

GEORGETOWN CLIMATE CENTER

Supplement — Estimating the Greenhouse Gas Impact of Federal Infrastructure Investments in the IJA

Inputs and outputs

December 16, 2021

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The Transportation Investment Strategy Tool was used to evaluate two emission scenarios for the Infrastructure Investment and Jobs Act (IIJA). For each scenario, investments were made over the 2022–2026 period.

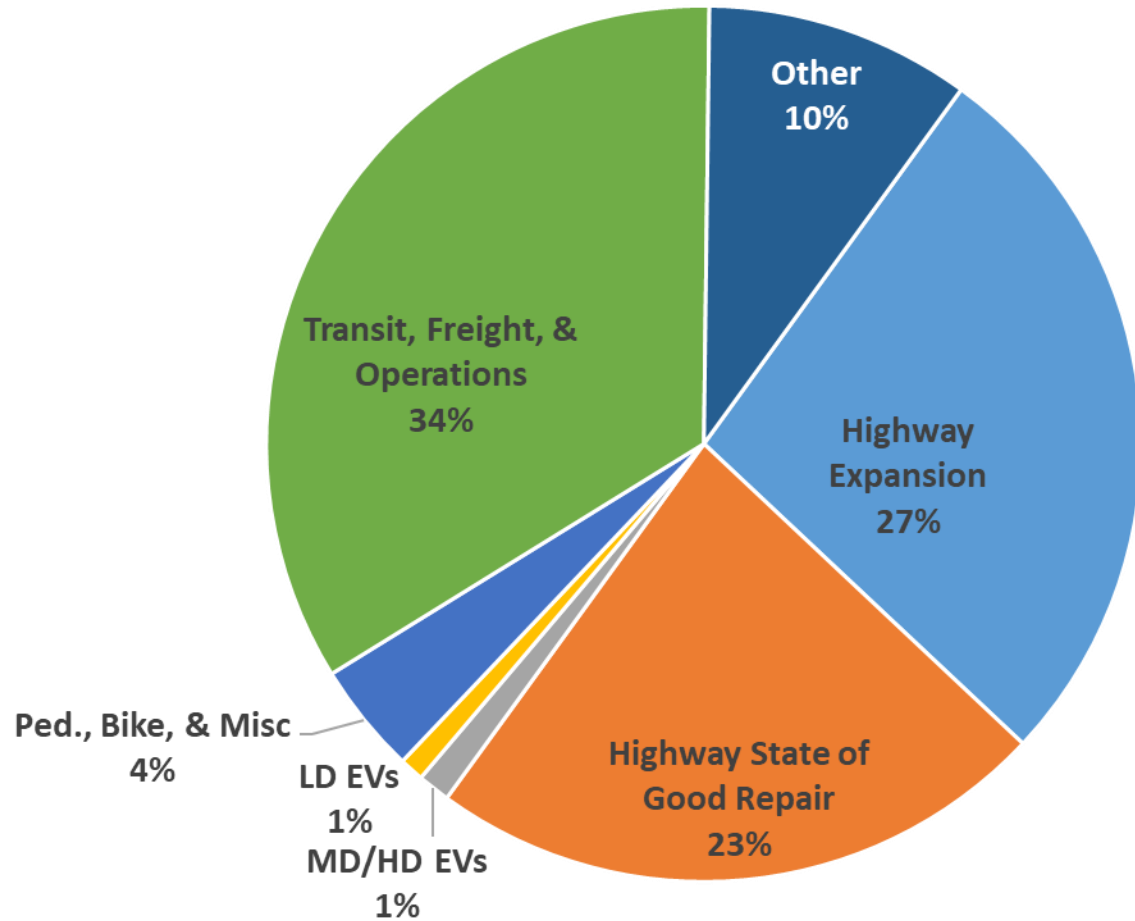
- Table: cumulative funding levels assigned to each transportation strategy under each scenario
 - The high-emission scenario assumes higher levels of investment in highway expansion and relatively less emphasis on highway maintenance and other low-carbon transportation strategies.
 - The low-emission scenario reflects more emphasis on low-carbon transportation strategies and maintenance of existing roads, with relatively little investment on new highway construction or highway expansion.
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Strategy Type	Cumulative amount spent over duration (\$millions)	
	IIJA High Emission, 5 years	IIJA Low Emission, 5 years
Light duty EV's	\$ 6,155	\$ 14,189
Electric transit buses	\$ 3,472	\$ 8,881
Electric school buses	\$ 4,125	\$ 5,250
Electric trucks - MDT/urban	\$ 205	\$ 4,497
Electric trucks - HDT/short-haul	\$ 205	\$ 4,497
Hydrogen trucks - long-haul	\$ 0	\$ 0
Passenger rail electrification	\$ 0	\$ 0
Shared ride incentives	\$ 50	\$ 100
Micromobility: shared e-scooters & e-bikes	\$ 2,719	\$ 119
Micromobility: e-bike ownership subsidies	\$ 2,719	\$ 129
Land use/smart growth	\$ 105	\$ 165
Bicycle investment	\$ 5,445	\$ 19,968
Pedestrian investment	\$ 12,459	\$ 14,209
Travel demand management	\$ 4,062	\$ 288
System operations	\$ 160	\$ 8,132
Freight/intermodal	\$ 5,923	\$ 16,940
Highway preservation	\$ 150,934	\$ 252,491
Highway expansion	\$ 181,491	\$ 25,388
Bus rapid transit	\$ 7,052	\$ 10,341
Urban rail	\$ 14,820	\$ 22,566
Commuter rail	\$ 53,545	\$ 28,772
Intercity rail	\$ 19,389	\$ 54,062
Bus service: expansion	\$ 8,448	\$ 5,346
Bus service: efficiency	\$ 3,246	\$ 6,111
Electric microtransit	\$ 55	\$ 114
Transit fare reduction	\$ 423	\$ 1,304
SGR: Bus	\$ 22,740	\$ 25,369
SGR: Urban rail	\$ 31,627	\$ 43,649
SGR: Commuter/intercity rail	\$ 57,408	\$ 30,745
Indirect (Other, non-GHG reducing)	\$ 64,062	\$ 59,424
SUM	\$ 663,045	\$ 663,045
SUM without Indirect	\$ 598,983	\$ 603,621

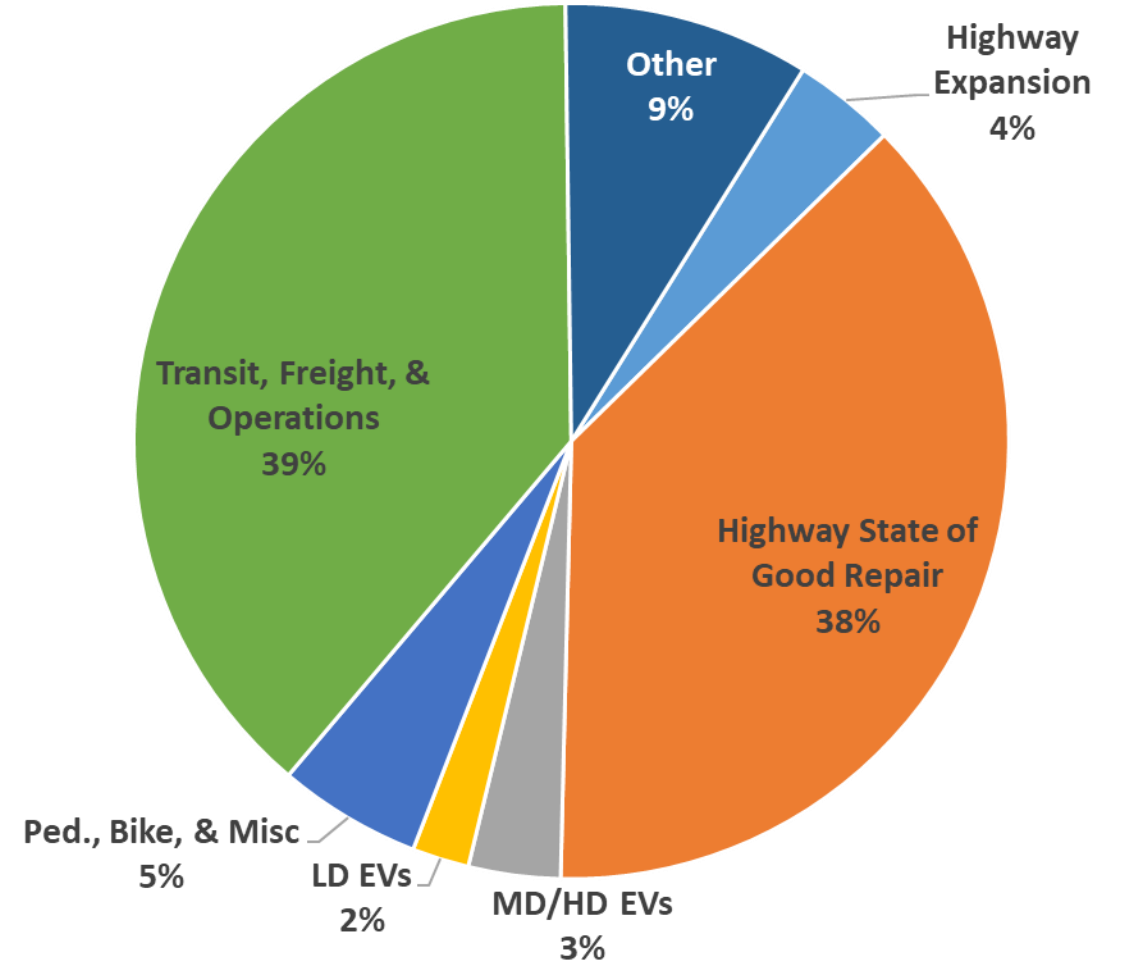
Cumulative funding levels assigned to each transportation strategy under each scenario

IIJA Analysis Inputs: Two investment scenarios for \$599 billion

IIJA High-Emission Scenario



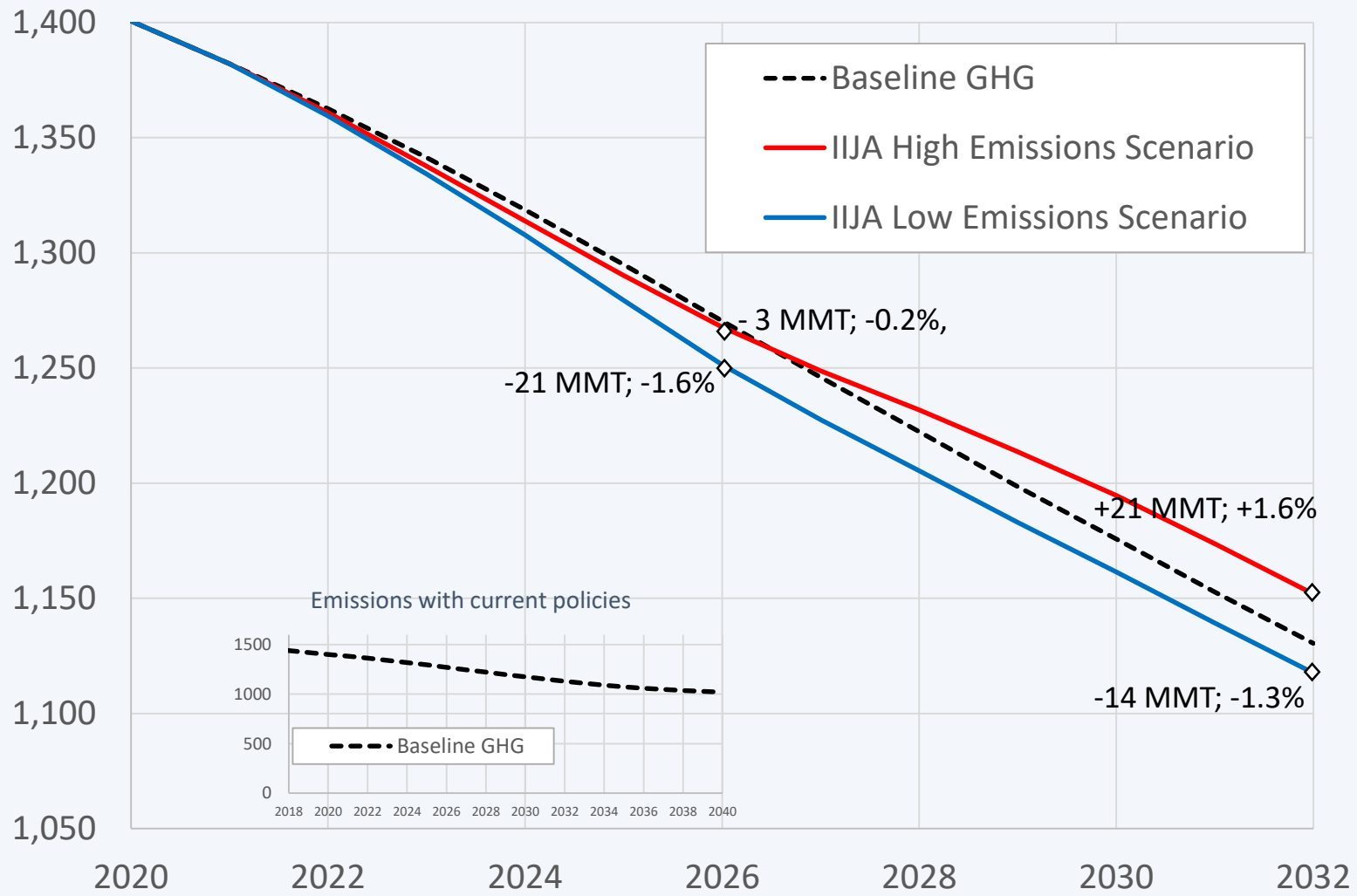
IIJA Low-Emission Scenario



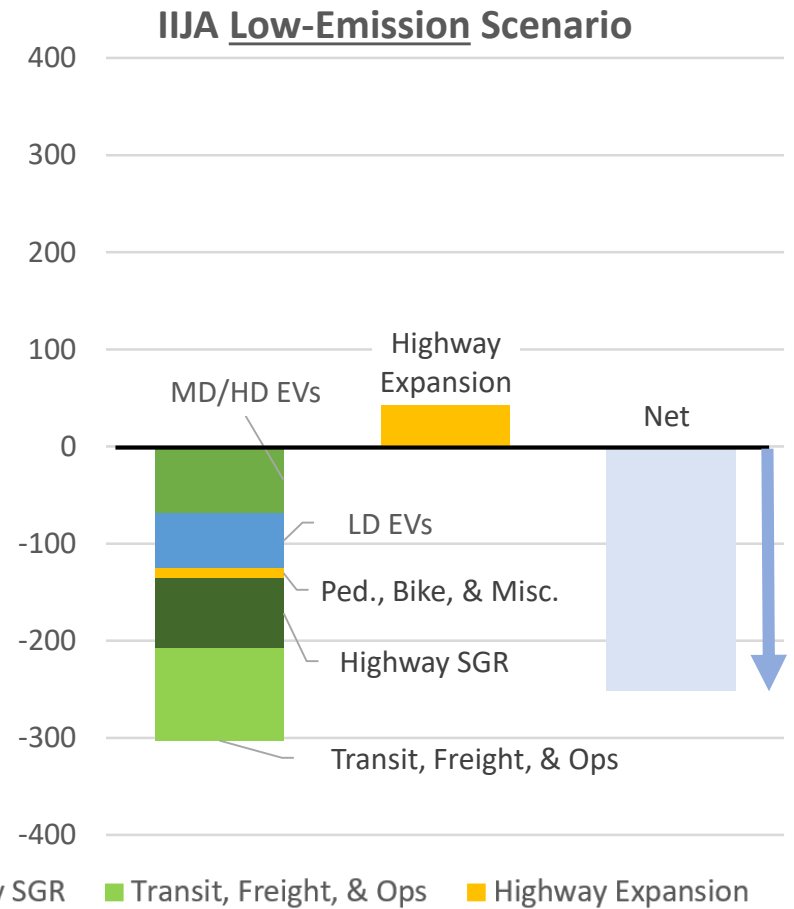
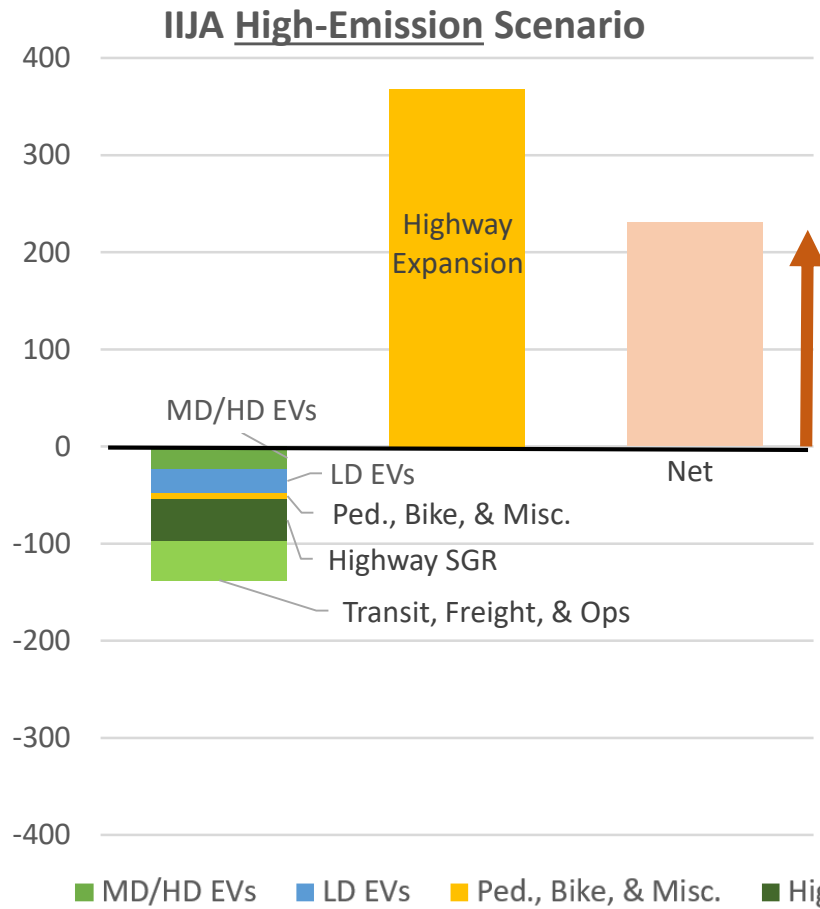
Strategy Type	Cumulative amount reduced, 2022-40 (million metric tonnes)	
	IJA High Emission, 5 years	IJA Low Emission, 5 years
Light duty EV's	-24.39	-56.22
Electric transit buses	-16.73	-42.81
Electric school buses	-5.70	-7.26
Electric trucks - MDT/urban	-0.50	-11.06
Electric trucks - HDT/short-haul	-0.36	-8.01
Hydrogen trucks - long-haul	0.00	0.00
Passenger rail electrification	0.00	0.00
Shared ride incentives	0.00	0.00
Micromobility: shared e-scooters & e-bikes	-0.15	-0.01
Micromobility: e-bike ownership subsidies	-1.32	-0.06
Land use/smart growth	-0.24	-0.38
Bicycle investment	-2.45	-7.97
Pedestrian investment	-1.42	-1.62
Travel demand management	-0.93	-0.07
System operations	-0.79	-39.90
Freight/intermodal	-6.98	-19.96
Highway preservation	-43.17	-72.24
Highway expansion	368.36	51.52
Bus rapid transit	0.34	0.49
Urban rail	-1.73	-2.64
Commuter rail	-1.98	-1.07
Intercity rail	-2.95	-8.21
Bus service: expansion	0.94	0.59
Bus service: efficiency	-0.98	-1.85
Electric microtransit	-0.01	-0.02
Transit fare reduction	-0.07	-0.21
SGR: Bus	-9.59	-10.69
SGR: Urban rail	-3.37	-4.66
SGR: Commuter/intercity rail	-13.13	-7.03
Emissions SUM	230.68	-251.35

Cumulative emissions reduced by each strategy under each scenario

Projected emissions by scenario (MMT CO₂)



Cumulative MMT of CO₂ Emissions, relative to Baseline GHG, 2022 to 2040



Low-emission scenario GHG outputs by year and strategy

GHG change, mmt CO2e																			
Strategy	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Light duty EV's	-1.088	-2.203	-3.310	-4.412	-5.468	-5.081	-4.689	-4.292	-3.903	-3.522	-3.161	-2.820	-2.505	-2.217	-1.952	-1.709	-1.489	-1.289	-1.110
Electric transit buses	0.000	-0.656	-1.366	-2.131	-2.950	-3.823	-3.729	-3.621	-3.498	-3.358	-3.212	-3.064	-2.916	-2.771	-2.250	-1.713	-1.160	-0.590	0.000
Electric school buses	0.000	-0.196	-0.299	-0.405	-0.515	-0.504	-0.494	-0.484	-0.474	-0.465	-0.456	-0.447	-0.440	-0.434	-0.429	-0.424	-0.347	-0.266	-0.181
Electric trucks - MDT/urban	-0.161	-0.321	-0.482	-0.643	-0.805	-0.781	-0.755	-0.732	-0.703	-0.682	-0.653	-0.627	-0.600	-0.576	-0.552	-0.530	-0.509	-0.484	-0.463
Electric trucks - HDT/short-haul	-0.105	-0.214	-0.326	-0.443	-0.564	-0.553	-0.539	-0.524	-0.510	-0.496	-0.482	-0.465	-0.449	-0.433	-0.416	-0.400	-0.382	-0.367	-0.346
Hydrogen trucks - long-haul	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Passenger rail electrification	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Shared ride incentives	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Micromobility: shared e-scooters & e-bikes	-0.001	-0.001	-0.001	-0.001	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Micromobility: e-bike ownership subsidies	-0.002	-0.005	-0.007	-0.009	-0.011	-0.010	-0.008	-0.006	-0.004	-0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Land use/smart growth	0.000	0.000	0.000	-0.007	-0.013	-0.019	-0.025	-0.030	-0.029	-0.029	-0.028	-0.027	-0.026	-0.026	-0.025	-0.024	-0.024	-0.024	-0.023
Bicycle investment	0.000	-0.064	-0.125	-0.182	-0.235	-0.284	-0.331	-0.374	-0.415	-0.453	-0.489	-0.522	-0.554	-0.584	-0.614	-0.643	-0.671	-0.700	-0.727
Pedestrian investment	0.000	-0.026	-0.050	-0.074	-0.096	-0.117	-0.114	-0.110	-0.107	-0.104	-0.101	-0.098	-0.095	-0.093	-0.090	-0.088	-0.087	-0.085	-0.083
Travel demand management	-0.015	-0.015	-0.015	-0.015	-0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
System operations	-0.452	-0.913	-1.386	-1.867	-2.358	-2.359	-2.360	-2.360	-2.361	-2.360	-2.357	-2.352	-2.349	-2.347	-2.345	-2.344	-2.344	-2.343	-2.342
Freight/intermodal	-0.274	-0.543	-0.806	-1.061	-1.307	-1.279	-1.252	-1.225	-1.198	-1.173	-1.150	-1.130	-1.112	-1.098	-1.086	-1.077	-1.069	-1.062	-1.055
Highway preservation	-1.045	-2.059	-3.038	-3.981	-4.886	-4.757	-4.633	-4.510	-4.393	-4.281	-4.174	-4.071	-3.979	-3.898	-3.826	-3.760	-3.703	-3.650	-3.600
Highway expansion	0.000	0.002	0.124	0.476	1.040	1.803	2.683	3.414	3.894	4.137	4.162	4.040	3.930	3.832	3.743	3.661	3.590	3.523	3.462
Bus rapid transit	0.000	0.000	0.022	0.029	0.036	0.035	0.034	0.033	0.032	0.030	0.030	0.029	0.028	0.027	0.027	0.026	0.025	0.025	0.024
Urban rail	0.000	0.000	0.000	-0.191	-0.227	-0.215	-0.204	-0.193	-0.183	-0.174	-0.165	-0.157	-0.150	-0.143	-0.137	-0.132	-0.127	-0.122	-0.118
Commuter rail	0.000	0.000	0.000	-0.083	-0.098	-0.091	-0.086	-0.080	-0.075	-0.071	-0.067	-0.063	-0.059	-0.056	-0.053	-0.050	-0.047	-0.045	-0.043
Intercity rail	0.000	0.000	0.000	-0.638	-0.752	-0.704	-0.660	-0.619	-0.581	-0.546	-0.514	-0.482	-0.454	-0.429	-0.405	-0.384	-0.365	-0.347	-0.332
Bus service: expansion	0.115	0.117	0.119	0.121	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bus service: efficiency	-0.175	-0.193	-0.211	-0.228	-0.245	-0.068	-0.066	-0.064	-0.062	-0.060	-0.058	-0.057	-0.055	-0.054	-0.053	-0.052	-0.051	-0.050	-0.049
Electric microtransit	-0.005	-0.004	-0.004	-0.004	-0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Transit fare reduction	-0.043	-0.043	-0.043	-0.042	-0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SGR: Bus	-0.127	-0.256	-0.388	-0.522	-0.658	-0.658	-0.658	-0.658	-0.658	-0.658	-0.658	-0.645	-0.632	-0.619	-0.606	-0.593	-0.580	-0.567	-0.554
SGR: Urban rail	-0.057	-0.113	-0.170	-0.227	-0.285	-0.285	-0.285	-0.285	-0.285	-0.285	-0.285	-0.281	-0.277	-0.273	-0.267	-0.260	-0.253	-0.246	-0.239
SGR: Commuter/intercity rail	-0.085	-0.171	-0.258	-0.346	-0.434	-0.434	-0.434	-0.434	-0.434	-0.434	-0.434	-0.422	-0.412	-0.402	-0.393	-0.385	-0.378	-0.371	-0.365
Total	(3.519)	(7.878)	(12.022)	(16.886)	(20.769)	(20.187)	(18.604)	(17.154)	(15.949)	(14.984)	(14.252)	(13.663)	(13.107)	(12.591)	(11.729)	(10.879)	(9.970)	(9.060)	(8.145)

High-emission scenario GHG outputs by year and strategy

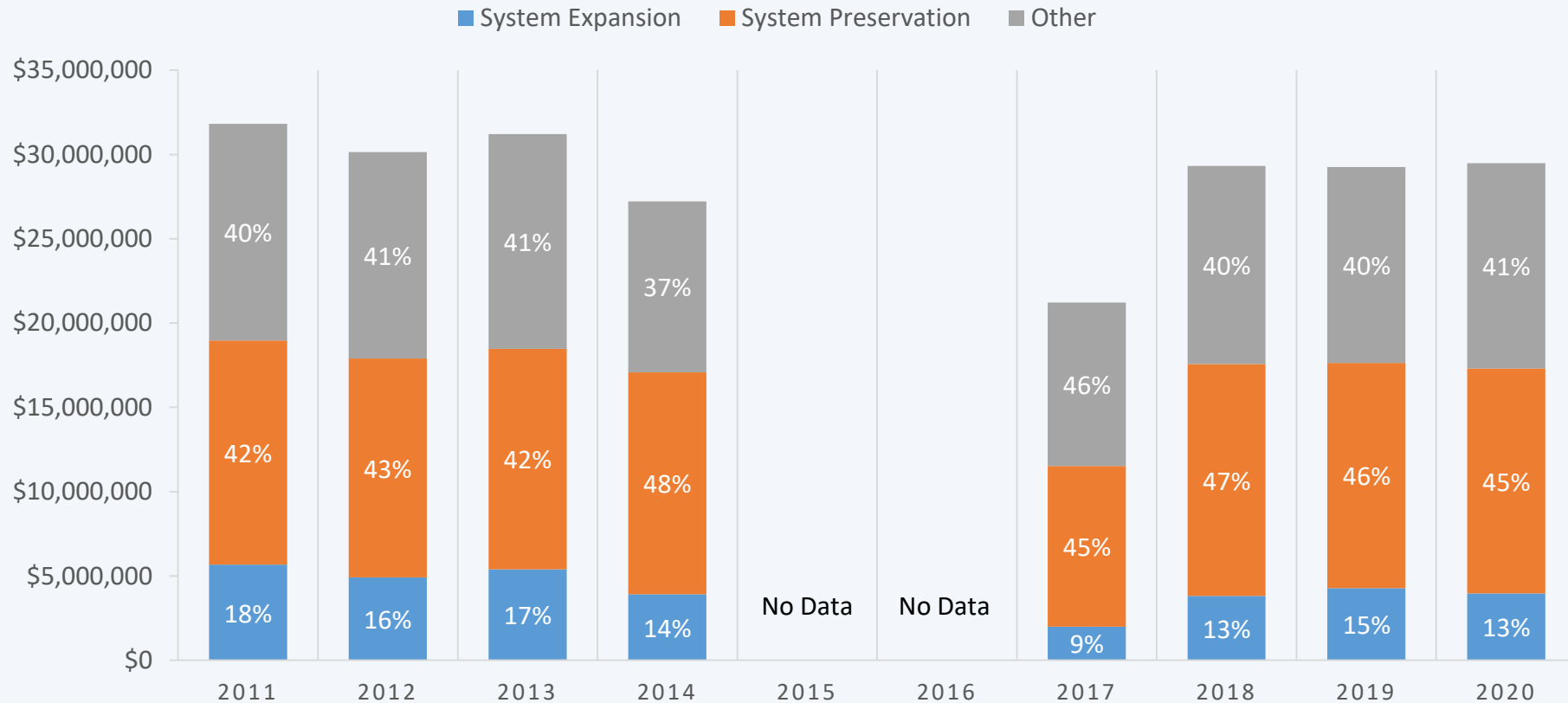
GHG change, mmt CO2e																			
Strategy	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Light duty EV's	-0.470	-0.953	-1.434	-1.913	-2.372	-2.205	-2.035	-1.862	-1.694	-1.528	-1.372	-1.224	-1.087	-0.962	-0.847	-0.742	-0.646	-0.560	-0.482
Electric transit buses	0.000	-0.259	-0.538	-0.837	-1.155	-1.493	-1.457	-1.414	-1.366	-1.311	-1.254	-1.197	-1.139	-1.082	-0.877	-0.666	-0.450	-0.229	0.000
Electric school buses	0.000	-0.155	-0.236	-0.319	-0.404	-0.396	-0.388	-0.380	-0.372	-0.365	-0.358	-0.351	-0.346	-0.341	-0.337	-0.333	-0.272	-0.208	-0.142
Electric trucks - MDT/urban	-0.006	-0.012	-0.020	-0.028	-0.037	-0.036	-0.035	-0.034	-0.032	-0.031	-0.030	-0.029	-0.028	-0.027	-0.025	-0.024	-0.023	-0.022	-0.021
Electric trucks - HDT/short-haul	-0.004	-0.008	-0.013	-0.019	-0.026	-0.025	-0.025	-0.024	-0.024	-0.023	-0.022	-0.021	-0.021	-0.020	-0.019	-0.018	-0.018	-0.017	-0.016
Hydrogen trucks - long-haul	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Passenger rail electrification	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Shared ride incentives	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Micromobility: shared e-scooters & e-bikes	-0.031	-0.031	-0.031	-0.030	-0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Micromobility: e-bike ownership subsidies	-0.049	-0.095	-0.140	-0.183	-0.224	-0.217	-0.170	-0.125	-0.082	-0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Land use/smart growth	0.000	0.000	0.000	-0.004	-0.008	-0.012	-0.016	-0.019	-0.019	-0.018	-0.018	-0.017	-0.017	-0.016	-0.016	-0.016	-0.015	-0.015	-0.015
Bicycle investment	0.000	-0.020	-0.038	-0.056	-0.072	-0.088	-0.102	-0.115	-0.128	-0.139	-0.151	-0.161	-0.170	-0.180	-0.189	-0.198	-0.207	-0.215	-0.224
Pedestrian investment	0.000	-0.023	-0.044	-0.065	-0.085	-0.103	-0.100	-0.097	-0.094	-0.091	-0.089	-0.086	-0.084	-0.081	-0.079	-0.078	-0.076	-0.075	-0.073
Travel demand management	-0.189	-0.188	-0.186	-0.184	-0.182	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
System operations	-0.009	-0.019	-0.028	-0.037	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046
Freight/intermodal	-0.096	-0.191	-0.283	-0.372	-0.457	-0.447	-0.438	-0.428	-0.419	-0.410	-0.402	-0.395	-0.389	-0.384	-0.380	-0.376	-0.374	-0.371	-0.369
Highway preservation	-0.622	-1.227	-1.813	-2.377	-2.921	-2.844	-2.769	-2.696	-2.626	-2.559	-2.495	-2.434	-2.379	-2.330	-2.287	-2.248	-2.214	-2.182	-2.152
Highway expansion	0.000	0.017	0.887	3.410	7.452	12.907	19.202	24.421	27.842	29.580	29.749	28.880	28.095	27.396	26.758	26.170	25.662	25.182	24.747
Bus rapid transit	0.000	0.000	0.016	0.020	0.025	0.024	0.023	0.022	0.022	0.021	0.020	0.020	0.019	0.019	0.018	0.018	0.017	0.017	0.017
Urban rail	0.000	0.000	0.000	-0.126	-0.149	-0.141	-0.134	-0.127	-0.120	-0.114	-0.109	-0.103	-0.098	-0.094	-0.090	-0.087	-0.083	-0.080	-0.078
Commuter rail	0.000	0.000	0.000	-0.154	-0.181	-0.170	-0.159	-0.149	-0.140	-0.132	-0.124	-0.116	-0.110	-0.103	-0.098	-0.093	-0.088	-0.084	-0.080
Intercity rail	0.000	0.000	0.000	-0.231	-0.270	-0.253	-0.237	-0.222	-0.208	-0.196	-0.184	-0.173	-0.163	-0.154	-0.145	-0.138	-0.131	-0.125	-0.119
Bus service: expansion	0.181	0.184	0.188	0.191	0.194	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bus service: efficiency	-0.094	-0.103	-0.112	-0.121	-0.129	-0.036	-0.035	-0.034	-0.033	-0.032	-0.031	-0.030	-0.029	-0.029	-0.028	-0.027	-0.027	-0.026	-0.026
Electric microtransit	-0.002	-0.002	-0.002	-0.002	-0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Transit fare reduction	-0.014	-0.014	-0.014	-0.014	-0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SGR: Bus	-0.114	-0.229	-0.347	-0.467	-0.590	-0.590	-0.590	-0.590	-0.590	-0.590	-0.590	-0.578	-0.567	-0.555	-0.543	-0.531	-0.520	-0.508	-0.496
SGR: Urban rail	-0.040	-0.080	-0.121	-0.163	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.206	-0.203	-0.201	-0.198	-0.193	-0.189	-0.184	-0.179	-0.174
SGR: Commuter/intercity rail	-0.161	-0.323	-0.485	-0.647	-0.810	-0.810	-0.810	-0.810	-0.810	-0.810	-0.810	-0.789	-0.769	-0.751	-0.734	-0.719	-0.705	-0.693	-0.681
Total	(1.720)	(3.731)	(4.795)	(4.729)	(2.701)	2.812	9.473	15.064	18.854	20.957	21.479	20.945	20.473	20.062	19.841	19.659	19.601	19.565	19.570

Strategy Type (30 types)	Bin Category (7 categories)
LD EVs	LD EVs
Electric transit buses	MD/HD EVs
Electric school buses	MD/HD EVs
Electric trucks - MDT/urban	MD/HD EVs
Electric trucks - HDT/short-haul	MD/HD EVs
Hydrogen trucks - long-haul	MD/HD EVs
Passenger rail electrification	MD/HD EVs
Shared ride incentives	Ped., Bike, & Misc.
Micromobility: shared e-scooters & e-bikes	Ped., Bike, & Misc.
Micromobility: e-bike ownership subsidies	Ped., Bike, & Misc.
Land use/smart growth	Ped., Bike, & Misc.
Bicycle investment	Ped., Bike, & Misc.
Pedestrian investment	Ped., Bike, & Misc.
Travel demand management	Ped., Bike, & Misc.
System operations	Transit, Freight, & Ops
Freight/intermodal	Transit, Freight, & Ops
Highway SGR	Highway SGR
Highway Expansion	Highway Expansion
Bus rapid transit	Transit, Freight, & Ops
Urban rail	Transit, Freight, & Ops
Commuter rail	Transit, Freight, & Ops
Intercity rail	Transit, Freight, & Ops
Bus service: expansion	Transit, Freight, & Ops
Bus service: efficiency	Transit, Freight, & Ops
Electric microtransit	Transit, Freight, & Ops
Transit fare reduction	Transit, Freight, & Ops
SGR: Bus	Transit, Freight, & Ops
SGR: Urban rail	Transit, Freight, & Ops
SGR: Commuter/intercity rail	Transit, Freight, & Ops
Other	Other

Categorization of strategies within the Tool

Historical spending levels for federal highway dollars

FEDERAL-AID FUNDS OBLIGATED (THOUSANDS OF \$)



Source: Table FA-10, FHWA Highway Statistics, 2011–2020