

Costs and Benefits of Clean Transportation in Massachusetts

The Union of Concerned Scientists commissioned independent research to evaluate three proven technology pathways by which the Northeast and Mid-Atlantic states could accelerate the deployment of clean vehicles and fuels at a scale sufficient to come very close to meeting regional climate targets: emissions reductions of 40 percent below 1990 levels by 2030, and 80 percent by 2050 (Lowell, Saha, and Van Atten 2018).

The analysis estimates the investments needed to take these technologies to scale, as well as the resulting financial, environmental, and health benefits. For Massachusetts, the cumulative investments and returns result in a net benefit of almost \$40 billion by 2050.

Table 1 shows the components of these investments and returns on an annual basis for 2020, 2030, 2040 and 2050, and

on a cumulative basis for 2030 and 2050. The components of the investments and returns in 2050 (the far right column in Table 1) are also shown in chart form on the reverse. As a result of these investments, the state will accrue benefits from reduced oil use and avoided environmental and health costs. There will also be cost savings for consumers and businesses. The emissions reductions and oil savings are summarized in Table 2 (on the reverse). Full results, methodology, and assumptions are available online at www.ucsusa.org/CleanTransportationBenefits.

REFERENCE

Lowell, D., A. Saha, and C. Van Atten. 2018. *Decarbonizing transportation: The benefits and costs of a clean transportation system in the Northeast and Mid-Atlantic Region*. M.J. Bradley & Associates, LLC. Online at www.ucsusa.org/sites/default/files/attach/2018/10/UCS_Final_Report_FINAL_11Oct18.pdf.

TABLE 1. Increasing Investments in Clean Vehicle and Fuel Technologies Lead to Greater Benefits (2015\$ billions)

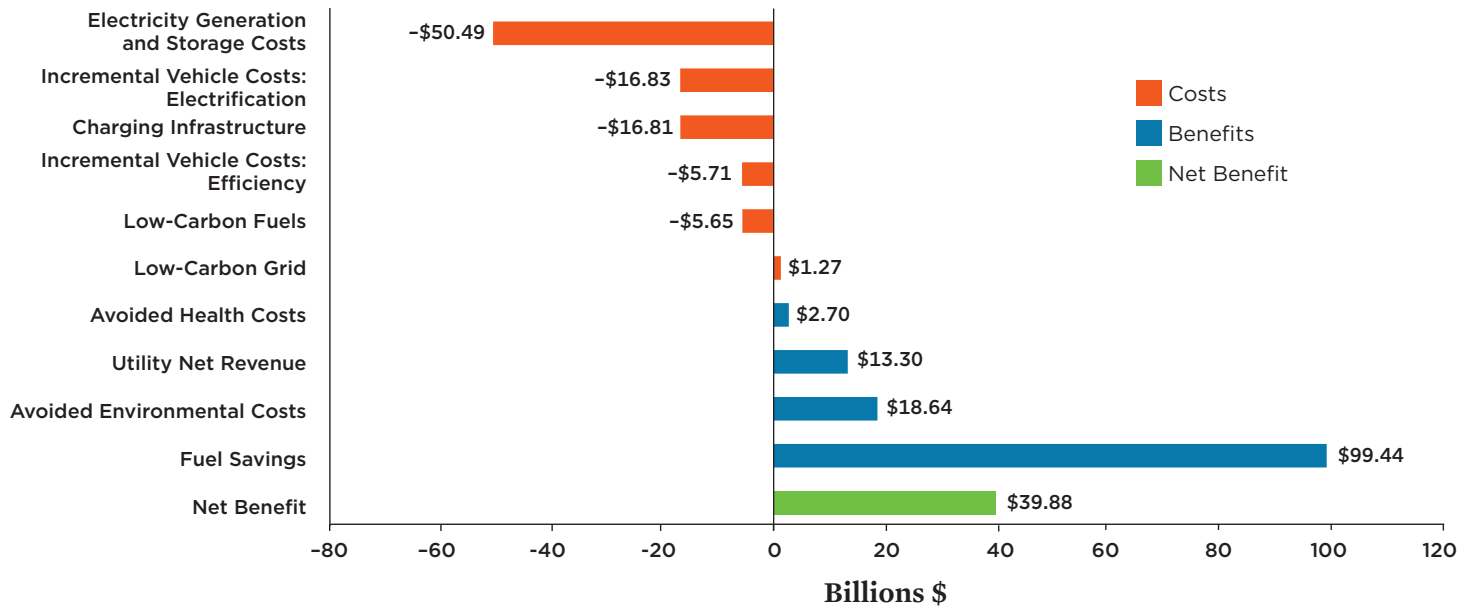
			Annual in				Cumulative by	
			2020	2030	2040	2050	2030	2050
Costs	Incremental Vehicle Costs: Efficiency	LDV	\$0.00	-\$0.07	-\$0.25	-\$0.27	-\$0.16	-\$4.75
		M/HDV	\$0.00	\$0.00	-\$0.04	-\$0.10	-\$0.01	-\$0.96
	Incremental Vehicle Costs: Electrification	LDV	-\$0.17	-\$0.43	-\$0.24	-\$0.02	-\$3.78	-\$8.45
		M/HDV	-\$0.05	-\$0.18	-\$0.35	-\$0.49	-\$1.36	-\$8.35
	Charging Infrastructure	LDV Home Chargers	-\$0.02	-\$0.10	-\$0.30	-\$0.45	-\$0.59	-\$6.55
		LDV Public Chargers	-\$0.04	-\$0.14	-\$0.24	-\$0.34	-\$1.07	-\$6.49
		M/HDV	-\$0.02	-\$0.07	-\$0.16	-\$0.26	-\$0.51	-\$3.79
	Electricity Generation and Storage Costs	LDV	-\$0.23	-\$0.84	-\$1.92	-\$2.76	-\$5.94	-\$43.94
		M/HDV	-\$0.02	-\$0.12	-\$0.28	-\$0.44	-\$0.80	-\$6.55
	Low-Carbon Fuels		\$0.00	\$0.00	\$0.00	\$0.00	-\$2.01	-\$5.65
Low-Carbon Grid		\$0.00	\$0.01	\$0.06	\$0.13	\$0.03	\$1.27	
Benefits	Fuel Savings		\$0.45	\$1.89	\$4.47	\$6.05	\$12.40	\$99.44
	Utility Net Revenue from EV Charging		\$0.08	\$0.31	\$0.58	\$0.70	\$2.12	\$13.30
	Avoided Environmental Costs		\$0.09	\$0.36	\$0.82	\$1.18	\$2.39	\$18.64
	Avoided Health Costs		\$0.01	\$0.05	\$0.12	\$0.19	\$0.28	\$2.70
Net Benefit		\$0.07	\$0.66	\$2.26	\$3.11	\$1.00	\$39.88	

As Massachusetts' total investments (costs) in three technologies increase over time—strengthening fuel efficiency, aggressive electrification of vehicles, and lower-carbon fuels—returns (benefits) also increase every year, in the form of fuel savings, utility revenue, and avoided environmental and health costs. By 2050 the cumulative net benefit reaches almost \$40 billion.

Notes: LDV = light-duty vehicles; M/HDV = medium- and heavy-duty vehicles. To obtain the state-disaggregated values, a multiplier based on the percentage of the state's vehicle miles traveled (VMT) in 2015 relative to the regional VMT was applied to the regional values (Massachusetts accounts for 10.2% and 7.0% of light-duty vehicles and medium-/heavy-duty vehicles, respectively, in the region).

SOURCE: LOWELL, SAHA, AND VAN ATTEN 2018, UCS ANALYSIS.

Cumulative Investments, Returns, and Net Benefit from Clean Vehicle and Fuel Technologies in 2050



A total investment of approximately \$94 billion from 2018 through 2050 generates \$134 billion for Massachusetts by 2050, benefiting consumers and the economy. Electricity generation and storage makes up the largest share of the investment by 2050, but fuel savings alone amounts to twice as much.

Note: This chart depicts the values shown in the far right column of Table 1.

SOURCE: LOWELL, SAHA, AND VAN ATTEN 2018, UCS ANALYSIS.

TABLE 2. Emissions Reductions and Fuel Savings

		Annual in				Cumulative by	
		2020	2030	2040	2050	2030	2050
Climate Emissions	CO ₂ Reduction (million MT)	1.95	6.25	11.90	15.00	45.0	276.8
Local Air Pollution	NO _x Reduction (1000 MT)	0.23	0.97	2.56	4.34	6.5	59.8
	PM _{2.5} Reduction (1000 MT)	0.01	0.03	0.09	0.13	0.2	1.9
Fuel Savings	Gasoline Savings (million gallons)	156.8	522.2	1,106.0	1,403.1	3,660	25,016
	Diesel Savings (million gallons)	5.3	55.9	167.0	268.6	315	3,728

Massachusetts' reduced use of fossil-based liquid fuels—almost 29 billion gallons by 2050—results in almost 277 million tons of avoided carbon dioxide. Local air quality will also be vastly improved.

Notes: MT = metric ton. Reductions are relative to the baseline scenario.

SOURCE: LOWELL, SAHA, AND VAN ATTEN 2018, UCS ANALYSIS.