Table 13. Natural Gas Supply, Disposition, and Prices
https://www.eia.gov/outlooks/aeo/data/browser/#/?id=13-AEO2023&cases=ref2023&sourcekey=0
Thu Jan 25 2024 20:44:14 GMT-0500 (Eastern Standard Time)
Source: U.S. Energy Information Administration

	full name	api key	units	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Production																		
Dry Gas Production	Natural Gas: Production: Dry Gas Production:	AEO2023 F	Tcf		34.463068	36.465631	35.567017	35.723479	36.131468	36.33415	36.43782	36.679668	37.635716	37.466496	37.873099	38.351033	39.045914	39.497791
STEO					36.354	37.79575	38.3396	38.8287										
Supplemental Natural Gas	Natural Gas: Production: Supplemental Natur	AEO2023 F	Tcf		0.066763	0.068295	0.067115	0.066134	0.065053	0.063973	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892
Net Imports	Natural Gas: Net Imports: Reference case	AEO2023 F	Tcf		-4.184149	-5.133025	-6.471913	-6.969156	-6.566649	-7.050457	-7.555391	-7.941295	-8.533591	-9.253414	-9.695042	-10.54845	-11.15696	-11.53403
Pipeline	Natural Gas: Net Imports: Pipeline: Reference	AEO2023 F	Tcf		-0.451161	-0.656333	-0.92537	-1.137381	-1.295535	-1.418258	-1.615046	-1.716693	-1.727938	-1.82732	-2.054696	-1.922849	-1.991361	-2.098429
Liquefied Natural Gas	Natural Gas: Net Imports: Liquefied Natural G	AEO2023 F	Tcf		-3.733324	-4.47849	-5.545546	-5.831753	-5.271153	-5.632185	-5.940345	-6.225601	-6.825608	-7.425601	-8.040345	-8.625603	-9.125601	-9.425603
STEO					-3.8398	-4.30375	-4.4895	-5.2405										
Total Supply	Natural Gas: Total Supply: Reference case	AEO2023 F	Tcf		32.347463	31.419122	30.162315	29.822479	29.631831	29.349665	28.943322	28.800265	28.545638	28.278365	28.340951	28.065473	27.991841	28.036252
Consumption by Sector	Natural Gas: Use by Sector: Total: Reference c	AEO2023 F	Tcf		32.0039	30.83448	29.646307	29.365435	29.27532	28.785442	28.621919	28.478453	28.250396	27.957972	27.826641	27.740442	27.673423	27.676506
Residential	Natural Gas: Use by Sector: Residential: Refer	AEO2023 F	Tcf		4.956125	4.991772	4.754877	4.787254	4.832247	4.827975	4.834563	4.83274	4.822402	4.807221	4.793354	4.783406	4.777336	4.761995
Commercial	Natural Gas: Use by Sector: Commercial: Refe	AEO2023 F	Tcf		3.463433	3.474623	3.371235	3.406176	3.444572	3.463466	3.492099	3.507773	3.518445	3.527853	3.534345	3.535379	3.535345	3.528708
Industrial	Natural Gas: Use by Sector: Industrial: Refere	AEO2023 F	Tcf		10.482346	10.226442	10.131637	10.278058	10.51756	10.654901	10.790615	10.844591	10.895127	10.918466	10.964546	11.021493	11.092604	11.149645
Other Industrial	Natural Gas: Use by Sector: Industrial: Other:	AEO2023 F	Tcf		8.49547	8.208763	8.124475	8.262086	8.473063	8.609991	8.714933	8.767846	8.801032	8.814925	8.852177	8.875966	8.926038	8.972638
Lease and Plant Fuel	Natural Gas: Use by Sector: Industrial: Lease a	AEO2023 F	Tcf		1.986676	2.018399	2.007162	2.015972	2.044499	2.044909	2.075682	2.080745	2.092096	2.10376	2.133209	2.149526	2.166563	2.177007
Natural Gas-to-Liquids Heat and Power	Natural Gas: Use by Sector: Industrial: GTL He	AEO2023 F	Tcf		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas to Liquids Production	Natural Gas: Use by Sector: Industrial: GTL Liq	AEO2023 F	Tcf		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation	Natural Gas: Use by Sector: Transportation: R	AEO2023 F	Tcf		1.294378	1.266994	1.335015	1.231742	1.23106	1.322495	1.316443	1.339322	1.28733	1.338367	1.394376	1.452291	1.498319	1.51834
Motor Vehicles	Trans	and Ships	Natural Gas AEO2023 F Tcf				0.104104	0.111344	0.120681	0.118723	0.1287	0.131696	0.136779	0.140579	0.143661	0.142376	0.141415	0.144205
Pipeline and Distribution Fuel	Natural Gas: Use by Sector: Transportation: Pi	AEO2023 F	Tcf		0.873416	0.793266	0.733831	0.700622	0.671032	0.630631	0.592021	0.590296	0.58854	0.590064	0.595732	0.605939	0.608261	0.610675
Fuel Used to Liquefy Gas for Export	Natural Gas: Use by Sector: Transportation: Li	AEO2023 F	Tcf		0.320659	0.364415	0.370303	0.394398	0.430318	0.480147	0.485641	0.508747	0.557347	0.609947	0.655741	0.703247	0.743647	0.767947
Electric Power	Natural Gas: Use by Sector: Electric Power: Re	AEO2023 F	Tcf		11.799421	10.874231	10.15912	9.678199	9.269682	8.619464	8.219996	8.050027	7.707353	7.365424	7.121334	6.946913	6.77484	6.706119
Discrepancy	Natural Gas: Discrepancy: Reference case	AEO2023 F	Tcf		0.345723	0.584641	0.516209	0.457045	0.406712	0.361244	0.321454	0.321832	0.314141	0.318394	0.31427	0.324993	0.320419	0.350745
Natural Gas Prices					-4.1%	-4.1%	-4.2%	-4.2%	-4.2%									
Natural Gas Spot Price at Henry Hub					2.7%	2.6%	2.5%	2.4%	2.3%									
(2022 dollars per million Btu)	Natural Gas: Henry Hub Spot Price: Reference	AEO2023 F	2022 $/MMBtu		6.523997	5.266376	4.072381	3.429534	3.063508	2.853001	2.799904	2.825097	2.91348	3.043754	3.208004	3.416918	3.56443	3.641824
Delivered Prices					321%	277%	327%	360%	389%	404%	402%	400%	389%	375%	360%	342%	333%	324%
(2022 dollars per thousand cubic feet)					8.3	9.3	9.2	9.1	8.9	8.7	8.4	8.5	8.4	8.4	8.3	8.3	8.3	8.3
Residential	Natural Gas: Delivered Prices: Residential: Ref	AEO2023 F	2022 $/Mcf		14.831185	14.631103	13.320674	12.568542	11.918526	11.516709	11.244637	11.297374	11.341616	11.448144	11.542928	11.695349	11.820528	11.952122
Commercial	Natural Gas: Delivered Prices: Commercial: Re	AEO2023 F	2022 $/Mcf		11.435294	10.728113	9.689114	9.191206	8.784163	8.544701	8.471746	8.510665	8.516977	8.619766	8.694034	8.833131	8.936379	9.027164
Industrial	Natural Gas: Delivered Prices: Industrial: Refe	AEO2023 F	2022 $/Mcf		7.616423	6.514565	5.361677	4.771115	4.321446	4.073116	3.966417	4.002231	4.062998	4.172435	4.287567	4.451712	4.582927	4.658439
Transportation	Natural Gas: Delivered Prices: Transportation:	AEO2023 F	2022 $/Mcf		18.231704	16.934065	15.447995	14.842036	14.140349	13.775438	13.514743	13.379133	13.303586	13.292325	13.270396	13.334075	13.310819	13.281355
Electric Power	Natural Gas: Delivered Prices: Electric Power:	AEO2023 F	2022 $/Mcf		7.234743	5.812991	4.63491	3.999119	3.50011	3.19096	3.066681	3.063754	3.193804	3.175838	3.259538	3.393353	3.506365	3.630531
Average	Natural Gas: Delivered Prices: Average: Refere	AEO2023 F	2022 $/Mcf		9.209995	8.273377	7.306081	6.526754	6.0649	5.81117	5.730124	5.772043	5.850703	5.979175	6.097002	6.262642	6.387128	6.512626
Natural Gas Spot Price at Henry Hub																		
(nominal dollars per million Btu)	Natural Gas: Henry Hub Spot Price: Reference	AEO2023 F	nom $/MMBtu		6.523997	5.48406	4.344237	3.803406	3.4135	3.264545	3.252955	3.354206	3.535344	3.779039	4.074234	4.442329	4.733782	5.018179
STEO					6.67	2.62	2.76	3.06										
Delivered Prices																		
(nominal dollars per thousand cubic feet)																		
Residential	Natural Gas: Delivered Prices: Residential: Ref	AEO2023 F	nom $/Mcf		14.831185	13.217185	14.209907	13.699132	13.289873	13.097237	13.064121	13.418353	13.764418	14.213603	14.659766	15.205102	15.736008	16.256527
Commercial	Natural Gas: Delivered Prices: Commercial: Re	AEO2023 F	nom $/Mcf		11.435294	11.171596	10.315918	10.017985	9.780688	9.74239	9.841353	10.104645	10.362112	10.702018	11.041609	11.4416	11.89413	12.29876
Industrial	Natural Gas: Delivered Prices: Industrial: Refe	AEO2023 F	nom $/Mcf		7.616423	6.763466	5.719601	5.200292	4.8106	4.832108	4.631628	4.751106	4.931633	5.180333	5.445302	5.787689	6.100914	6.401233
Transportation	Natural Gas: Delivered Prices: Transportation:	AEO2023 F	nom $/Mcf		18.231704	17.634115	16.500578	16.198921	15.740927	15.643972	15.701874	15.885794	16.147783	16.503017	16.853693	17.309625	17.719948	18.095016
Electric Power	Natural Gas: Delivered Prices: Electric Power:	AEO2023 F	nom $/Mcf		7.234743	6.051293	4.944318	4.358452	3.896295	3.632186	3.563232	3.637538	3.765064	3.94398	4.139464	4.433922	4.668094	4.946298
Average	Natural Gas: Delivered Prices: Average: Refere	AEO2023 F	nom $/Mcf		9.209996	8.615094	7.580453	7.313855	6.755452	6.632803	6.65731	6.851065	7.201353	7.423525	7.741331	8.342049	8.518215	8.872912

	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	Growth (2022-2050)		
Production																		
Dry Gas Production	39.857341	40.219318	40.491047	40.713443	40.870882	40.98383	41.16444	41.277199	41.354496	41.305783	41.340649	41.344994	41.611247	41.652993	42.063376	0.50%		
STEO																		
Supplemental Natural Gas	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	0.062892	-0.20%		
Net Imports	-11.81952	-12.03135	-12.06931	-12.34917	-12.05528	-12.02	-11.81622	-11.9752	-11.85641	-11.84736	-11.80029	-11.75337	-11.71303	-11.63977	-11.61346	3.70%		
Pipeline	-2.179178	-2.205747	-2.343531	-2.221547	-2.214935	-2.094932	-2.090625	-2.050593	-1.996069	-1.921756	-1.874565	-1.827761	-1.773708	-1.734366	-1.644256	7.00%		
Liquefied Natural Gas	-9.640546	-9.825603	-9.825603	-9.925602	-9.940345	-9.925603	-9.925603	-9.925603	-9.940345	-9.925603	-9.925605	-9.925603	-9.940345	-9.925603	-9.925603	5.40%		
STEO																		
Total Supply	28.150731	28.250662	28.464433	28.647346	28.871506	29.032726	29.211515	29.361895	29.482976	29.721317	29.603354	29.854511	29.965088	30.096073	30.534406	-0.20%		
Consumption by Sector	27.779486	27.812875	28.156765	28.337136	28.364293	28.715366	28.903845	29.067936	29.289127	29.33163	29.335364	29.439434	29.640429	29.790031	30.00379	-0.20%		
Residential	4.754154	4.747469	4.739067	4.733147	4.728333	4.723671	4.729968	4.718833	4.720219	4.719804	4.71269	4.708236	4.70734	4.707767	4.705333	-0.20%		
Commercial	3.527303	3.543382	3.534468	3.507703	3.499254	3.490335	3.443872	3.47908	3.478466	3.474299	3.463223	3.456156	3.454066	3.4524	3.44776	0.00%		
Industrial	11.237076	11.35991	11.372004	11.465034	11.521564	11.596119	11.674481	11.764809	11.847417	11.907819	11.919591	12.003126	12.115173	12.20997	12.331154	0.60%		
Other Industrial	9.032281	9.087664	9.140483	9.213684	9.271235	9.343618	9.409446	9.478456	9.534632	9.58394	9.591058	9.673329	9.757198	9.837563	9.950478	0.60%		
Lease and Plant Fuel	2.204799	2.222246	2.233526	2.251925	2.25034	2.2525	2.269136	2.286554	2.310805	2.318279	2.318533	2.329997	2.357975	2.372427	2.380637	0.70%		
Natural Gas-to-Liquids Heat and Power	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--		
Natural Gas to Liquids Production	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--		
Transportation	1.551047	1.571726	1.589475	1.596188	1.612993	1.626587	1.640996	1.654405	1.669755	1.681664	1.697375	1.718811	1.742685	1.759449	1.780975	1.10%		
Motor Vehicles	0.146432	0.150028	0.155319	0.160994	0.163994	0.171789	0.180587	0.189002	0.197866	0.204544	0.218929	0.230091	0.238662	0.252568	0.268154	0.284126	0.300812	1.90%
Pipeline and Distribution Fuel	0.613162	0.610384	0.615074	0.613952	0.622765	0.629148	0.634481	0.63741	0.641364	0.645326	0.650466	0.657796	0.66489	0.667396	0.671916	-0.90%		
Fuel Used to Liquefy Gas for Export	0.785341	0.800347	0.806447	0.836447	0.809641	0.808447	0.808447	0.808447	0.809641	0.808447	0.808447	0.858447	0.829641	0.808447	0.808447	3.40%		
Electric Power	6.704906	6.78539	6.941749	7.255307	7.202128	7.278443	7.351327	7.45083	7.473168	7.547843	7.522304	7.552923	7.623341	7.664525	7.764809	-1.50%		
Discrepancy	0.321245	0.317987	0.308044	0.330028	0.314213	0.31756	0.30769	0.295959	0.291849	0.307648	0.28797	0.415039	0.324659	0.306042	0.304618	--		
Natural Gas Prices																		
Natural Gas Spot Price at Henry Hub																		
(2022 dollars per million Btu)	3.694133	3.737396	3.844562	3.71878	3.918065	4.022155	4.034737	3.950616	3.913768	3.920706	3.907082	3.870706	3.849084	3.783895	3.771015	-1.90%		
Delivered Prices	324%	323%	316%	323%	333%	308%	320%	315%	317%	318%	327%	330%	331%	336%				
(2022 dollars per thousand cubic feet)	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.9	8.9	8.9	8.9				
Residential	11.985453	12.072364	12.23761	12.224497	12.320653	12.410968	12.447018	12.433371	12.389417	12.451389	12.771996	12.757806	12.721813	12.720624	12.764476	-0.50%		
Commercial	9.084223	9.135649	9.26419	9.26075	9.346378	9.434954	9.451043	9.450147	9.382954	9.433675	9.616347	9.596008	9.553413	9.551454	9.564332	-0.60%		
Industrial	4.718104	4.7644	4.895519	4.836315	4.960828	5.040644	5.034196	4.985189	4.929628	4.817132	4.885997	4.654062	4.818973	4.773721	4.771768	-1.70%		
Transportation	13.344872	13.03176	13.025172	12.834609	12.791951	12.729706	12.588046	12.407153	12.325406	12.330656	12.777816	12.609349	12.449089	12.321446	12.23544	-1.40%		
Electric Power	3.668931	3.715442	3.860356	3.810434	3.974774	4.050839	4.032197	3.977907	3.906819	3.890304	3.873679	3.840307	3.823203	3.764449	3.764537	-2.30%		
Average	6.519738	6.584328	6.695644	6.649044	6.744719	6.811135	6.795757	6.742635	6.683416	6.686644	6.760439	6.718736	6.676045	6.613656	6.626702	-1.20%		
Natural Gas Spot Price at Henry Hub																		
(nominal dollars per million Btu)	5.148495	5.326049	5.631648	5.659532	5.992483	6.257671	6.167213	6.449273	6.516383	6.663004	6.813443	6.930819	7.036972	7.083832	7.230118	0.40%		
STEO																		
Delivered Prices																		
(nominal dollars per thousand cubic feet)																		
Residential	16.705376	17.209039	17.794958	18.196033	18.748116	19.334583	19.803475	20.23432	20.628242	21.214325	22.27762	22.777987	23.261866	23.825199	24.479167	1.80%		
Commercial	12.633677	13.018239	13.493298	13.784311	14.211116	14.675907	15.066053	15.347076	15.622315	16.071956	16.608756	17.132866	17.442034	17.831212	18.375494	1.70%		
Industrial	6.576075	6.789239	7.127412	7.298794	7.544803	7.842237	8.009438	8.206436	8.207777	8.394775	8.526066	8.646553	8.82032	8.940605	9.344849	0.70%		
Transportation	18.341268	18.570173	18.97117	19.074985	19.465782	19.804446	20.026846	20.191328	20.353371	20.702452	22.204286	22.512932	22.799615	23.066996	23.456435	0.90%		
Electric Power	5.110954	5.295079	5.622611	5.701523	6.043342	6.302199	6.433398	6.473648	6.504844	6.642873	6.755427	6.826344	6.969435	7.051131	7.217737	0.00%		
Average	9.115061	9.382624	9.752209	9.897018	10.262282	10.600035	10.83165	10.97511	11.12615	11.392868	11.780045	11.995737	12.205248	12.422542	12.709126	1.20%		

Analysis of energy market and greenhouse gas emissions impacts of pending US liquefied natural gas export terminals

By Jesse D. Jenkins, PhD; This version: September 9, 2024.
See "Model" sheet for calculations, detailed assumptions, and referenced sourced.

Proposed LNG export terminals currently waiting for federal permits total 12.8 billion cubic feet/day (Bcf/d) of additional export capacity. If all terminals pending approval were ultimately built, they would be sufficient to consume about 11% of all US dry gas production as of 2023. These proposed terminals are in addition to 14.3 Bcf/d of operating capacity and 12.0 Bcf/d of capacity currently under construction and expected to be operating before 2028. Another 19.8 Bcf/d of proposed export capacity is *already* permitted and awaiting financing and offtake agreements before entering construction and would be unaffected by any changes in federal permitting process.

Assuming all proposed LNG terminals currently awaiting export permit approval are approved and built, and assuming all of this capacity is additional (rather than displacing already permitted terminals that have yet to enter construction), we can estimate the potential impact on US and global natural gas supply and demand and associated CO2 and methane emissions.

To do so, I apply a basic supply and demand elasticity model derived from previous work by Brian Prest (Resource for the Future). This simple model represents two separate gas markets—a US market and a rest of world market—connected via LNG trade. Additional US LNG exports are treated as an exogenous "demand shock" or increase in US demand, and a "supply shock" or increase in supply to the rest of world market. While simplified, this modeling approach helps illustrate the multiple feedbacks and adjustments to US and global energy markets that result from an increase in US LNG exports. Modeled effects reflect mid-term impacts circa 2035-2040, assuming approved terminals enter operation circa 2030.

While total LNG exports may increase by 11.1 Bcf/d in this scenario (accounting for typical utilization rates for export terminals), we should not expect US natural gas production to increase by this full amount. Instead, the large increase in demand for US gas represented by additional export terminals should be expected to increase US natural gas prices by about 9% to 15%

This increase in US gas prices will drive a corresponding decline in US gas consumption of roughly -3.5 to -4.3 Bcf/d. This decline in US consumption could reflect (a) a reduction in end-use consumption (e.g. for household or building heating or industry); (b) substitution of renewable electricity for natural gas-fired generation; and/or (c) substitution of coal-fired electricity for gas-fired generation. The first two responses will reduce US emissions, while the latter will contribute to higher emissions. I thus assume that in the best case (for emissions), all reduction in US gas consumption constitutes end-use demand reductions and/or renewables substitution, while in a worst case scenario, 50% of this reduction constitutes coal substitution.

US gas production will also increase in response to higher market prices by between 8.0 to 8.8 Bcf/d. Increased domestic gas production will also result in associated upstream and midstream CO2 emissions from pipeline compression and transport as well as associated methane leakage, adding to US GHG emissions. I account for these impacts using a range of possible methane leakage rate: spanning 4% (reflecting current estimated emissions from the Permian basin, one of the highest in the US) to 0.5% (reflecting future reductions in methane leakage prompted by EPA methane regulations & fees or similar to current estimates for the Marcellus basin, the producing region with the lowest current estimated leakage rates).

Accounting for all of these net effects in US energy markets — increased US gas production and associated upstream/midstream emissions; increased emissions from LNG liquefaction; reductions in domestic gas consumption and associated combustion emissions; and potential increases in coal consumption to substitute for reduced gas use — I estimate that US greenhouse gas emissions could experience anywhere from a reduction of about -50 MMT CO2e/y to an increase of abo 110 MMT CO2/y (using GWP100).

Additionally, we must account for changes in rest of world markets as a result of increased supply of LNG from the US. These changes mirror those in the US: increased supply of US gas (net of transport and regasification consumption) will reduce rest of world prices by a -4% to -6% Lower rest of world prices will in turn deter other world gas producers, reducing rest of world supply by about -5.8 to -6.5 Bcf/d, with associated reductions in methane leakage from these producers.

Lower prices also result in increased natural gas use overseas. I estimate that rest of world gas consumption increases b 3.5 to 4.1 Bcf/d. Just as with the reduction in domestic gas use, this increase in rest of world gas use could reflect (a) an increase in end-use energy consumption; (b) substitution for renewable energy supplies; and/or (c) substitution for coal consumption (e.g. in industry or power generation). To estimate a range of potential emissions impacts, I assume in a 'best case' (for emissions) scenario that 100% of increased gas use displaces coal consumption, while a higher emissions scenario assumes 100% of increased gas use constitutes an increase in end-use demand and/or substitutes for renewables.

Accounting for all of these net effects in rest of world (RoW) energy markets — decreased RoW gas production and associated upstream/midstream emissions; increased emissions from LNG liquefaction; increases in RoW gas consumption and associated combustion emissions; and potential decreases in coal consumption displaced by increased gas use — I estimate that rest of world greenhouse gas emissions could experience anywhere from a reduction of abou -70 MMT CO2e/y to an increase of about 60 MMT CO2/y (using GWP100).

Summing the full range of plausible effects across the US and rest of world, I estimate that the net change in annual global GHG emissions circa 2035-2040 ranging from a decline of roughly -120 MMT CO2e/y to an increase of abou 170 MMT CO2e/y (using GWP 100).

Note that using GWP 20 to convert methane emissions to CO2-equivalent (CO2e) does not have a significant effect on the net global emissions result, as using the higher GWP20 conversion rate for methane leakage increases the significance of both increased US methane leakage *and* decreased leakage from RoW gas producers. As these effects roughly offest one another, the range of global emissions impacts using GWP20 spans rc -170 to 240 MMT CO2e/y. The range of impacts on US emissions using GWP20 spans rou -40 to 250 MMT CO2/y (with the high end reflecting 4% leakage rates and the low end reflecting 0.5% leakage rates).

Finally, note that the scale of effects estimated here is likely larger than the real-world impact of approving all pending terminals, as this analysis assumes that all approved terminals are ultimately built *and* are purely additional to what would be built absent their approval. As there is nearly 20 Bcf/d of export capacity *already permitted* but not yet under construction, neither assumption is likely. Permit approval does not necessarily mean a project will enter operation (as evidenced by the large number of approved-but-not-yet-built projects), and where permit approval leads to construction, the newly-approved capacity may ultimately displace another already permitted project that would have otherwise eventually secured offtake and financing and entered operation instead. It is thus an extreme case to assume that 100% of pending capacity would ultimately constitute additional US LNG export capacity.