132	—	1,341	57,525	76,391
MI .....	5,606	14,688	874	1,739	—	7,248	275	12,142	14,890	19,750	748,220	845,388
MN .....	1,720	11,032	289	1,306	—	—	184	6,596	62,160	13,068	471,389	623,737
MO .....	2,089	20,563	—	2,435	—	—	—	1,427	14,214	6,267	638,950	685,945
MS .....	210	3,863	741	457	—	2,882	42	3,483	—	20,385	289,252	388,041
MT .....	187	2,119	144	251	—	2,515	70	205	—	4,235	105,565	148,905
NC .....	3,003	11,789	867	1,396	—	—	—	8,028	—	3,952	905,914	934,948
ND .....	543	363	445	43	—	15,327	—	861	20,090	15,524	133,799	201,535
NE .....	552	2,039	720	241	—	64	—	203	91,572	7,342	225,717	328,450
NH .....	359	3,744	—	443	—	—	—	990	—	84	76,233	81,853
NJ .....	21,297	4,971	1,019	589	—	—	10	1,412	—	5,298	503,546	623,342
NM .....	1,752	4,602	102	545	—	87,702	241	75	1,272	8,867	164,119	293,238
NV .....	4,266	1,201	1,080	142	—	3	440	42	—	5,075	200,743	213,187
NY .....	8,139	8,771	776	1,039	—	558	676	6,960	9,106	25,718	911,177	972,919
OH .....	4,491	16,712	868	1,979	—	4,931	335	7,365	29,316	13,241	1,073,094	1,242,492
OK .....	86	3,857	—	457	—	90,303	—	3,745	—	47,194	421,987	653,456
OR .....	3,747	10,603	676	1,256	—	26	166	5,198	2,276	3,766	292,467	320,180
PA .....	5,540	10,930	853	1,294	—	130,599	78	14,602	6,108	38,118	1,012,518	1,306,635
RI .....	160	635	72	75	—	—	—	21	—	2,910	41,022	44,895
SC .....	802	2,745	28	325	—	—	—	11,176	—	2,466	608,394	625,934
SD .....	660	1,315	967	156	—	856	251	485	56,245	5,403	88,313	154,649
TN .....	725	5,372	26	636	—	277	—	8,241	12,493	6,073	753,141	815,412
TX .....	4,453	8,558	1,136	1,013	—	421,590	—	6,575	17,074	283,294	2,628,973	4,366,033
UT .....	611	695	356	82	—	31,473	357	58	—	14,694	200,574	278,555
VA .....	2,023	11,325	885	1,341	—	7,554	99	5,693	2,341	7,733	822,875	861,870
VT .....	739	3,874	—	459	—	—	—	101	—	126	15,938	21,236
WA .....	1,226	11,691	778	1,384	—	—	—	7,441	—	9,318	652,031	789,729
WI .....	1,436	16,032	—	1,898	—	—	1,569	15,162	28,534	3,751	519,541	593,719
WV .....	156	12,553	3	1,486	—	37,209	5,029	338	—	31,333	223,169	314,437
WY .....	89	751	528	89	—	49,603	65	30	632	15,623	126,102	223,304
US .....	291,428	336,361	24,602	39,829	—	1,546,184	17,050	222,103	754,861	864,348	25,802,806	33,056,480

<sup>a</sup> In this table, "other petroleum" consists of: still gas and petroleum coke consumed as refinery fuel; and aviation gasoline blending components, motor gasoline blending components, pentanes plus, and unfinished oils used as intermediate products.

<sup>b</sup> Natural gas including supplemental gaseous fuels.

<sup>c</sup> Electricity is converted at the rate of 3,412 Btu per kilowatt-hour.

<sup>d</sup> Hydroelectric power, geothermal, solar, and wind energy. Distributed photovoltaic and solar

thermal energy consumed in the commercial and industrial sectors that cannot be separately identified are included in residential consumption.

<sup>e</sup> Energy losses and co-products from the production of fuel ethanol without denaturant.

— = No consumption. NA = Not available.

Source: EIA, State Energy Data System.

Table TN7.2. Energy consumption adjustments for calculating expenditures, selected years, 1970 through 2014 (trillion Btu)

Year	Total (Gross) Consumption	Adjustments													Consumption used in Expenditure Calculations <sup>c</sup>
		Residential		Commercial		Industrial						Transportation	Electrical System Energy Losses	Total	
		Non-combustible Renewable Energy <sup>a</sup>	Wood	Non-combustible Renewable Energy <sup>a</sup>	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 <sup>a</sup>	Wood and Waste	Ethanol Production Losses <sup>b</sup>	Natural Gas Pipeline Fuel			
1970	67,742	—	298	—	6	2,714	—	1,442	34	789	—	740	11,497	17,521	50,221
1975	71,987	—	316	—	6	2,883	—	1,434	32	824	—	595	14,304	20,394	51,593
1976	76,002	—	357	—	7	2,906	—	1,679	33	944	—	559	15,154	21,640	54,363
1977	77,988	—	402	—	8	3,007	—	1,706	33	991	—	544	15,898	22,588	55,400
1978	80,022	—	462	—	9	2,937	—	1,694	32	1,083	—	541	16,680	23,438	56,584
1979	80,882	—	543	—	10	3,077	—	1,534	34	1,087	—	613	16,879	23,776	57,106
1980	78,093	—	627	—	16	3,052	—	1,058	33	1,283	—	650	17,178	23,897	54,347
1981	76,142	—	651	—	16	2,203	—	959	33	1,354	6	660	17,161	23,043	53,272
1982	73,059	—	724	—	16	2,088	—	1,144	33	1,310	16	614	16,835	22,780	50,423
1983	72,934	—	722	—	16	2,121	140	1,010	33	1,480	29	505	17,262	23,319	49,746
1984	76,571	—	733	—	16	2,254	135	1,113	33	1,510	35	545	17,790	24,165	52,515
1985	76,464	—	755	—	18	2,045	128	1,001	33	1,503	42	521	18,164	24,211	52,378
1986	76,639	—	688	—	20	2,285	103	954	33	1,478	48	501	18,135	24,247	52,506
1987	79,006	—	634	—	22	2,485	72	1,194	33	1,472	55	538	18,558	25,063	54,041
1988	82,760	—	676	—	24	2,696	85	1,134	33	1,531	55	633	19,478	26,346	56,514
1989	84,777	57	684	3	73	2,710	59	1,103	30	684	56	650	20,850	26,958	57,923
1990	84,507	61	337	4	59	2,802	51	1,269	33	716	49	682	21,255	27,319	57,306
1991	84,436	63	353	4	60	2,668	39	1,164	32	685	56	621	21,444	27,190	57,352
1992	85,788	66	371	4	66	2,954	27	1,208	33	689	64	608	21,309	27,399	58,502
1993	87,394	68	308	4	68	2,877	21	1,199	32	642	74	643	22,097	28,034	59,474
1994	89,115	69	292	5	66	2,991	19	1,153	65	662	82	706	22,400	28,511	60,709
1995	91,094	71	292	6	66	2,914	15	1,253	58	445	86	723	23,214	29,142	62,058
1996	94,091	72	303	7	77	3,203	14	1,280	64	495	61	734	23,916	30,226	63,970
1997	94,750	72	233	7	80	3,196	5	1,251	61	493	80	781	24,167	30,426	64,423
1998	95,031	72	207	8	71	3,042	—	1,212	58	493	86	657	25,102	31,008	64,119
1999	96,630	71	213	9	66	3,050	—	1,103	53	495	90	663	25,689	31,501	65,223
2000	98,810	69	229	9	67	2,950	—	1,181	47	459	99	661	26,405	32,175	66,720
2001	96,146	68	210	9	46	3,152	—	1,139	37	437	108	641	25,663	31,509	64,717
2002	97,651	68	213	9	43	3,027	—	1,135	44	312	130	683	26,210	31,874	65,842
2003	97,921	70	225	12	46	3,141	—	1,147	46	315	168	609	26,117	31,895	66,091
2004	100,103	71	230	13	46	3,123	—	1,123	36	536	201	582	26,607	32,568	67,593
2005	100,191	74	249	14	49	3,130	—	1,138	36	335	227	601	27,149	33,004	67,246
2006	99,456	82	221	15	46	3,210	—	1,171	33	277	280	602	26,907	32,844	66,674
2007	101,005	92	244	15	46	3,180	—	1,257	20	292	368	640	27,542	33,697	67,381
2008	<sup>R</sup> 98,879	107	273	15	47	2,983	—	1,250	22	282	518	667	27,245	33,408	65,554
2009	94,116	122	292	17	48	2,922	—	1,304	22	456	602	689	25,814	32,289	61,914
2010	97,446	151	255	19	45	3,127	—	1,316	20	283	726	692	26,826	33,460	64,076
2011	96,827	193	261	21	45	3,106	—	1,355	22	270	754	705	26,516	33,250	63,665
2012	94,411	226	244	22	34	3,188	—	1,433	27	262	709	751	25,545	32,441	62,058
2013	<sup>R</sup> 97,141	259	336	24	40	<sup>R</sup> 3,270	—	<sup>R</sup> 1,524	38	<sup>R</sup> 224	707	<sup>R</sup> 859	<sup>R</sup> 25,665	<sup>R</sup> 32,944	<sup>R</sup> 64,249
2014	98,385	291	336	25	40	3,157	—	1,546	17	222	755	864	25,803	33,056	65,386

<sup>a</sup> Hydroelectric power, geothermal, solar, and wind energy. Distributed photovoltaic and solar thermal energy consumed in the commercial and industrial sectors that cannot be separately identified are included in residential consumption.

<sup>b</sup> Energy losses and co-products from the production of fuel ethanol without denaturant.

<sup>c</sup> 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.cfm?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%		

Section 4 of the SEDS Consumption Technical Notes at <http://www.eia.gov/state/seds/seds-technical-notes-complete.cfm>.

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.cfm>.

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 12 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 LPG) or 0.1% (for coal and residual fuel oil) of the U.S. industrial sector total consumption are not included in the allocation.

Prior to 2013, 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 LPG 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), pentanes plus (1984 forward), 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.

**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.



**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	LPG	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	LPG	198	PAD District 5	PAD District 4

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

**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 in order to calculate expenditures.

**Electricity exports.** Electricity exported to Canada and Mexico are 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 fuel ethanol.** Fuel ethanol is produced from corn and other biomass inputs that are not included elsewhere as energy sources. The difference in heat content of the feedstock and the fuel ethanol 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), pentanes plus (1984 forward), petroleum coke, plant condensate (1970-1983), still gas (excluding still gas consumed as petrochemical feedstocks, 1970-1985), unfinished oil, 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](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](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.cfm>.

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.cfm>.

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).