Table 2. Standard deviations of the forecast errors

	H=0	H=1	H=2	H=3	H=4	H=5	H=6	H=7	H=8	H=9	H=10	H=11	H=12	H=13	H=14	H=15
Gross domestic product																
Real gross domestic product (average cumulative growth)[1] (table 3)	0.007	0.011	0.011	0.011	0.011	0.011	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.008
Petroleum																
Imported refiner acquisition cost of crude oil (constant $) (table 4a)	0.046	0.206	0.367	0.440	0.543	0.617	0.675	0.746	0.798	0.813	0.808	0.778	0.740	0.647	0.549	0.515
Imported refiner acquisition cost of crude oil (nominal $) (table 4b)	0.046	0.213	0.376	0.450	0.552	0.626	0.682	0.750	0.802	0.815	0.806	0.774	0.735	0.640	0.541	0.500
Total petroleum and other liquids consumption (table 5)	0.009	0.032	0.040	0.049	0.060	0.074	0.082	0.094	0.104	0.110	0.120	0.119	0.113	0.107	0.096	0.086
Crude oil production (table 6)	0.017	0.063	0.115	0.142	0.152	0.160	0.172	0.184	0.195	0.204	0.212	0.217	0.220	0.221	0.219	0.213
Petroleum net imports (table 7)	0.100	1.174	1.518	1.769	2.889	4.093	5.205	4.782	7.965	10.539	11.374	14.811	15.938	16.300	20.168	24.998
Natural Gas																
Natural gas price, electric power sector (constant $)[2] (table 8a)	0.054	0.215	0.344	0.401	0.471	0.530	0.578	0.589	0.613	0.634	0.660	0.670	0.664	0.609	0.544	0.493
Natural gas price, electric power sector (nominal $)[2] (table 8b)	0.054	0.218	0.349	0.408	0.475	0.532	0.577	0.582	0.605	0.623	0.644	0.651	0.641	0.582	0.518	0.472
Total natural gas consumption (table 9)	0.019	0.038	0.060	0.074	0.090	0.106	0.117	0.131	0.140	0.150	0.158	0.161	0.162	0.153	0.125	0.101
Dry natural gas production (table 10)	0.016	0.041	0.066	0.079	0.098	0.116	0.135	0.157	0.176	0.196	0.208	0.215	0.219	0.204	0.186	0.170
Natural gas net imports (table 11)[3]	0.111	0.692	0.360	0.560	0.506	1.734	2.385	4.823	5.124	4.565	8.267	11.572	10.321	15.292	14.876	13.692
Coal																
Coal prices to electric generating plants (constant $)[4] (table 12a)	0.027	0.066	0.111	0.156	0.201	0.241	0.280	0.314	0.335	0.343	0.343	0.329	0.308	0.296	0.270	0.233
Coal prices to electric generating plants (nominal $)[4] (table 12b)	0.028	0.070	0.119	0.169	0.216	0.256	0.295	0.328	0.349	0.358	0.360	0.346	0.324	0.310	0.283	0.248
Total coal consumption (table 13)	0.021	0.053	0.096	0.132	0.175	0.214	0.273	0.307	0.324	0.358	0.413	0.473	0.522	0.563	0.600	0.616
Coal production excluding waste coal (table 14)	0.023	0.046	0.091	0.114	0.148	0.179	0.236	0.280	0.295	0.299	0.324	0.365	0.403	0.428	0.457	0.485
Electricity																
Average electricity prices (constant $) (table 15a)	0.021	0.036	0.064	0.083	0.105	0.119	0.130	0.134	0.131	0.136	0.136	0.131	0.127	0.118	0.107	0.099
Average electricity prices (nominal $) (table 15b)	0.022	0.040	0.074	0.099	0.122	0.137	0.149	0.154	0.154	0.162	0.162	0.155	0.148	0.139	0.135	0.138
Total electricity sales excluding direct use (table 16)	0.008	0.016	0.023	0.031	0.036	0.046	0.053	0.062	0.070	0.078	0.086	0.096	0.105	0.112	0.118	0.123
Solar net generation (all sectors), Projected versus actual (table 17)[5,6]	0.142	0.123	0.116	0.149	0.161	0.118	0.138	0.084	0.083	0.068	0.060	0.059	0.054	0.047	0.002	NA
Wind net generation (all sectors), Projected versus actual (table 18)[5]	0.041	0.115	0.098	0.156	0.192	0.228	0.247	0.158	0.146	0.145	0.150	0.143	0.142	0.064	0.084	NA
(table 19)[5]	0.028	0.085	0.076	0.087	0.078	0.085	0.074	0.073	0.076	0.078	0.067	0.062	0.053	0.052	0.058	NA
Coal net generation (all sectors), Projected versus actual (table 20)[5]	0.018	0.061	0.108	0.132	0.174	0.182	0.265	0.252	0.206	0.153	0.248	0.300	0.292	0.347	0.385	NA
Natural gas net generation (all sectors), Projected versus actual (table 21)[5]	0.017	0.057	0.086	0.096	0.102	0.098	0.092	0.106	0.101	0.087	0.100	0.117	0.095	0.073	0.096	NA
Nuclear net generation (all sectors), Projected versus actual (table 22)[5]	0.011	0.024	0.028	0.036	0.037	0.032	0.031	0.032	0.041	0.052	0.053	0.045	0.039	0.012	0.002	NA
Total energy, carbon, and intensity																
Total energy consumption (all sectors) (table 23)	0.009	0.023	0.030	0.035	0.041	0.050	0.057	0.063	0.069	0.074	0.080	0.081	0.081	0.080	0.081	0.081
Delivered residential energy consumption (table 24)	0.024	0.045	0.046	0.051	0.058	0.066	0.073	0.075	0.079	0.086	0.090	0.094	0.093	0.086	0.091	0.096
Delivered commercial energy consumption (table 25)	0.019	0.032	0.040	0.051	0.059	0.068	0.079	0.085	0.092	0.101	0.104	0.110	0.112	0.114	0.126	0.132
Delivered industrial energy consumption (table 26)	0.018	0.033	0.044	0.050	0.055	0.061	0.066	0.079	0.090	0.098	0.106	0.106	0.108	0.101	0.080	0.069
Delivered transportation energy consumption (table 27)	0.017	0.037	0.039	0.043	0.058	0.060	0.071	0.080	0.093	0.100	0.111	0.115	0.115	0.116	0.118	0.117
Total energy-related carbon dioxide emissions (table 28)	0.019	0.032	0.041	0.049	0.059	0.072	0.084	0.094	0.102	0.110	0.122	0.130	0.135	0.144	0.155	0.160
Energy intensity (energy consumption / real $ gdp) (table 29)	0.036	0.041	0.047	0.055	0.062	0.067	0.071	0.077	0.082	0.086	0.093	0.096	0.099	0.105	0.104	0.107

Data source: projections are from Annual Energy Outlook Reference case projections from various editions

Note: NA = not available

Standard deviations are based on the percentage projection error, except for the price quantities, which are given as the log of the error. Methodology derived from Kaack et al. "Empirical Prediction Intervals Improve Energy Forecasting," Proceedings of the National Academies of Sciences 114, 33.

H represents the number of years since the first projection year.