

Cost Benefit Analysis Brine vs. Rock Salt

Prepared by Dutchess County Environmental Management Council

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Summary:

In March and April 2022, we investigated the issue of replacing rock salt with brine for winter snow and ice control. Studies conducted by [Clear Roads](#) and others indicate that total road salt use can be reduced by 30-50% when brine is used. We asked highway superintendents in the mid-Hudson Valley if they used brine in addition to, or instead of rock salt. One town (Rhinebeck) responded positively. In addition to Rhinebeck, the Town of Hague in Lake George has used brine and other salt savings methods with great success. The following analysis is based on information provided in correspondence with officials in those towns, a local brine equipment distributor and the road salt literature.

Most road service agencies that use brine, use it to pretreat roads before a storm although some also use it during storms. Spreading brine requires different equipment than rock salt and that equipment will necessarily incur a cost that can be difficult to budget. Using a conservative estimate of 30% salt reduction together with the cost of brine equipment, we estimate that the cost of new equipment would be recovered in less than one year in salt savings. The funds to purchase equipment can come from a road salt budget (e.g., Rhinebeck NY). Alternatively, in Dutchess County, equipment may be purchased with the assistance of the Municipal Investment Grants (MIG) program.

We recommend that a municipality start small (c.f. Clear Roads) and speak with highway personnel in towns that have successfully used brine (Rhinebeck, Hague). Because brine adheres to pavement where it is spread with no bounce and scatter to the side of the road as happens with rock salt, the reduction it allows will significantly reduce contamination of groundwater, streams, lakes, ponds and other freshwater. The protection of our environment, including our drinking water, together with the savings in salt budgets is a win-win situation. We strongly encourage the use of brine for winter snow and ice control.

The following table provides a cost benefit analysis of using brine in three situations. For this analysis, we estimate the need for one brine truck per 100 lane miles of road served. We used a cost of \$70 per ton of rock salt, a 30% reduction in overall salt use and the cost for new equipment of \$12,000 to convert a truck and \$37,000 to purchase new equipment for a truck. See footnotes for details about each estimate.

Lane Miles Served ^a	Salt Used Per Lane Mile (Tons) ^a	Current Salt Use (Tons) ^a	Salt Use if Brine (Tons) ^b	Current Cost of Salt (\$) ^c	Cost if Use Brine (\$) ^b	Annual Cost Savings (\$)	Estimate Brine Equipment Cost (\$) ^d	Years to pay for equipment
100	20	2000	1400	\$140,000	\$98,000	\$42,000	\$12,000	0.3
100	20	2000	1400	\$140,000	\$98,000	\$42,000	\$37,000	0.9
400	20	8000	5600	\$560,000	\$392,000	\$168,000	\$148,000	0.9

Footnotes:

^aCurrent Salt Use (Tons)

2 municipalities report use of approximately 20 tons per lane mile (Dutchess County 2021-22 & Hague 2015-16 before implementing salt savings practices).

Several municipalities report approximately 100 lane miles per town (Hague, Ancram)

NY DOT salt use at Wassaic & Clinton substations was an average of 17.9 tons/lane mile from 1996-2012, and 19.3 tons/lane mile from 1996-2004.

^bSalt Use if Brine (tons)

Haake & Knouft 2019 (DOI: 10.1021/acs.est.9b02864) found 45% reduction in Cl loading to streams when brine was used; they cite one city that expected a 20-40% reduction in salt use

Fay & Clouser 2020 (Western Transportation Institute, Project 1003322/CR18-05, May 2020 www.clearroads.org) report that municipalities reduced salt use by up to 50%, and reported a case study in Wisconsin that used 52% less salt when brine was used (p. 20)

Personal communication from Rhinebeck town highway superintendent 30% reduction when brine used to pretreat all roads in town

For this analysis, we used a conservative estimate of 30% reduction in salt use.

^cCurrent Cost of Salt (\$)

email from Gary Cooper, Dutchess County dated April 7, 2022

Salt Price: \$62.42 per ton

Salt used by Dutchess County in winter of 2021 -2022: 8000 tons

Lane Miles Served: 393 center lane miles

The County does not use brine.

email from Tim Fiallo, Hague NY Highway Dept.

Price of Salt \$66.95-\$72 per ton

In 2015-2016 they budgeted for 2200 tons

Lately they use 500-700 tons, with 200-300 tons in storage

They serve 110 lane miles of roads (= 6.36 tons/lane mile if 700 tons used)

They've achieved 50% reduction in salt usage by using combinations of brine and straight road salt applications.

For this analysis we used an estimated cost for road salt of \$70/ton

^dEstimate Brine Equipment Cost (\$)

Personal Communication with Lucas at Hudson River Truck and Trailer in Poughkeepsie dated April 2022. To convert a truck with a 200 gal tank and a sprayer will cost about \$12,000. The dealer is Snowex. To buy a brine system, which includes the tank, mixers, pumps, etc. will cost about \$37,000. The dealer is Snowex. A small live-edge type plow blade from Fischer is about \$9,000 to 10,000, and a large one with hydraulics from Wausua is \$20,000

Personal Communcation with Bob Wyant, Town of Rhinebeck Highway Superintendent dated April 2022. The cost to build a brine system was approximately \$12,000.